# ACADEMIC YEAR
# 2022 – 2023




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## ACADEMIC YEAR – 2022-2023


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**SCHOOL OF ENGINEERING AND TECHNOLOGY**
**DEPARTMENT OF MECHANICAL ENGINEERING**

Minutes of the meeting of the Board of Studies (BoS)*

Date: 09.05.2022
Venue: seminar hall
Time: 10.00am

Members present:

Chair: **Dr S DHANUSHKODI**
**PRIST**

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. C.SATHIYA NARAYANAN | Associate Professor& HEAD,Production Engg NIT ,TRICHY | Online | |
| 2 | Er.S.MARIMUTHU | Deputy Manger, Stock verification Wing, BHEL Trichy | Online | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1. | Dr.T.V.CHRISTY Professor | Mechanical Engineering | Physical | Granted leave of absence * |
| 2. | Dr.S.DHANUSKODI Professor | Mechanical Engineering | Physical | |
| 3. | M.ABDUL GHANI KHAN Associate Professor | Mechanical Engineering | Physical | |
| 4. | Dr.V.YALINI Associate Professor | Mechanical Engineering | Physical | |
| 5. | Dr.S.P.KALAISELVAN Associate Professor | Mechanical Engineering | Physical | Granted leave of absence * |
| 6. | Dr.S.V.SRIDHAR Associate Professor | Mechanical Engineering | Physical | |
| 7. | R.TAMIZH SELVAN Assistant Professor | Mechanical Engineering | Physical | |
| 8. | P VIJAYAKUMAR Assistant Professor | Mechanical Engineering | Physical | |
| 9. | R.BASKARAN Assistant Professor | Mechanical Engineering | Physical | |
| 10. | K.PURUSHOTHAMAN Assistant Professor | Mechanical Engineering | Physical | Granted leave of absence * |

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| | | | | |
|---|---|---|---|---|
| 11. | M.SUDHAHAR<br>Assistant Professor | Mechanical Engineering | Physical | |
| 12. | P.SARATH KUMAR<br>Assistant Professor | Mechanical Engineering | Physical | |
| 13. | N.SIVAHARINATHAN<br>Assistant Professor | Mechanical Engineering | Physical | |
| 14. | J. .RAJESH<br>Assistant Professor | Mechanical Engineering | Physical | |
| 15. | G.ARUNKUMAR<br>Assistant Professor | Mechanical Engineering | Physical | |
| 16. | G.BRITHIVIRAJ<br>Assistant Professor | Mechanical Engineering | Physical | |
| 17. | J.SELVAMANI<br>Assistant Professor | Mechanical Engineering | Physical | |

*- Oral Inputs received

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class<br>Institute/Organization/Address | Online/<br>Physical | Signature<br>(scan, if online) |
|---|---|---|---|---|
| 1 | Dr.Latha<br>Ph.D/Professor | CSE/PRIST | Physical | |
| 2 | Mr VIVEK,<br>Managing Director | Advisewise Educational Consultancy,Thanjavur | Physical | |
| 3 | Mr. SaiGowtham | Student | Physical | Sai Gowtham |

Agenda:

1. To Confirm the previous Meeting Minutes
2. To discuss the action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feed backs on B.Tech – Mechanical Engineering (FT/PT).
4. To scrutinize the stakeholder feed backs on M.Tech-Manufacturing Technology (FT/PT).
5. To recommend the panel of Examiners for B.Tech – Mechanical Engineering (FT/PT).
6. To recommend the panel of Examiners for M.Tech- Manufacturing Technology (FT/PT).
7. To discuss about B.Tech - Mechanical Engineering (FT) syllabus revision of higher semesters with Subject to theprevailing condition.
8. To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B.Tech - Mechanical Engineering (PT) & M.Tech- Manufacturing Technology (FT/PT)
9. To discuss about addition of new value added courses.

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MINUTES OF THE MEETING

At the outset, the Chairman BOS welcomed the members for attending the meeting ofthe Board of Studies. In his introductory remarks, he described the agenda items.

| Agendum 1: |
| --- |
| Discussion: To confirm the previous BOS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes. |
| Resolution: The chairman confirmed the previous meeting minutes of BoS and discussed the action taken on the previous BOS Meeting Minutes. |

| Agendum 2: |
| --- |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabi for B.TECH-MECH (Full Time/Part Time) and M.TECH- Manufacturing Tech (Full Time/Part Time). |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabi and the abstract of stakeholders feedback on B.TECH-MECH (Full Time/Part Time) and M.TECH- Manufacturing Tech (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |

| Agendum 3: |
| --- |
| Discussion: To discuss about B.Tech(FT) syllabus revision of higher semesters subject to the prevailing condition. |
| Resolution: Subject to the prevailing condition, syllabus revision is to be carried out for the higher semesters of B.Tech(FT). |

| Agendum 4: |
| --- |
| Discussion: To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B.Tech(PT) & M.Tech- Manufacturing Tech (FT/PT). |
| Resolution: The members of the board have unanimously recommended to introduce the new courses with the revised curriculum and syllabi for B.TECH–MECH(PT) & M.TECH – Manufacturing Tech (FT/PT). |

| Agendum 5: |
| --- |
| Discussion: To recommend the panel of Examiners for B.Tech(FT/PT) and for M.Tech-Manufacturing Tech (FT/PT). |
| Resolution: The members of the board also scrutinized and updated the panel of examiners and recommended the panel of examiners for the B.TECH –MECH (FT/PT) & M.TECH – Manufacturing Tech (FT/PT), and submitted the same for the Academic Council for its approval. |

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| Agendum 6: |
|---|
| Discussion: To recommend the addition of new value added courses. |
| Resolution: The members of the board analyzed the feedback from various stakeholders and suggested the following value added courses.<br>1) Certificate Course On Metrology And Quality Control<br>2) Certificate Course On Artificial Neural Networks<br>3) Certificate Course On Advanced Automotive Systems<br>4) Certificate Course On Electrical Automotives<br>5) Certificate Course On Wind Energy |

| Agendum 7: | | |
|---|---|---|
| Discussion: The board has unanimously recommended continuing with the existing curriculum of Regulation 2020 with addition of six new electives in 5th to 8th semester. | | |
| Resolution: As per discussion the list of suggested subjects are | | |
| **S. NO** | **COURSE CODE** | **NAME OF THE COURSE** |
| 1 | 20154E66E | Engineering Mechanics |
| 2 | 20154E75E | Advance I.C Engines |
| 3 | 20154E76E | Marketing Management |
| 4 | 20154E82E | Industrial Engineering |
| 5 | 20154FE54C | Electronics And Microprocessors |
| 6 | 20154FE74C | Nuclear Engineering |

The meeting was concluded with thanks from the Chairman.

Signature:

Chair/HoD: HOD

Dept.: Mechanical Engineering

Name: Dr. S. Dhanushkodi

Date: 9.5.22

Signature:

Dean: EDT

School:

Name: R. TAMIZH SOUND

Date: 09.05.2022

Enc:

1. Annexure – I: B.Tech (PT) – Mechanical Engineering
2. Annexure – II: M.Tech (FT / PT) – Manufacturing Technology

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ANNEXURE-I:

B.TECH (Mechanical Engineering) – Part Time

**ITEM 1:** A new course is introduced as 22154C15P-Manufacturing Technology –I instead of 19154C15P Foundry and Welding Technology to get the Knowledge of industries to educating the employees and enforcing various labor legislation in order to eliminate the prevailing unsafe condition and correct the usage actions.

**ITEM 2:** A new course is introduced as 22154C22P-Manufacturing Technology –II instead of 19154C22P Machine tool technology to get the Knowledge in industries for educating the employees

**ITEM 3:** A new course is introduced as 22154C33P-Computer Aided design and manufacturing in stead of 19154C33P Production Planning and Control to get the Knowledge and to identify the new methodologies

**ITEM 4:** A new course is introduced as 22154C41P-Professional Ethics instead of 19154C33P Power plant engg to get the Knowledge with human ethics

**ITEM 5:** A new course is introduced as 22154C53P-Safety in process industries instead of 19154C53P Automobile Engg to get the Knowledge in industrial Safety measures for educating the employees

**ITEM 6:** A new course is introduced as 22154C63P-Maintainence Engineering instead of 19154C63P Computer integrated manufacturing to get the Knowledge industries for educating the employees action

**ITEM 7:** A new course is introduced as 22154C73P-Advanced IC Engines instead of 19154C73P Applied hydraulics and pneumatics to get the Knowledge in automobile industries for educating the employees

**ITEM 8:** A 22154E44P Fundamental of Nano science is introduced in 4th semester as elective instead of the course 19154E44P-Non Destructive testing to understand about NANO Technology.

**ITEM 9:** A 22154E54BP Human Rights is introduced in 5th semester as elective instead of the course 19154E54BP-Composite Materials to understand about Human Rights Acts

**ITEM 10:** A 22154E64CP Engineering Economics is introduced in 6th semester as elective instead of the course 19154E64CP-Intelectual Property Rights to understand about Economics aspects in engineering

**ITEM 11:** 22154E74DP Disaster Management is introduced in 7th semester as elective instead of the course 19154E74DP-Industrial Engineering tounderstand about Calamity changes in environment

**ITEM 12:** 22154E44BP Welding Trechnology is introduced in 4th semester as elective instead of the course 19154E44BP-Refrigeration and Airconditioning to understand about advanced joining process.

**ITEM 13:** 22154E54DP Marketing Management is introduced in 5th semester as elective instead of the course

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19154E54DP-Design Of Jigs, Fixtures and Press Tools to understand about strategy in bussiness industries

**ITEM 14:** 22154E64BP Energy conservation and management is introduced in 6th semester as elective instead of the course 19154E64BP-Nuclear Engineering to gain knowledge in energy conservations in engineering

**ITEM 15:** 22154E74AP Additive manufacturing is introduced in 7th semester as elective instead of the course 19154E74AP-Quality control and reliability engineering to understand about 3D printing and advanced knowledge in recent trends

**ITEM 16:** 22154E74BP Computional fluid dynamics is introduced in 7th semester as elective instead of the course 19154E74BP-vibration and noise control to understand about advanced fluid properties in space engineering technology

**Inclusion of Courses in B.Tech – Mechanical Engineering (PT)-(R-2022)**

1. Manufacturing Technology –I
2. Manufacturing Technology –II
3. Computer Aided design and manufacturing
4. Professional Ethics
5. Safety in process industries
6. Maintainence Engineering
7. Advanced IC Engines
8. Fundamental of Nano science
9. Human Rights
10. Engineering Economics
11. Disaster Management
12. Welding Trechnology
13. Marketing Management
14. Energy conservation and management
15. Additive manufacturing
16. Computional fluid dynamics

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DEPARTMENT OF
MECHANICAL ENGINEERING

# PROGRAM HANDBOOK

B.Tech
MECHANICAL ENGINEERING
Part time
[Regulation 2022]

## Semester – I

| Sl. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S11P | Transforms & Partial Differential Equations | 3 | 1 | 0 | 4 |
| 2 | 22154C12P | Electrical drives and controls | 3 | 0 | 0 | 3 |
| 3 | 22154C13P | Engineering Thermodynamics | 3 | 1 | 0 | 4 |
| 4 | 22154C14P | Fluid Mechanics and Machinery | 3 | 1 | 0 | 4 |
| 5 | 22154C15P | Manufacturing Technology - I | 4 | 0 | 0 | 4 |
| | | | | | Total No of Credits | 19 |

## Semester – II

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S21P | Numerical Methods | 3 | 1 | 0 | 4 |
| 2 | 22154C22P | Manufacturing Technology - II | 3 | 0 | 0 | 3 |
| 3 | 22154C23P | Thermal Engineering | 3 | 1 | 0 | 4 |
| 4 | 22154C24P | Strength of Materials | 3 | 1 | 0 | 4 |
| 5 | 22154C25P | Engineering Materials and Metallurgy | 4 | 0 | 0 | 4 |
| | | | | | Total No of Credits | 19 |

## Semester – III

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S31CP | Probability and Statistics | 3 | 1 | 0 | 4 |
| 2 | 22154C32P | Kinematics of Machinery | 3 | 1 | 0 | 4 |
| 3 | 22154C33P | Computer Aided Design and Manufacturing | 4 | 0 | 0 | 4 |
| 4 | 22154C34P | Engineering Metrology and Measurements | 4 | 0 | 0 | 4 |
| 5 | 22154L35P | Computer Aided Simulation and Analysis Laboratory | 0 | 0 | 3 | 2 |
| | | | | | Total No of Credits | 18 |

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## Semester –IV

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154C41P | Professional Ethics | 4 | 0 | 0 | 4 |
| 2 | 22154C42P | Dynamics of Machinery | 3 | 1 | 0 | 4 |
| 3 | 22154C43P | Design of Machine Elements | 3 | 1 | 0 | 4 |
| 4 | 22154E44-P | Elective -I | 4 | 0 | 0 | 4 |
| 5 | 22154L45P | Dynamics Laboratory | 0 | 0 | 3 | 2 |
| | | | | | Total No of Credits | 18 |

## Semester – V

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154C51P | Heat and Mass Transfer | 3 | 1 | 0 | 4 |
| 2 | 22154C52P | Design of Transmission Systems | 3 | 1 | 0 | 4 |
| 3 | 22154C53P | Safety in Process Industries | 4 | 0 | 0 | 4 |
| 4 | 22154E54-P | Elective-II | 4 | 0 | 0 | 4 |
| 5 | 22154L55P | Heat Transfer Laboratory | 0 | 0 | 3 | 2 |
| | | | | | Total No of Credits | 18 |

## Semester –VI

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154C61P | Finite Elements Analysis | 3 | 1 | 0 | 4 |
| 2 | 22154C62P | Mechatronics | 4 | 0 | 0 | 4 |
| 3 | 22154C63P | Maintenance Engineering | 4 | 0 | 0 | 4 |
| 4 | 22154E64-P | Elective-III | 4 | 0 | 0 | 4 |
| 5 | 22154L65P | Mechatronics Laboratory | 0 | 0 | 3 | 2 |
| | | | | | Total No of Credits | 18 |

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## Semester –VII

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22160S71P | Total Quality Management | 3 | 0 | 0 | 3 |
| 2 | 22154C72P | Process Planning and Cost Estimation | 3 | 1 | 0 | 4 |
| 3 | 22154C73P | Advanced I.C. Engines | 3 | 0 | 0 | 4 |
| 4 | 22154E74-P | Elective-IV | 3 | 0 | 0 | 3 |
| 5 | 22154P75P | Project Work | 0 | 0 | 12 | 6 |
| | | | | | Total No of Credits | 19 |

Total No of Credits from Semester I to VII – 130

## LIST OF ELECTIVES

### Elective I

## Semester – IV

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154E44AP | Gas Dynamics and Jet Propulsion | 4 | 0 | 0 | 4 |
| 2 | 22154E44BP | Welding Technology | 4 | 0 | 0 | 4 |
| 3 | 22154E44CP | Fundamentals of Nanoscience | 4 | 0 | 0 | 4 |
| 4 | 22154E44DP | Renewable Sources of Energy | 4 | 0 | 0 | 4 |

### Elective II

## Semester – V

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154E54AP | Environmental Science and Engineering | 4 | 0 | 0 | 4 |
| 2 | 22154E54BP | Human Rights | 3 | 0 | 0 | 4 |
| 3 | 22154E54CP | Robotics | 4 | 0 | 0 | 4 |
| 4 | 22154E54DP | Marketing Management | 4 | 0 | 0 | 4 |

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## Elective III

## Semester – VI

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154E64AP | Principles of Management | 4 | 0 | 0 | 4 |
| 2 | 22154E64BP | Energy Conservation and Management | 4 | 0 | 0 | 4 |
| 3 | 22154E64CP | Engineering Economics | 4 | 0 | 0 | 4 |
| 4 | 22148E64DP | Mathematics for Industrial Operations | 4 | 0 | 0 | 4 |

## Elective IV

## Semester – VII

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22154E74AP | Additive Manufacturing | 3 | 0 | 0 | 3 |
| 2 | 22154E74BP | Computational Fluid Dynamics | 3 | 0 | 0 | 3 |
| 3 | 22154E74CP | Unconventional Machining Process | 3 | 0 | 0 | 3 |
| 4 | 22154E74DP | Disaster Management | 3 | 0 | 0 | 3 |

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**ANNEXURE-II:**

## M.TECH(Manufacturing Tech)-Full Time & Part Time

**ITEM 1:** A new course is introduced as 22254C14-Advanced casting & welding instead of 19254C14 Mechanical Metallurgy to get the Knowledge for industries and educating the employees

**ITEM 2:** A new course is introduced as 22254C21-Tooling for manufacturing instead of 19254C21 Production management to get the Knowledge for management activities in industries

**ITEM 3:** 22254E16B Quality and Reliability Engg is introduced in I semester as elective instead of the course 19254E16B-Financial management to understand and gain knowledge in quality control.

**ITEM 4:** 22254E25A Non Destructive testing and evaluation is introduced in II semester as elective instead of the course 19254E25A-Advanced Metrology and computer Aided Inspection to understand and gain knowledge in NDT

**ITEM 5:** 22254E32A Process planning and cost estimation is introduced in III semester as elective instead of the course 19254E32A-Manufacturing Systems and Simulation to understand and gain knowledge in process planning in organization.

**ITEM 6 :**22254E32C Research methodology is introduced in III semester as elective instead of the course 19254E32C Artificial intelligence and Neural network to understand and gain knowledge in research activities

ITEM 7 : A newcourse 22254E33C Internet of things for manufacturing is introduced in III semester as elective to understand and gain knowledge in IOT

ITEM 8 : A newcourse 22254E34C Additive manufacturing is introduced in III semester as elective to gain knowledge in 3D printing as emerging areas

ITEM 9 : 22254E34B Industrial safety is introduced in III semester as elective instead of the course 19254E34B Industrial Ergonomics to understand and gain knowledge in safety in Engineering industries.

**Inclusion of Courses in M.Tech.(FT)-(R-2022)**

1. Advanced casting & welding
2. Tooling for manufacturing
3. Quality and Reliability Engineering
4. Non Destructive testing
5. Process planning and cost estimation
6. Research methodology
7. Internet of things for manufacturing
8. Additive manufacturing
9. Industrial safe

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## DEPARTMENT OF MECHANICAL ENGINEERING

# PROGRAMME HANDBOOK

## M.Tech. – Manufacturing Technology

**FULL TIME PROGRAMME**

**Regulation 2022**

(For candidates admitted to M.Tech Manufacturing Technology Programme from June 2022 onwards)

# COURSE STRUCTURE

## Semester - 1

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22248S11 | Advanced Engineering Mathematics | 3 | 1 | - | 4 |
| 22254C12 | Theory of Metal Cutting | 4 | - | - | 4 |
| 22254C13 | Advanced Manufacturing Processes | 4 | - | - | 4 |
| 22254C14 | Advances in Casting & Welding | 4 | - | - | 4 |
| 22254C15 | Automated Computer Integrated Manufacturing Systems | 4 | - | - | 4 |
| 22254E16 (A To C) | Elective – I | 3 | - | - | 3 |
| 22254L17 | CAD/CAM Laboratory | - | - | 3 | 3 |
| TOTAL NO. OF CREDITS | | | | | 26 |

## Semester – 2

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254C21 | Tooling for Manufacturing | 4 | - | - | 4 |
| 22254C22 | MEMS and Nano Technology | 4 | - | - | 4 |
| 22254C23 | Manufacturing Metrology and Quality Control | 4 | - | - | 4 |
| 22254E24 (A to C) | Elective – II | 3 | - | - | 3 |
| 22254E25 (A to C) | Elective – III | 3 | - | - | 3 |
| 22254L26 | Automation Lab | - | - | 3 | 3 |
| 222TECWR | Technical Writing/Seminar | - | - | 3 | 3 |
| TOTAL NO. OF CREDITS | | | | | 24 |

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## Semester - 3

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254C31 | Metal Forming Process | 4 | - | - | 4 |
| 22254E32 (A to C) | Elective – IV | 3 | - | - | 3 |
| 22254E33 (A to B) | Elective - V | 3 | - | - | 3 |
| 22254E34 (A to B) | Elective - VI | 3 | - | - | 3 |
| 22254P35 | Project Work Phase I | - | - | 10 | 10 |
| TOTAL NO. OF CREDITS | | | | | 23 |

## Semester – 4

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254P41 | Project Work Phase II | - | - | 15 | 15 |
| TOTAL NO. OF CREDITS | | | | | 15 |

## ELECTIVE –I

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E16A | Materials Management and Logistics | 3 | - | - | 3 |
| 22254E16B | Quality And Reliability Engineering | 3 | - | - | 3 |
| 22254E16C | Manufacturing Information Systems | 3 | - | - | 3 |

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## ELECTIVE –II

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E24A | Finite Element Application in Manufacturing | 3 | - | - | 3 |
| 22254E24B | Lean Manufacturing | 3 | - | - | 3 |
| 22254E24C | Material management | 3 | - | - | 3 |

## ELECTIVE –III

| Course Code | Title of Paper | L | T | P | C |
|---|---|---|---|---|---|
| 22254E25A | Non-Destructive Testing And Evaluation | 3 | - | - | 3 |
| 22254E25B | Maintenance Management | 3 | - | - | 3 |
| 22254E25C | Optimization Techniques | 3 | - | - | 3 |

## ELECTIVE –IV

| | | | | | |
|---|---|---|---|---|---|
| 22254E32A | Process Planning And Cost Estimation | 3 | - | - | 3 |
| 22254E32B | Instrumentation and Control Engineering | 3 | - | - | 3 |
| 22254E32C | Research Methodology | 3 | - | - | 3 |

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u/s 3 of the UGC Act, 1956
THANJAVUR - 613 403, Tamil Nadu.

## ELECTIVE -V

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E33A | Product Design and Development | 3 | - | - | 3 |
| 22254E33B | Fluid Power Automation | 3 | - | - | 3 |
| 22254E33C | Internet Of Things For Manufacturing | 3 | - | - | 3 |

## ELECTIVE -VI

| | | | | | |
|---|---|---|---|---|---|
| 22254E34A | Advanced Material Technology | 3 | - | - | 3 |
| 22254E34B | Industrial Safety | 3 | - | - | 3 |
| 22254E34C | Additive Manufacturing | 3 | - | - | 3 |

**Total No of Credits - 88**

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# DEPARTMENT OF MECHANICAL ENGINEERING

# PROGRAMME HANDBOOK

## M.Tech. – Manufacturing Technology

**PART TIME PROGRAMME**

**Regulation 2022**

( for candidates admitted to M.Tech Mechanical Engineering programme from June 2022onwards)

# COURSE STRUCTURE

SEMESTER-I

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22248S11EP | Advanced Engineering Mathematics | 3 | 1 | - | 4 |
| 22254C12P | Theory of Metal Cutting | 3 | 1 | - | 4 |
| 22254C13P | Advanced Manufacturing Processes | 3 | 1 | - | 4 |
| 22254L14P | CAD/CAM Laboratory | - | - | 3 | 3 |
| TOTAL NO. OF CREDITS | | | | | 15 |

SEMESTER-II

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254C21P | Tooling for Manufacturing | 3 | 1 | - | 4 |
| 22254C22P | MEMS and Nano Technology | 4 | - | - | 4 |
| 22254E23_P | Elective - I | 4 | - | - | 3 |
| 22254L24P | Automation Lab | - | - | 3 | 3 |
| 222TECWRP | Technical Writing/Seminar | - | - | 3 | 3 |
| TOTAL NO. OF CREDITS | | | | | 17 |

SEMESTER-III

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254C31P | Advances in Casting and Welding | 3 | 1 | - | 4 |
| 22254C32P | Automated Computer Integrated Manufacturing Systems | 3 | 1 | - | 4 |
| 22254E33P | Elective II | 4 | - | - | 3 |
| TOTAL NO. OF CREDITS | | | | | 11 |

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SEMESTER-IV

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254C41P | Manufacturing Metrology and Quality Control | 4 | - | - | 4 |
| 22254C42P | Metal Forming Process | 4 | - | - | 4 |
| 22254E43_p | Elective III | 4 | - | - | 3 |
| 22254P44P | Project Work Phase - I | - | - | 10 | 10 |
| TOTAL NO. OF CREDITS | | | | | 21 |

SEMESTER-V

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E51_P | Elective IV | 4 | - | - | 3 |
| 22254E52_P | Elective V | 4 | - | - | 3 |
| 22254E53_P | Elective VI | 4 | - | - | 3 |
| TOTAL NO. OF CREDITS | | | | | 9 |

SEMESTER-VI

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254P61P | Project Work Phase - II | - | - | 15 | 15 |
| TOTAL NO. OF CREDITS | | | | | 15 |

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Thanjavur

## ELECTIVE-I

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E23AP | Finite Element Application in Manufacturing | 4 | - | - | 3 |
| 22254E23BP | Lean Manufacturing | 4 | - | - | 3 |
| 22254E23CP | Design and Analysis of Experiments | 4 | - | - | 3 |

## ELECTIVE-II

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E33AP | Materials Management And Logistics | 4 | - | - | 3 |
| 22254E33BP | Quality And Reliability Engineering | 4 | - | - | 3 |
| 22254E33CP | Manufacturing Information Systems | 4 | - | - | 3 |

## ELECTIVE-III

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E43AP | Non-Destructive Testing And Evaluation | 4 | - | - | 3 |
| 22254E43BP | Maintenance Management | 4 | - | - | 3 |
| 22254E43CP | Optimization Techniques | 3 | 1 | - | 3 |

## ELECTIVE-IV

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E51AP | Process Planning And Cost Estimation | 4 | - | - | 3 |
| 22254E51BP | Instrumentation and Control Engineering | 4 | - | - | 3 |
| 22254E51CP | Research Methodology | 3 | - | - | 3 |

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## ELECTIVE-V

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E52AP | Product Design and Development | 4 | - | - | 3 |
| 22254E52BP | Fluid Power Automation | 4 | - | - | 3 |
| 22254E52CP | Internet Of Things For Manufacturing | 4 | - | - | 4 |

## ELECTIVE-VI

| Course Code | Title of Paper | Hours / Per Week | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| 22254E53AP | Advanced Material Technology | 4 | - | - | 3 |
| 22254E53BP | Industrial Safety | 4 | - | - | 3 |
| 22254E53CP | Additive Manufacturing | 4 | - | - | 4 |

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SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF
## MECHANICAL ENGINEERING

PROGRAM HANDBOOK

B.Tech – FULL TIME

[Regulation 2020]

COURSE STRUCTURE

# B.E. MECHANICAL ENGINEERING

## REGULATIONS – 2020

## CHOICE BASED CREDIT SYSTEM

### PROGRAMME EDUCATIONAL OBJECTIVES:

Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

1. Have a successful career in Mechanical Engineering and allied industries.
2. Have expertise in the areas of Design, Thermal, Materials and Manufacturing.
3. Contribute towards technological development through academic research and industrial practices.
4. Practice their profession with good communication, leadership, ethics and social responsibility.
5. Graduates will adapt to evolving technologies through life-long learning.

### PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

A. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of industrial problems.

B. **Problem analysis**: Identify, formulates, and solve complex engineering problems. with high degree of competence.

C. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

D. **Design/development of solutions**: Design solutions for mechanical engineering problems and design components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

E. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering use modern tools, software and equipment to analyze multidisciplinary.

F. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

G. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

H. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

I. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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J. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

K. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

L. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

| PROGRAMME EDUCATIONAL OBJECTIVES | PROGRAMME OUTCOMES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L | M |
| 1 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 3 |
| 2 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 2 | 2 |
| 4 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 |
| 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

1-Reasonable: 2- Significant: 3- Strong

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# I - VIII SEMESTER CURRICULUM AND SYLLABI

## B.TECH (FT) MECHANICAL [Regulation 2020]

### SEMESTER I

| S.NO | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 20147S11 | Communicative English | 4 | 0 | 0 | 4 |
| 2. | 20148S12 | Engineering Mathematics - I | 4 | 0 | 0 | 4 |
| 3. | 20149S13 | Engineering Physics | 3 | 0 | 0 | 3 |
| 4. | 20149S14 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 5. | 20154S15 | Engineering Graphics | 2 | 0 | 4 | 4 |
| 6. | 20150S16 | Problem Solving and Python Programming | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 7. | 20150L17 | Problem Solving and Python Programming Laboratory | 0 | 0 | 4 | 2 |
| 8. | 20149L18 | Physics and Chemistry Laboratory | 0 | 0 | 4 | 2 |
| 9. | 201AGIT | Induction Training Programme | | | | 2 |
| **TOTAL** | | | **19** | **0** | **12** | **27** |

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## SEMESTER II

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 20147S21 | Technical English ( All Branches ) | 4 | 0 | 0 | 4 |
| 2. | 20148S22 | Engineering Mathematics II (All Branches ) | 4 | 0 | 0 | 4 |
| 3 | 20149S23C | Material Science ( MECH ) | 3 | 0 | 0 | 3 |
| 4. | 20149S24A | Environmental Science And Engineering (CSE, EEE, MECH, CIVIL) | 3 | 0 | 0 | 3 |
| 5. | 20153S25D | Basic Electrical, Electronics And Instrumentation Engineering (MECH) | 3 | 0 | 0 | 3 |
| 6. | 20154S26D | Engineering Mechanics ( MECH,CIVIL ) | 3 | 2 | 0 | 4 |
| **PRACTICAL** | | | | | | |
| 7. | 20154L27 | Engineering Practices Lab . (All Branches) | 0 | 0 | 4 | 2 |
| 8. | 20153L28D | Basic Electrical, Electronics and Instrumentation Engineering Lab (Mech) | 0 | 0 | 4 | 2 |
| 9. | 201AGIC | Indian Constitution | | | | 2 |
| 10 | 201ASBE | Basic Behavioral Etiquette | | | | 2 |
| **TOTAL** | | | 20 | 2 | 8 | 29 |

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## SEMESTER III

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1. | 20148C31C | Transforms and Partial Differential Equations | 4 | 0 | 0 | 4 |
| 2. | 20154C32 | Engineering Thermodynamics | 3 | 2 | 0 | 4 |
| 3. | 20154C33 | Fluid Mechanics and Machinery | 4 | 0 | 0 | 4 |
| 4. | 20154C34 | Production Technology - I | 4 | 0 | 0 | 4 |
| 5. | 20154C35 | Electrical Drives and Controls | 3 | 2 | 0 | 4 |
| | | **PRACTICAL** | | | | |
| 6. | 20154L36 | Production Technology Laboratory - I | 0 | 0 | 4 | 2 |
| 7. | 20154L37 | Computer Aided Machine Drawing | 0 | 0 | 4 | 2 |
| 8. | 20154L38 | Electrical Engineering Laboratory | 0 | 0 | 4 | 2 |
| 9. | 20154L39 | Interpersonal Skills / Listening & Speaking | 0 | 0 | 2 | 1 |
| 10 | 201AGGS | Introduction to Gender studies | | | | 2 |
| | | **TOTAL** | 17 | 4 | 14 | 29 |

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## SEMESTER IV

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1. | 20148C41D | Statistics and Numerical Methods | 3 | 2 | 0 | 4 |
| 2. | 20154C42 | Theory of Machines-I | 3 | 2 | 0 | 4 |
| 3. | 20154C43 | Production Technology – II | 3 | 0 | 0 | 3 |
| 4. | 20154C44 | Engineering Metallurgy | 3 | 0 | 0 | 3 |
| 5. | 20154C45 | Strength of Materials for Mechanical Engineers | 3 | 2 | 0 | 4 |
| 6. | 20154C46 | Thermal Engineering- I | 3 | 2 | 0 | 4 |
| | | **PRACTICAL** | | | | |
| 7. | 20154L47 | Production Technology Laboratory - II | 0 | 0 | 4 | 2 |
| 8. | 20154L48 | Strength of Materials and Fluid Mechanics and Machinery Laboratory | 0 | 0 | 4 | 2 |
| 9. | 20154L49 | Advanced Reading and Writing | 0 | 0 | 2 | 1 |
| 10 | 201AGCE | Community Engagement | | | | 2 |
| 11 | 201ASTT | Technical, General Aptitude and Skill set Development | | | | 2 |
| | | **TOTAL** | **19** | **0** | **10** | **31** |

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## SEMESTER V

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | THEORY | | | | |
| 1. | 20154C51 | Thermal Engineering- II | 3 | 2 | 0 | 4 |
| 2. | 20154C52 | Design of Machine Elements | 3 | 2 | 0 | 4 |
| 3. | 20154C53 | Metrology and Measurements | 4 | 0 | 0 | 4 |
| 4. | 2015-OE54-_ | Open Elective I | 3 | 0 | 0 | 3 |
| 5. | 20154C55 | Theory of Machines-II | 3 | 2 | 0 | 4 |
| | | PRACTICAL | | | | |
| 6. | 20154L56 | Theory of Machines Laboratory | 0 | 0 | 4 | 2 |
| 7. | 20154L57 | Thermal Engineering Laboratory | 0 | 0 | 4 | 2 |
| 8. | 20154L58 | Metrology and Measurements Laboratory | 0 | 0 | 4 | 2 |
| 09 | 201AGIE | Innovation and Entrepreneurship | | | | 2 |
| | | TOTAL | 16 | 6 | 12 | 27 |

## SEMESTER VI

| S.NO | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | THEORY | | | | |
| 1 | 20154C61 | Design of Transmission Systems | 3 | 2 | 0 | 4 |
| 2 | 20154C62 | Computer Aided Design And Manufacturing | 3 | 2 | 0 | 4 |
| 3 | 20154C63 | Heat and Mass Transfer | 3 | 2 | 0 | 4 |
| 4 | 20154C64 | Finite Element Analysis | 3 | 2 | 0 | 4 |
| 5 | 20154C65 | Hydraulics And Pneumatics | 3 | 0 | 0 | 3 |
| 6 | 20154E66-_ | Elective - I | 3 | 0 | 0 | 3 |
| | | PRACTICAL | | | | |
| 6 | 20154L67 | CAD / CAM Laboratory | 0 | 0 | 4 | 2 |
| 7 | 20154L68 | Design and Fabrication Project | 0 | 0 | 4 | 2 |
| 8 | 20154L69 | Professional Communication | 0 | 0 | 2 | 1 |
| 9 | 201ASTT | Technical Training | | | | 2 |
| | | TOTAL | 18 | 8 | 10 | 29 |

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## SEMESTER VII

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1. | 20154C71 | Power Plant Engineering | 4 | 0 | 0 | 4 |
| 2. | 20154C72 | Process Planning and Cost Estimation | 3 | 2 | 0 | 4 |
| 3. | 20154C73 | Mechatronics | 4 | 0 | 0 | 4 |
| 4. | 2015-OE74__ | Open ElectiveII | 3 | 0 | 0 | 3 |
| 5. | 20154E75- | Elective II | 3 | 0 | 0 | 3 |
| 6. | 20154E76-_ | Elective III | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 7. | 20154L77 | Simulation and Analysis Laboratory | 0 | 0 | 4 | 2 |
| 8. | 20154L78 | Mechatronics Laboratory | 0 | 0 | 4 | 2 |
| 9. | 20154L79 | Technical Seminar | 0 | 0 | 2 | 1 |
| TOTAL | | | 20 | 2 | 6 | 26 |

## SEMESTER VIII

| S.No. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1. | 20154C81 | Principles of Management | 3 | 0 | 0 | 3 |
| 2. | 20154E82-_ | Elective– IV | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 3. | 20154PW83 | Project Work | 0 | 0 | 20 | 15 |
| 4 | 201AGPE | Professional Ethics and Human Values | | | | 2 |
| 5 | 201ASIM | Interview Skills Training and Mock Test | | | | 2 |
| .6 | 20154PEE | Programme Exit Examination | | | | 2 |
| TOTAL | | | 6 | 0 | 20 | 27 |

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## ELECTIVE – I ( VI SEMESTER)

| S.NO. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20154E66A | Automobile Engineering | 3 | 0 | 0 | 3 |
| 2. | 20154E66B | Safety in Engineering industries | 3 | 0 | 0 | 3 |
| 3. | 20154E66C | Gas Dynamics and Jet Propulsion | 3 | 0 | 0 | 3 |
| 4. | 20154E66D | Fundamentals of Nano Science | 3 | 0 | 0 | 3 |
| 5. | 20154E66E | Engineering Mechanics | 3 | 0 | 0 | 3 |

## ELECTIVE – II ( VII SEMESTER)

| | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20154E75A | Renewable Sources of Energy | 3 | 0 | 0 | 3 |
| 2. | 20154E75B | Nonconventional Machining Processes | 3 | 0 | 0 | 3 |
| 3. | 20154E75C | Operations Research | 3 | 0 | 0 | 3 |
| 4. | 20154E75D | Total Quality Management | 3 | 0 | 0 | 3 |
| 5. | 20154E75E | Advance I.C Engines | 3 | 0 | 0 | 3 |

## ELECTIVE – III ( VII SEMESTER)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20154E76A | Robotics | 3 | 0 | 0 | 3 |
| 2. | 20154E76B | Design of Jigs, Fixtures and Press Tools | 3 | 0 | 0 | 3 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | 20154E76C | General Aspects of Energy Management and Energy audit | 3 | 0 | 0 | 3 |
| 4. | 20154E76D | Composite Materials | 3 | 0 | 0 | 3 |
| 5. | 20154E76E | Marketing Management | 3 | 0 | 0 | 3 |

## ELECTIVE – IV ( VIII SEMESTER)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20154E82A | Production Planning and Control | 3 | 0 | 0 | 3 |
| 2. | 20154E82B | Computer Integrated Manufacturing Systems | 3 | 0 | 0 | 3 |
| 3. | 20154E82C | Energy Efficiency in Thermal Utilities | 3 | 0 | 0 | 3 |
| 4. | 20154E82D | Vibration and Noise Control | 3 | 0 | 0 | 3 |
| 5. | 20154E82E | Industrial Engineering | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE– I

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1. | CSE | 20150FE54A | Data Base management systems | 3 | 0 | 0 | 3 |
| 2. | | 20150FE54B | Cloud computing | 3 | 0 | 0 | 3 |
| 3. | | 20150FE54C | Software Architecture | 3 | 0 | 0 | 3 |
| 4. | ECE | 20152FE54A | Basics Of Bio Medical Instrumentation | 3 | 0 | 0 | 3 |
| 5. | | 20152FE54B | Sensors And Transducers | 3 | 0 | 0 | 3 |
| 6. | | 20152FE54C | Microprocessors and Microcontroller | 3 | 0 | 0 | 3 |
| 7. | EEE | 20153FE54A | Industrial Nano Technology | 3 | 0 | 0 | 3 |
| 8. | | 20153FE54B | Energy Conservation and Management | 3 | 0 | 0 | 3 |
| 9. | | 20153FE54C | Computer Aided design of | 3 | 0 | 0 | 3 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Electrical Apparatus | | | | |
| 10. | MECH | 20154FE54A | Renewable energy sources | 3 | 0 | 0 | 3 |
| 11. | | 20154FE54B | Automotive Systems | 3 | 0 | 0 | 3 |
| 12. | | 20154FE54C | Electronics And Microprocessors | 3 | 0 | 0 | 3 |
| 13. | CIVIL | 20155FE54A | Air Pollution And Control Engineering | 3 | 0 | 0 | 3 |
| 14. | | 20155FE54B | Geographic Information Systems | 3 | 0 | 0 | 3 |
| 15. | | 20155FE54C | Drinking Water Supply and treatment | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE– II

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | CSE | 20150FE74A | Introduction to C programming | 3 | 0 | 0 | 3 |
| 2. | | 20150FE74B | Data structures and algorithms | 3 | 0 | 0 | 3 |
| 3. | | 20150FE74C | Web Technology | 3 | 0 | 0 | 3 |
| 4. | ECE | 20152FE74A | Robotics | 3 | 0 | 0 | 3 |
| 5. | | 20152FE74B | Electronic devices | 3 | 0 | 0 | 3 |
| 6. | | 20152FE74C | Wireless communication | 3 | 0 | 0 | 3 |
| 7. | EEE | 20153FE74A | Basic circuit theory | 3 | 0 | 0 | 3 |
| 8. | | 20153FE74B | Introduction to renewable energy systems | 3 | 0 | 0 | 3 |
| 9. | | 20153FE74C | Power Electronics for renewable energy systems | 3 | 0 | 0 | 3 |
| 10. | MECH | 20154FE74A | Industrial safety | 3 | 0 | 0 | 3 |
| 11. | | 20154FE74B | Testing of materials | 3 | 0 | 0 | 3 |
| 12. | | 20154FE74C | Nuclear Engineering | 3 | 0 | 0 | 3 |
| 13. | CIVIL | 20155FE74A | Green building design | 3 | 0 | 0 | 3 |
| 14. | | 20155FE74B | Waste water treatment | 3 | 0 | 0 | 3 |
| 15. | | 20155FE74C | Fundamentals of Aeronautical Engineering | 3 | 0 | 0 | 3 |

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## CGPA CREDITS

| Semester | Core | Elective | Free elective | Practical | Seminar/ Exit exam | Audi | Project | Total |
|---|---|---|---|---|---|---|---|---|
| I | 21 | - | - | 04 | - | 2 | - | 27 |
| II | 21 | - | - | 04 | - | 4 | - | 29 |
| III | 20 | - | - | 07 | - | 2 | - | 29 |
| IV | 22 | - | - | 05 | - | 4 | - | 31 |
| V | 16 | - | 03 | 06 | - | 2 | - | 27 |
| VI | 19 | 03 | - | 05 | - | 2 | - | 29 |
| VII | 12 | 06 | 03 | 04 | 1 | - | - | 26 |
| VIII | 03 | 03 | - | - | 2 | 4 | 15 | 27 |
| TOTAL | | | | | | | | 225 |

## NON-CGPA CREDITS

| Semester | Add on course | Total |
|---|---|---|
| I | 01 | 01 |
| II | 01 | 01 |
| III | - | - |
| IV | - | - |
| V | - | - |
| VI | - | - |
| VII | - | - |
| VIII | - | - |
| Co curricular Activities | In-plant Training , Industrial Visit , Seminars & Conferences | 03 |
| TOTAL NON-CGPA CREDITS | | 05 |

| TOTAL CREDITS | |
|---|---|
| CGPA CREDITS | 225 |
| NON-CGPA CREDITS | 05 |
| TOTAL | 230 |

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| 20154E66E | ENGINEERING MECHANICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

1 To Learn the use scalar and vector analytical techniques for analysing forces in statically determinate structures

2 To introduce the equilibrium of rigid bodies, vector methods and free body diagram

3 To study and understand the distributed forces, surface, loading on beam and intensity.

4 To learn the principles of friction, forces and to determine the apply the concepts of frictional forces at the contact surfaces of various engineering systems.

5 To develop basic dynamics concepts – force, momentum, work and energy;

**UNIT I STATICS OF PARTICLES** 9

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

**UNIT II EQUILIBRIUM OF RIGID BODIES** 9

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

**UNIT III DISTRIBUTED FORCES** 9

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus-Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three- Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin
Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

**UNIT IV FRICTION** 9

The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.

**UNIT V DYNAMICS OF PARTICLES** 9

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion - Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force, Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students would be able to

- Illustrate the vector and scalar representation of forces and moments
- Analyse the rigid body in equilibrium
- Evaluate the properties of distributed forces
- Determine the friction and the effects by the laws of friction
- Calculate dynamic forces exerted in rigid body

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TEXT BOOKS:

Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12thEdition, 2019.
Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCES:

1 Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2 Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3 Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education Asia Pvt. Ltd., 2005.
4 Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
5 Timoshenko S, Young D H, Rao J V and SukumarPati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2013.

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20154E75E ADVANCED I.C ENGINES L T P C
3 0 0 3

OBJECTIVES:

- To understand the underlying principles of operation of different IC Engines and components.
- To provide knowledge on pollutant formation, control, alternate fuel etc.

**UNIT I SPARK IGNITION ENGINES** 9

Mixture requirements – Fuel injection systems – Monopoint, Multipoint & Direct injection - Stages of combustion – Normal and Abnormal combustion – Knock - Factors affecting knock – Combustion chambers.

**UNIT II COMPRESSION IGNITION ENGINES** 9

Diesel Fuel Injection Systems - Stages of combustion – Knocking – Factors affecting knock – Direct and Indirect injection systems – Combustion chambers – Fuel Spray behaviour – Spray structure and spray penetration – Air motion - Introduction to Turbocharging.

**UNIT III POLLUTANT FORMATION AND CONTROL** 9

Pollutant – Sources – Formation of Carbon Monoxide, Unburnt hydrocarbon, Oxides of Nitrogen, Smoke and Particulate matter – Methods of controlling Emissions – Catalytic converters, Selective Catalytic Reduction and Particulate Traps – Methods of measurement – Emission norms and Driving cycles.

**UNIT IV ALTERNATIVE FUELS** 9

Alcohol, Hydrogen, Compressed Natural Gas, Liquefied Petroleum Gas and Bio Diesel - Properties, Suitability, Merits and Demerits - Engine Modifications.

**UNIT V RECENT TRENDS** 9

Air assisted Combustion, Homogeneous charge compression ignition engines – Variable Geometry turbochargers – Common Rail Direct Injection Systems - Hybrid Electric Vehicles – NOx Adsorbers - Onboard Diagnostics.

TOTAL : 45 PERIODS

OUTCOME:

- Upon completion of this course, the students can able to compare the operations of different IC Engine and components and can evaluate the pollutant formation, control, alternate fuel

TEXT BOOKS:

1. Ramalingam. K.K., "Internal Combustion Engine Fundamentals", Scitech Publications, 2002.
2. Ganesan, "Internal Combustion Engines", II Edition, TMH, 2002.

REFERENCES:

1. Mathur. R.B. and R.P. Sharma, "Internal Combustion Engines"., Dhanpat Rai & Sons 2007.
2. Duffy Smith, "Auto Fuel Systems", The Good Heart Willcox Company, Inc., 1987.
3. Eric Chowenitz, "Automobile Electronics", SAE Publications, 1995

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| 20154E76E | MARKETING MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**AIM:**

To impart knowledge in Marketing Management and its techniques

**OBJECTIVES:**

- To provide sufficient knowledge about the Marketing process, buying Behavior and Market segmentation.
- To provide information about the product pricing and Marketing research.
- To give experience in Marketing planning, strategy foundation, advertising, sales promotion and distribution.

**UNIT - 1 MARKETING PROCESS** 12

Definition, Marketing process, dynamics, needs, wants and demands, marketing concepts, environment, mix, types selling versus marketing, industrial versus consumer marketing.

**UNIT - 2 BUYING BEHAVIOUR AND MARKET SEGMENTATION** 12

Cultural, demographic factors, motives, types, buying decisions, segmentation factors - demographic -Psycho graphi and geographic segmentation, process, patterns.

**UNIT- 3 PRODUCT PRICING AND MARKETING RESEARCH** 12

Objectives, pricing, decisions and pricing methods, process of marketing research.

**UNIT – 4 MARKETING PLANNING AND STRATEGY FORMULATION** 12

Components of marketing plan-strategy formulations and the marketing process, implementations, portfolio analysis BCG, GEC grids.

**UNIT – 5 ADVERTISING, SALES PROMOTION AND DISTRIBUTION** 12

Characteristics, impact, goals, types, and sales promotions- point of purchase- unique selling proposition Characteristics, wholesaling, retailing, channel design, logistics, and modern trends in retailing.

**Total Hours : 60**

**TEXT BOOKS**


1. Ramasamy and Nama kumari, "Marketing Environment: Planning, implementation and control the India context", 1990.
2. Govindarajan. M, "Industrial marketing management", Vikas Publishing Pvt. Ltd, 2003.


**REFERENCES**


1. Philip Kolter, "Marketing Management", Pearson Education 2001.
2. Green Paul.E.and Donald Tull, "Research for marketing decisions", Prentice Hall of India. 1975.
3. Donald S. Tull and Hawkins, "Marketing Reasearch", Prentice Hall of Inida-1997.
4. Philip Kotler and Gary Armstrong "Principles of Marketing" Prentice Hall of India, 2000.
5. Steven J.Skinner, "Marketing", All India Publishers and Distributes Ltd. 1998.


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| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

20154E82E INDUSTRIAL ENGINEERING

**AIM**

Impartation of the basic knowledge on Industry underscoring the development trends.

**OBJECTIVE:**

To provide a general perspective of Industry indicating the role of mechanical engineers in their operation and material handling.

**UNIT I INTRODUCTION TO INDUSTRIAL ENGINEERING** 9

Introduction to Industrial Engineering – Evolution of modern Concepts in Industrial Engineering – Functions o Industrial Engineering – Field of application of Industrial Engineering Product Development and research- Desig function – Objectives of design- Manufacturing Vs purchase- Development of designs- Experimentation- prototyp production and testing simplification and standardization – Selection of materials and processes- Human factors i design- value Engineering job plan.

**UNIT II PLANT LAYOUT** 9

Plant layout - Types of layouts- Product, process, fixed, Group technology, Flexible manufacturing system- elementary concepts and structure, flow charts, use of time study data, physical facilities- Constructional details- environmental control like lighting, temperature, humidity, Ventilation, noise and dust, Industrial waste disposal-

**UNIT III - MATERIAL HANDLING** 9

Principles of material handling- Types of material handling equipments- Selection and application maintenance and replacements- Preventive and brake- down maintenance and replacement- Preventive and brake- down maintenance- economic aspect, Replacement of equipment- Method of providing for depreciation- Determination of economic life, Criteria for selection of equipment- Simple problem.

**UNIT IV ORGANIZATION** 9

Principles of organization, Development of Organizational charts like line, staff, line and staff & functional types. Resources, Human relationship. Factory acts, payment of wages, workmen compensation, E.S.I. Sales management & forecasting cost accounting, Budgetary control. , partnership, Joint stock & co-operative stores.

**UNIT V LABOUR WELFARE AND INDUSTRIAL SAFETY** 9

Workers participation in management- Labour welfare and social security- Industrial safety- Important statutor provisions in labour legislation. Safety engineering, accident prevention program , safety design concepts, fir protection-industrial noise-Legislations on safety in industry . Recent Developments in maintenance methods-RCM CBM –DMS – TPM etc.

**TOTAL HOURS: 45 PERIODS**

**References:**

1. Industrial Engineering and Management - O. P. Khanna

2 Industrial Engineering & Production Management, M Mahajan - Dhanpat Rai (pub).

3. Industrial Engineering - Dr. B. Kumar – Khanna pub.

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## 20154FE54C ELECTRONICS AND MICROPROCESSORS

### 1. SEMICONDUCTORS AND RECTIFIERS 9

Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics-Half wave and full wave rectifiers -Voltage regulation.

### 2. TRANSISTORS AND AMPLIFIERS 9

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits-Class A, B and C amplifiers- Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics -Concept of feedback-Negative feedback-

### 3. DIGITAL ELECTRONICS 9

Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra-Exclusive OR gate - Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

### 4. 8085 MICROPROCESSOR 9

Block diagram of microcomputer-Architecture of 8085-Pin configuration-Instruction set-Addressing modes-Simple programs using arithmetic and logical operations.

### 5. INTERFACING AND APPLICATIONS OF MICROPROCESSOR 9

Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control, Stepper motor control, traffic light control.

**Total Hrs:45**

### TEXT BOOKS


1. Milman and Halkias, "Integrated Electronics", Tata McGraw-Hill publishers, 1995.
2. Ramesh Goankar, "Microprocessor Architecture", Programming and Applications with 8085, Wiley Eastern, 1998.


### REFERENCES


1. Malvino and Leach, "Digital Principles and Applications", Tata McGraw-Hill, 1996
2. Mehta V.K, "Principles of Electronics", S. Chand and Company Ltd, 1994
3. Dougles V.Hall, "Microprocessor and Interfacing", Programming and Hardware, Tata McGraw-Hill, 1999.
4. Salivahanan S, Suresh Kumar N, Vallavaraj A, "Electronic Devices and Circuits" First Edition, Tata McGraw-Hill, 1999.


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# 20154FE74C NUCLEAR ENGINEERING

**AIM:**

To impart knowledge in Nuclear Engineering, Nuclear safety and nuclear waste disposal

**OBJECTVIES:**

To understand the basic concepts of nuclear physics
To understand about Nuclear reactions and reaction materials
To understand the concepts of Nuclear reactors, their safety and safe disposal of Nuclear waste

**UNIT-I: NUCLEAR PHYSICS** 9

Nuclear model of an atom-Equivalence of mass and energy-binding- radio activity-half life-neutron interactions-cross sections.

**UNIT-II: NUCLEAR REACTIONS AND REACTION MATERIALS** 9

Mechanism of nuclear fission and fusion- radio activity- chain reactions-critical mass and composition-nuclear fuel cycles and its characteristics-uranium production and purification-Zirconium, thorium, beryllium.

**UNIT-III: REPROCESSING** 9

Reprocessing: nuclear fuel cycles-spent fuel characteristics-role of solvent extraction in reprocessing-solvent extraction equipment.

**UNIT-IV: NUCLEAR REACTOR** 9

Nuclear reactors: types of fast breeding reactors-design and construction of fast breeding reactors-heat transfer techniques in nuclear reactors- reactor shielding. Fusion reactors.

**UNIT-V: SAFETY AND DISPOSAL** 9

Safety and disposal: Nuclear plant safety-safety systems-changes and consequences of accident-criteria for safety-nuclear waste-types of waste and its disposal-radiation hazards and their prevention-weapons proliferation.

**Total Hours : 45**

**TEXT BOOK:**


1. Thomas J.Cannoly, "Fundamentals of nuclear Engineering" John Wiley 1978.


**REFERENCES:**


1. Collier J.G., and Hewitt G.F, "Introduction to Nuclear power", Hemisphere publishing, New York. 1987
2. Wakil M.M.El., "Power Plant Technology" – McGraw-Hill International, 1984.


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# METROLOGY AND QUALITY CONTROL

OBJECTIVES

- To understand the concept of metrology and principles of measuring instruments
- To understand the concept of different types of comparative measurements
- To gain the knowledge about calibration technique in measuring instruments
- To impart knowledge on quality control and control charts • To impart the knowledge on control charts for variables

**UNIT - I BASICS OF METROLOGY** 9

Definition of metrology - Objective of metrology - Precision and Accuracy - Sources of errors - Concept of Repeatability, Sensitivity, Readability and Reliability – Linear measurements – types – Vernier caliper Micrometer – types - Vernier height gauges – depth gauges – Slip gauges – Angular measurements – Types - Vernier and optical Bevel protractor - Sine Principle and Sine Bar - Optical Instruments for angular measurement – Autocollimator - Angle Gauge.

**UNIT–II COMPARATIVEMEASUREMENT** 9

Comparators – Introduction – Characteristics and uses – types – mechanical – Optical – profile projector – Electrical – pneumatic – Testing of straightness – Flatness – parallelism and circularity- Limit gauges – types- Taylors principle - Snap gauges – plain plug gauges – progressive plug gauges - Ring gauges – Thread pitch gauges - feeler gauges – radius gauges – engineers square and parallel – dial gauges – types – plunger type – needle type – Magnetic V block.

**UNIT - III CALIBRATION AND MEASURING MACHNES** 9

Introduction – sensitivity – Range – standards – Traceability - Calibration of Vernier caliper – Micrometer – Dial gauges – Measurement using surface roughness tester – Co-ordinate measuring machine – Types - Tool makers microscope - Gear measurement – Gear tooth caliper – Circular pitch measuring machine.

**UNIT - IV QUALITY CONTROL FOR VARIABLES** 9

Introduction, definition of quality – Facts of quality - basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance - Concepts of Quality control - Quality cost- Variation in process- factors – process capability – process capability studies and simple problems.

**UNIT - V PROCESS CONTROL FOR ATTRIBUTES** 9

Control chart for proportion or fraction defectives – p chart and np chart – control chart for defects – C and U charts, State of control and process out of control identification in charts – Acceptance sampling plan – Types - O.C. curves – producer's Risk and consumer's Risk, AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

**TOTAL HOURS: 45**

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COURSE OUTCOMES

1. Understand the basics of metrology and linear and angular measuring instruments
2. Explain the working principles of comparators and limit gauges
3. Determine the status of the measuring instruments and different parameters using measuring machines
4. Understand the concepts of quality and to Solve the problems in process control charts for variables
5. Solve the problems in process control charts for attributes

TEXT BOOK

1. R.K.JAIN, Engineering Metrology, Khanna publishers, 21st edition, 1984
2. GRANT, EUGENE.L "Statistical Quality Control", Tata McGraw-Hill, 7th edition, 2005

REFERENCES

1. MONOHAR MAHAJAN, "Statistical Quality Control", Dhanpat Rai & Sons, 2001.
2. R.C.GUPTA, "Statistical Quality control", Khanna Publishers, 9th edition, 1998.
3. BESTERFIELD D.H., "Quality Control", Prentice Hall, 7th edition, 2003.
4. SHARMA S.C., "Inspection Quality Control and Reliability", Khanna Publishers, 2002.

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# ADVANCED AUTOMOTIVE SYSTEMS

OBJECTIVES

Appreciate and explain advancements in different components and systems of Automobile.

**UNIT - I COMBUSTION CHAMBERS AND STRATIFIED ENGINES** 9

Petrol engine combustion Chambers-types-construction, merits and demerits-Thead, L head, F head and I head Air swirl-need-methods of generating swirl, Diesel engine combustion Chambers-open combustion chamber-pre-combustion chamber-M combustion chamber-construction and working.

**UNIT - II ADVANCEMENTS IN AIR INDUCTION SYSTEMS** 9

Variable geometry intake manifold-concept-need-working principle. Variable valve timingconcept-need-types-working principle of cam changing VVT (Honda VTEC)-Cam phasing VVT (Toyota VVT)-advantages, supercharging-concept-need-types of superchargers, turbo chargingconcept-need-types, constant pressureturbo charging-construction and working-merits-demerits, pulse pressure turbo charging-construction and working-merits-demerits.

**UNIT – III ALTERNATE PROPULSION TECHNOLOGY** 9

Petrol wankel engine-construction and working-advantages and disadvantages. Fuel cells-types, proton exchange membrane type fuel cell-working principle -advantages and disadvantages. Hybrid propulsion-concept, hybrid-working principle-merits-demerits,parallel hybrid-working principle-advantages and disadvantages. Battery operated vehicle-working principle-advantages and disadvantages, regenerative brakingneed-working principle.

**UNIT - IV ADVANCEMENTS IN STEERING AND SUSPENSION SYSTEM** 9

Air spring-types-advantages, bellows air spring-construction and working, piston air springconstruction and working, air suspension-layout and working-advantages, hydro-elastic springconstruction and working, hydro-elastic suspension-layout and working-advantages, power steering-need-types, integral-construction and working , linkage power steering construction and working.

**UNIT – V ADVANCEMENTS IN FINAL DRIVES AND BRAKES** 9

Limited slip differential-need-types-construction and working of clutch type LSD, Differential lock-need-construction and working of dog clutch type differential lock. Servo brakes-need-types, vacuum servo brakes-layout-working, vacuum servo booster construction and working, power brakes-need -types, air brake system-layout and working, air brake valve-brake chamber.

**TOTAL HOURS: 45**

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COURSE OUTCOMES

1. Describe the construction, working, merits and demerits of different combustion chamber of S I and C I engines.
2. Explain the need, construction and working of different advancements in Air intake systems of engine.
3. Explain the need, construction and working of different alternate/modern propulsion systems of Auto mobiles.
4. Explain the need, construction and working of different alternate/modern suspension and steering systems of Automobile.
5. Explain the need, construction and working of different alternate/modern Final drive and Braking systems of Automobiles.

REFERENCES


1. Understanding Automotive electronics William Ribben Butterworth Heinemann.
2. A Systems Approach to Automotive technology Jack Erjavec Cengage Learning.
3. Electronic Engine Controls Steve.V.Hatch Cengage Learning.
4. Truck engines Fuel& computerized management systems Sean Bennett Cengage Learning.
5. Advanced vehicle technology Heinz Heisler Butterworth Heinemann.


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# ARTIFICIAL NEURAL NETWORKS

OBJECTIVES

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms.
3. To know the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

**UNIT-I INTRODUCTION** 9

A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural NetworksLearning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

**UNIT-II SINGLE LAYER PERCEPTRONS** 9

Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection.

**UNIT-III BACK PROPAGATION** 9

Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

**UNIT – IV SELF-ORGANIZATION MAPS (SOM)** 9

Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

**UNIT-V NEURO DYNAMICS** 9

Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, restricted boltzmen machine.

**TOTAL HOURS: 45**

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COURSE OUTCOMES

1. Upon completing this course, the student will be able to
2. Understand the similarity of Biological networks and Neural networks
3. Perform the training of neural networks using various learning rules.
4. Understanding the concepts of forward and backward propagations.
5. Understand and Construct the Hopfield models.

REFERENCES

1.Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
2.Neural Networks -James A Freeman David M S Kapura Pearson Ed., 2004.
3.Artificial Neural Networks – B. Vegnanarayana Prentice Hall of India P Ltd 2005

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# WIND ENERGY

## UNIT 1 - INTRODUCTION TO WIND TECHNOLOGY AND COMPONENTS

Introduction and Status of Wind Energy Technology-Overview of Wind Turbine Components - Design aspects of Wind Turbine-The Aerodynamics of Wind Turbine-Wind Turbine Blade Manufacture-Role of Non Crimp fabric in Blade Manufacturing-Drive Train Concepts of Wind Turbine-Wind Turbine Gear Box-Wind Turbine Generator.

## UNIT 2 - WIND RESOURCE ASSESSMENT

Wind Resource Assessment and Techniques-Guidelines for Wind Measurements-Wind Measurements by Remote Sensing Instruments-Wind Data Measurements and Analysis-Design and Layout if Wind Farms-Indian Wind Atlas: A Case Study-Forecasting of Wind and Energy Production.

## UNIT 3 -WIND TURBINE TESTING & CERTIFICATION

Type Certification of wind turbine and overview of Design Requirements as per IEC 61400 - 1 Wind Turbine Testing & Measurement Techniques-Instrumentation for Wind Turbine Testing Safety and Function Testing-Power Curve Measurements-Quality aspects of Wind turbines.

## UNIT 4 -WIND TURBINE PRE AND POST INSTALLATION

Wind Farm Developments and Related Issues -Economic Analysis of Wind Power Development Installation and Commissioning of Wind Turbine-Grid Integration of Wind Turbine-Wind Power Evacuation-Operation and Maintenance of Wind Farms-Wind Farm Management using SCADA Wind Turbine Condition Monitoring-Power Quality Characteristics of Wind Farms-Power System Studies for Renewable Integration

## UNIT 5 - SMALL WIND TURBINE- MISCELLANEOUS / ANCILLARY

Small Wind Turbine Testing and Hybrid System-Role of NIWE in India Wind Energy Development-Wind Energy Development in India-Offshore Wind Energy: An Overview-Water Pumping Wind Mill and RE for Rural Development -Environmental Aspects of Wind Turbine Technology -Integration of Wind energy with other renewable sources.

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# ELECTRICAL AUTOMOTIVES

## UNIT: 1 -BATTERY

Principle and construction of Lead Acid Battery - Li-ion Battery – Nickel Cadmium Battery - Nickel Metal - Hybrid Battery - Sodium Sulfur Battery and Aluminum Air Battery - Characteristics of Battery - Battery Rating - Capacity and Efficiency - Various Tests on Battery - Battery Charging Techniques - Maintenance of batteries.

## UNIT: 2 -ELECTRICAL COMPONENTS

Requirements of Starter Motor - Starter Motor types - construction and characteristics - Starter drive mechanisms - Starter Switches and Solenoids - Generators - Alternators types - Construction - Voltage and Current Regulation - Cutout relays and regulators – Charging circuits for D.C. Generator - A.C. Single Phase and Three Phase Alternators.

## UNIT: 3 -IGNITION AND INJECTION SYSTEMS

Battery Coil and Magneto Ignition System – Circuit details - Components of Battery Coil and Magneto Ignition System - Centrifugal and Vacuum Advance Mechanisms - Spark Plugs - Constructional details and Types – CRDI

## UNIT: 4 -ELECTRICAL AND ELECTRONIC IGNITION SYSTEMS

Electronically Assisted and Full Electronic Ignition System (MPFI) - Noncontact type Ignition Triggering devices - Capacitive Discharge Ignition - Distributor less Ignition System- Digital Ignition System - Control Strategy of Electronic Ignition System.

## UNIT: 5 -WIRING, LIGHTING AND OTHER INSTRUMENTS AND SENSORS

Automotive wiring - insulated and earth return system - positive and negative earth systems - head lamp and indicator lamp details - electrical and electronic fuel lift pumps - theory and constructional details of dash board instruments - speedometer - odometer - fuel level indicator - oil pressure and coolant temperature sensors.

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# SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## BOARD OF STUDIES MEETING

## CIRCULAR

2022 - 2023

06.05.2022

The BOS meeting is scheduled on 09.05.2022 at 10.30 am in the ECE LAB at PRIST University Vallam Campus under the Chairmanship of Prof. Dr. Smitha Elso Peter. All are requested to attend without fail.

AGENDA OF THE MEETING

1. To confirm the previous minutes meetings.
2. To discuss the action taken on the previous meeting minutes
3. To scrutinize the stakeholder feed backs on B.Tech (FT/PT).
4. To scrutinize the stakeholder feed backs on M.Tech-Communication Systems (FT/PT).
5. To recommend the panel of Examiners for B.Tech (FT/PT).
6. To recommend the panel of Examiners for M.Tech-Communication Systems (FT/PT).
7. Subject to the prevailing condition, syllabus revision is to carried out for the higher semesters of B.Tech (FT).
8. To accomodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B.Tech(PT) & M.Tech-Communication Systems(FT/PT).
9. To discuss about addition of new Value added courses.

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The following Members attended the meeting:

| S.No | Designation | Name | Signature |
|---|---|---|---|
| 1 | Chairperson/HoD | Dr. Smitha elsa peter | |
| 2 | External Expert- Industry | Mr.A.Jothivelu | |
| 3 | External Expert-Academic | Dr.T.Jayasankar | |
| 4 | Professor | Dr. S. Devi | |
| 5 | Professor | Dr. Smitha elsa peter | |
| 6 | Associate Professor | Dr. A. Rijuvana begum | |
| 7 | Associate Professor | Dr. C. Rajinikanth | |
| 8 | Assistant Professor | S. Maheshwaran | |
| 9 | Assistant Professor | S.Saraswathy | |
| 10 | Special Invitee-Dean | Prof.R.Tamizhselvan | |
| 11 | Special Invitee-Alumnus/Alumna | NARANDHAR B. | |
| 12 | Special Invitee -Current student - UG or PG | SATHEESH M. | |

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School of Engineering and Technology
Department of Electronics and Communication Engineering
Minutes of the meeting of the Board of Studies (BoS)*

Date: 09.05.2022
Venue: ECE LAB
Time:10.30 a.m

Members present:

Chair: Prof.Dr.Smitha Elsa Peter, Ph.D
HOD/ECE
PRIST

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. T.Jayasankar,Ph.D Asst.Professor,(Sr.Gr) | UCE,BIT campus, Anna University, Tiruchirappalli. | Physical | 9/5/22 |
| 2 | Mr.A.Jothivelu B.E,M.s(NIT-Trichy) | Senior Sub Divisional Engieer BSNL, Tiruchirappalli. | Physical | 9/5 |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1. | Prof.Dr.A.Rijuvana Begum, Ph.D/Professor | ECE | Physical | |
| 2. | Prof.Dr.P.Geetha Ph.D/Associate Professor | ECE | Physical | |
| 3. | Prof.Dr.C.Rajinikanth Ph.D/Associate Professor | ECE | Physical | |
| 4. | Prof.Mr.S.Maheshwaran M.E/Assistant Professor | ECE | Physical | 9/5/2022 |
| 5. | Prof.Mrs.A.Aarthi M.E/Assistant Professor | ECE | Physical | 9/5/22 |

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Invited Participants

| S.No. | Name/Degree/Designation | Department/Class Institute/Organization/Address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Prof.Dr.Latha Ph.D/Professor | CSE/PRIST | Physical | |
| 2 | Mr.Abhishek Kunal B.E/ Data center Architect | Etisalit,Dubai. | Physical | |
| 3 | Mr.B.Narandhar | Student | Physical | |

Agenda

1. To Confirm the previous Meeting Minutes
2. To discuss the action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feed backs on B.Tech(FT/PT).
4. To scrutinize the stakeholder feed backs on M.Tech-Communication Systems (FT/PT).
5. To recommend the panel of Examiners for B.Tech(FT/PT).
6. To recommend the panel of Examiners for M.Tech-Communication Systems(FT/PT).
7. To discuss about B.Tech(FT) syllabus revision of higher semesters with Subject to the prevailing condition.
8. To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B.Tech(PT) & M.Tech-Communication Systems(FT/PT).

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MINUTES OF THE MEETING

At the outset, the Chairman BOS welcomed the members for attending the meeting of the Board of Studies. In her introductory remarks, she described the agenda items.

| Agendum 1: |
| --- |
| Discussion: To confirm the previous BOS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes. |
| Resolution: The chairman confirmed the previous meeting minutes of BoS and discussed the action taken on the previous BOS Meeting Minutes. |

| Agendum 2: |
| --- |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabi for B.TECH-ECE (Full Time/Part Time) and M.TECH-Communication Systems (Full Time/Part Time). |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabi and the abstract of stakeholders feedback on B.TECH-ECE (Full Time/Part Time) and M.TECH-Communication Systems (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |

| Agendum 3: |
| --- |
| Discussion: To discuss about B.Tech(FT) syllabus revision of higher semesters subject to the prevailing condition. |
| Resolution: Subject to the prevailing condition, syllabus revision is to be carried out for the higher semesters of B.Tech(FT). |

| Agendum 4: |
| --- |
| Discussion: To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B.Tech(FT) & M.Tech-Communication Systems(FT/PT). |
| Resolution: The members of the board have unanimously recommended to introduce the new courses with the revised curriculum and syllabi for B.TECH–ECE(PT) & M.TECH – Communication Systems (FT/PT). |

| Agendum 5: |
| --- |
| Discussion: To recommend the panel of Examiners for B.Tech(FT/PT) and for M.Tech-Communication Systems(FT/PT). |
| Resolution: The members of the board also scrutinized and updated the panel of examiners and recommended the panel of examiners for the B.TECH –ECE (FT/PT) & M.TECH – Communication Systems (FT/PT), and submitted the same for the Academic Council for its approval. |

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**Agendum 6:**

**Discussion:** To recommend addition of new Value added courses

**Resolution:** The members of the Board analyzed the feedback from various stakeholders and suggested the following value added courses.

- ✓ Introduction to Microcontroller
- ✓ Introduction to r Programming
- ✓ Introduction To Lab view
- ✓ Mobile Phone Technology

**Agendum 7:**

**Discussion:** To recommend addition of new courses .

**Resolution::** The board has unanimously recommended continuing with the existing curriculum of Regulation 2020 with addition of 6 new electives in 5th to 8th semester .As per discussion the list of suggested subjects are:

| S. No | Course Code | Name of the Course |
|---|---|---|
| 1. | 20152E56H | Opto Electronics |
| 2. | 20152E76H | Speech Processing |
| 3. | 20152E81F | Power Electronic |
| 4. | 20152E82G | Plc And Scada |
| 5. | 20152OE54 | Microprocessor And Micro Controller |
| 6. | 20152OE74C | Wireless Communication |

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ANNEXURE-I:

B.TECH(ECE)–Part Time

ITEM 1: It is suggested by board members,The course 22152C12P – Electromagnetic Fields , isre-designed , updated allthe 5 unitsin syllabusinsteadof ElectromagneticTheory inI semester.

ITEM 2:It is proposed by board that the course 22148521BP – Probability and Random Processes, a foundation course brought forward from IIIto II semester.

ITEM3:TheBoardmembersaresuggestedthatThecourse22152C22P –Communication Theory is shifted from III to II semester instead of Electrical Engineering andControl Systems.

ITEM 4:The Board suggested that the course 22148S31BP- Numerical Methods, a foundation course is brought forward from IIIto II semester

ITEM 5: It is proposed to introduce course 22152C32P – Microprocessor and Microcontrollers instead of 19152C32P-Microprocessor Interfacing and Applications to acquire the depth knowledge in processors and controllers.

ITEM 6: The board members are suggested that the course from IV semester, 22152C34P – Digital Communication, is shifed to III semester.

ITEM 7: The board members are suggested that introduce a lab course 22152L35P - Microprocessor and Microcontrollers Lab is revised so as to understand the advanced processor controller interfaving programs.

ITEM8:Itisproposedbymembersthatthecourse22152C41P–MedicalElectronics is brought forward from VI to IV semester.

ITEM 9: The board members are suggested thatthe course 22160C53P – Principles ofManagement is brought as a core paper from list of electives in previous curriculum.

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**ITEM 10:** It is proposed by board members that the new course 22152C61P – Wireless Communication instead of19152C61P- Mobile and Wireless Communication is to understand the concepts of advanced wireless techniques.

**ITEM 11:** The board members are suggested that a course from Vsemester, 22152C62P – VLSIDesign ispushedto VIsemester and also has revised all the 5 Unitsto incorporate the various approaches for design in VLSI.

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**ITEM 12:** It is proposed by board members that the new course is introduced, 22152C63P – Embeddedand Real Time Systems instead of 19152C63P- Microcontroller and Embedded Systems to incorporate fundamentals and advancements in Embedded systems.

**ITEM 13:** It is proposed by board that the board members are suggested that a course 22152C72P – Wireless Networks has revised all Units from I toV to include fundamental concepts in wireless networks.

**ITEM 14:** It is proposed by board members that the new elective course 22152E64AP – Professional Ethics in Engineering is introduced to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and toappreciate the rights of others.

**ITEM 15:** The board members are suggested that the elective course 22152E64CP-RoboticsandAutomation ischangedinsteadof 19152E64CP-RoboticsandallunitsItoV is revised.

**ITEM 16:** It is proposed by board members that the board members are suggested that changedtheelectivecoursefromVIIsemester,22152E748P-AdvancedMicroprocessors and Microcontrollers instead of 19152E748P- Advanced Microprocessors and also has revised itsunit from I to V.

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## SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**Inclusion of Courses in B.Tech., (PT-(R-2022)**

| S.No. | Sub.Code | Sub Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22152C32P | Microprocessors and Microcontrollers | 3 | 1 | 0 | 4 |
| 2. | 22160C53P | Principles of Management | 3 | 1 | 0 | 4 |
| 3. | 22152C61P | Wireless Communication | 4 | 0 | 0 | 4 |
| 4. | 22152E64AP | Professional Ethics in Engineering | 4 | 0 | 0 | 4 |
| 5. | 22152C63P | Embeddedand Real Time Systems | 3 | 1 | 0 | 4 |
| 6. | 22152C63P | Embedded and RealTime Systems | 3 | 1 | 0 | 4 |

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## B.TECH (PART TIME)–ECE–R-2022 SEMESTER I – VII CURRICULUM

### SEMESTER-I

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S11P | Transforms and Partial Differential Equations | 3 | 1 | 0 | 4 |
| 2 | 22152C12P | Electromagnetic Fields | 3 | 1 | 0 | 4 |
| 3 | 22152C13P | Digital Electronics | 3 | 1 | 0 | 4 |
| 4 | 22152C14P | Electronic Circuits-I | 3 | 0 | 0 | 3 |
| 5 | 22152C15P | Signals and Systems | 4 | 0 | 0 | 4 |
| | | TOTAL CREDITS | | | | 19 |

### SEMESTER-II

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S21BP | Probability and Random Processes | 3 | 1 | 0 | 4 |
| 2 | 22152C22P | Communication Theory | 3 | 0 | 0 | 3 |
| 3 | 22152C23P | LinearIntegrated Circuits | 3 | 1 | 0 | 4 |
| 4 | 221S2C24P | ElectronicCircuits– II | 3 | 1 | 0 | 4 |
| 5 | 22152C25P | Transmission Lines and Waveguides | 4 | 0 | 0 | 4 |
| | | TOTAL CREDITS | | | | 19 |

### SEMESTER-III

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1. | 22148S31BP | Numerical Methods | 3 | 1 | 0 | 4 |
| 2. | 22152C32P | Microprocessor and Microcontrollers | 3 | 1 | 0 | 4 |
| 3. | 22152C33P | Digital Signal Processing | 3 | 1 | 0 | 4 |
| 4. | 22152C34P | Digital Communication | 3 | 1 | 0 | 4 |
| 5. | 22152L35P | Microprocessor and Microcontrollers Lab | 0 | 0 | 3 | 2 |
| | | TOTAL CREDITS | | | | 18 |

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SEMESTER-IV

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152C41P | Medical Electronics | 3 | 1 | 0 | 4 |
| 2 | 22152C42P | Antenna and Wave Propagation | 3 | 1 | 0 | 4 |
| 3 | 22152C43P | Wireless Networks | 4 | 0 | 0 | 4 |
| 4 | 22152E44_P | Elective-I | 4 | 0 | 0 | 4 |
| 5 | 22152L45P | Networks and CommunicationLab | 0 | 0 | 3 | 2 |
| | | | | | TOTAL CREDITS | 18 |

SEMESTER-V

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152C51P | Optical Communication and Networks | 4 | 0 | 0 | 4 |
| 2 | 22152C52P | Microwave Engineering | 4 | 0 | 0 | 4 |
| 3 | 22160C53P | Principles of Management | 3 | 1 | 0 | 4 |
| 4 | 22152E54_P | ElectiveII | 4 | 0 | 0 | 4 |
| 5 | 22152L55P | Optical Communication and Microwave Lab | 0 | 0 | 3 | 2 |
| | | | | | TOTAL CREDITS | 18 |

SEMESTER-VI

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152C61P | Wireless Communicatioh | 4 | 0 | 0 | 4 |
| 2 | 22152C62P | VLSI Design | 3 | 1 | 0 | 4 |
| 3 | 22152C63P | Embedded and Real Time Systems | 3 | 1 | 0 | 4 |
| 4 | 22152E64_P | ElectiveIII | 4 | 0 | 0 | 4 |
| 5 | 22152L65P | VLSI and Embedded Systems Lab | 0 | 0 | 3 | 2 |
| | | | | | TOTAL CREDITS | 18 |

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SEMESTER-VII

| S.NO | SUBCODE | SUBJECTNAME | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 21160S71P | Total Quality Management | 3 | 0 | 0 | 3 |
| 2 | 22152C72P | Wireless Networks | 3 | 1 | 0 | 4 |
| 3 | 22152C73P | Telecommunication Switching and Networks | 4 | 0 | 0 | 4 |
| 4 | 22152E74_P | ElectiveIV | 3 | 0 | 0 | 3 |
| 5 | 22152P75P | ProjectWork | 0 | 0 | 12 | 6 |
| | | | | | TOTAL CREDITS | 20 |

## LISTOF ELECTIVES

ELECTIVE-I(SEMESTER-IV)

| S.No | Sub Code | Sub Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152E44AP | High Speed Networks | 4 | 0 | 0 | 4 |
| 2 | 22152E44BP | Advanced Digital Signal Processing | 4 | 0 | 0 | 4 |
| 3 | 22152E44CP | Speech Processing | 4 | 0 | 0 | 4 |
| 4 | 22152E44DP | Fuzzy Logic and Neural Networks | 4 | 0 | 0 | 4 |
| 5 | 22152E44EP | Advanced Electronic System Design | 4 | 0 | 0 | 4 |

ELECTIVE-II(SEMESTER-V)

| S.No | Sub Code | Sub Name | PeriodsPerWeek | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152ES4AP | Environmental Science and Engineering | 4 | 0 | 0 | 4 |
| 2 | 22152ES4BP | Optoelectronic Devices | 4 | 0 | 0 | 4 |
| 3 | 22152ES4CP | Radar and Navigational Aids | 4 | 0 | 0 | 4 |
| 4 | 22152ES4DP | Digital Image Processing | 4 | 0 | 0 | 4 |
| 5. | 22152ES4EP | Engineering Acoustics | 4 | 0 | 0 | 4 |

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ELECTIVE-III(SEMESTER-VI)

| S.No | Sub Code | Sub Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152E64AP | Professional Ethics in Engineering | 4 | 0 | 0 | 4 |
| 2 | 22152E64BP | Satellite Communication | 4 | 0 | 0 | 4 |
| 3 | 22152C63P | Embedded and Real Time Systems | 3 | 1 | 0 | 4 |
| 4 | 22152E64DP | Remote sensing | 4 | 0 | 0 | 4 |
| 5. | 22152E64EP | Network Security | 4 | 0 | 0 | 4 |

ELECTIVE-IV(SEMESTER-VII)

| S.No | Sub Code | Sub Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22152E74AP | Power Electronics | 3 | 0 | 0 | 3 |
| 2 | 22152E74BP | Advanced Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 3 | 22152E74CP | Electromagnetic Interference and Compatibility | 3 | 0 | 0 | 3 |
| 4 | 22152E74DP | SolidState Electronic Drives | 3 | 0 | 0 | 3 |
| 5 | 22152E74EP | Computer Hardware and Interfacing | 3 | 0 | 0 | 3 |

## B.TECH (PART TIME) – ECE – R-2022

## COURSESTRUCTUREANDCREDITSDISTRIBUTION

| Sem. | CoreCourses | | | | Elective Courses | | Total Credits |
|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 05 | 19 | - | - | - | - | 19 |
| II | 05 | 19 | - | - | - | - | 19 |
| III | 04 | 16 | 01 | 02 | - | - | 18 |
| IV | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| V | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| VI | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| VII | 03 | 11 | 01 | 06 | 01 | 03 | 20 |
| TotalCredits | | | | | | | 130 |

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**ANNEXURE-II:**

**M.TECH(Communication Systems)- FullTime & Part Time**

**ITEM 1:** The board members aresuggestedthat 22271C12/22271C12P- Advanced DigitalSignal Processing -This new course is introduced instead of 19271C12/19271C12P- Statistical Signal Processing to comprehendmathematical description and modelling of discrete time random signals.

**ITEM 2:** It is proposed by board members that 22271C13/22271C13P-Advanced Digital Communication Techniques -This new course is introduced instead of 19271C13/19271C13P-Modern Digital Communication Systems to understand the basics of signal-space analysis and digital transmission.

**ITEM 3:** The board members aresuggested that 22271C14/22271C31P- Optical Networks -This course is introduced and revised instead of 19271C23/19271C42P- Fiber Optic Networking to get Understanding the Optical system components like optical amplifiers, wavelength converters.

**ITEM 4:** It is suggested by board members that 22271C23/22271C42P- Electromagnetic Interference and Compatibility -This new course is introduced to familiarize the basics of EMI and EMI sources.

**ITEM 5:** The board members are suggested tha the course 22271E25B /22271E43BP-Soft Computing Techniques is revised all the 5 units instead of 19271E25B/19271E43BP Soft Computing.

**ITEM 6:** The members of board are suggested that the new course22271E34A/22271E53AP - Space Time Wireless Communication is introduced instead of 19271E34A/19271E53AP-Simulation of Communication Networks also toacquire the knowledge on various modulation and coding schemes for space-time WirelessCommunications.

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## SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**Inclusion of Courses in M.Tech., (Communication Systems)-Full Time & Part Time-(R-2022)**

| S.No. | Sub.Code | Sub Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271C12 | Advanced Digital Signal Processing | 3 | 1 | 0 | 4 |
| 2. | 22271C13 | Advanced Digital Communication Techniques | 3 | 1 | 0 | 4 |
| 3. | 22271C14 | Optical Networks | | | | |
| 4. | 22271E25B | Soft Computing Techniques | 3 | 0 | 0 | 3 |
| 5. | 22271E34A | Space Time Wireless Communication | 3 | 0 | 0 | 3 |
| 6. | 22271C23 | Electromagnetic Interference and Compatibility | 4 | 0 | 0 | 4 |

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## M.TECH.COMMUNICATION SYSTEMS-FULLTIME-R-2022 SEMESTER I – IV CURRICULUM

### SEMESTER I

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22248S11B | Applied Mathematics for Electronics Engineering | 3 | 1 | 0 | 4 |
| 2 | 22271C12 | Advanced Digital Signal Processing | 3 | 1 | 0 | 4 |
| 3 | 22271C13 | Advanced Digital Communication Techniques | 3 | 1 | 0 | 4 |
| 4 | 22271C14 | Optical Networks | 4 | 0 | 0 | 4 |
| 5 | 22271C15 | Advanced Radiation Systems | 4 | 0 | 0 | 4 |
| 6 | 22271E16_ | Elective-I | 3 | 0 | 0 | 3 |
| | | Practical | | | | |
| 7 | 22271L17 | Communication Systems Lab–I | 0 | 0 | 3 | 3 |
| | | Total | 20 | 3 | 3 | 26 |

### SEMESTER II

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271C21 | Mobile Communication Networks | 4 | 0 | 0 | 4 |
| 2 | 22271C22 | Advanced Microwave Systems | 4 | 0 | 0 | 4 |
| 3 | 22271C23 | Electromagnetic Interference and Compatibility | 4 | 0 | 0 | 4 |
| 4 | 22271E24_ | Elective-II | 3 | 0 | 0 | 3 |
| 5 | 22271E25_ | Elective-III | 3 | 0 | 0 | 3 |
| | | Practical | | | | |
| 6 | 22271L26 | Communication SystemsLab–II | 0 | 0 | 3 | 3 |
| 7 | 222TECWR | Technical Writing/Seminars | 0 | 0 | 3 | 3 |
| | | Total | 18 | 0 | 6 | 24 |

### SEMESTER III

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271C31 | Wireless Sensor Networks | 4 | 0 | 0 | 4 |
| 2 | 22271E32_ | Elective–IV | 3 | 0 | 0 | 3 |
| 3 | 22271E33_ | Elective–V | 3 | 0 | 0 | 3 |
| 4 | 22271E34_ | Elective–VI | 3 | 0 | 0 | 3 |
| | | Project | | | | |
| 5 | 22271P35 | Project Phase–I | 0 | 0 | 10 | 10 |
| | | Total | 13 | 0 | 10 | 23 |

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SEMESTER IV

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22271P41 | Project Phase–II | 0 | 0 | 15 | 15 |
| | | Total | 0 | 0 | 15 | 15 |
| | | TOTALNO.OFCREDITS | | | | 88 |

LIST OFELECTIVES
Elective-I(SEMESTER–I)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E16A | Internetworking and Multimedia | 3 | 0 | 0 | 3 |
| 2. | 22271E16B | Digital Image Processing | 3 | 0 | 0 | 3 |
| 3. | 22271E16C | LASER Communication | 3 | 0 | 0 | 3 |

Elective-II(SEMESTER–II)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E24A | High Speed Switching Architecture | 3 | 0 | 0 | 3 |
| 2. | 22271E24B | DSP Processor Architecture and Programming | 3 | 0 | 0 | 3 |
| 3. | 22271E24C | Digital Speech Processing | 3 | 0 | 0 | 3 |

Elective-III(SEMESTER–II)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E25A | Digital Communication Receivers | 3 | 0 | 0 | 3 |
| 2. | 22271E25B | Soft Computing Techniques | 3 | 0 | 0 | 3 |
| 3. | 22271E25C | Communication Network Security | 3 | 0 | 0 | 3 |

Elective-IV(SEMESTER–III)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E32A | Software Defined Radio | 3 | 0 | 0 | 3 |
| 2. | 22271E32B | Satellite Communication | 3 | 0 | 0 | 3 |
| 3. | 22271E32C | CDMA Systems | 3 | 0 | 0 | 3 |

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Elective-V(SEMESTER–III)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E33A | Wavelets and Multi Resolution Processing | 3 | 0 | 0 | 3 |
| 2. | 22271E33B | High Performance Communication Networks | 3 | 0 | 0 | 3 |
| 3. | 22271E33C | Advanced Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |

Elective-VI(SEMESTER–III)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E34A | Space Time Wireless Communication | 3 | 0 | 0 | 3 |
| 2. | 22271E34B | Medical Imaging | 3 | 0 | 0 | 3 |
| 3. | 22271E34C | Mobile ADHOC Networks | 3 | 0 | 0 | 3 |

**M.TECH.COMMUNICATIONSYSTEMS-FULLTIME-R-2022**
**Course Structure and Credit Distribution**

| Sem. | CoreCourses | | | | Elective Courses | | Foundation Courses | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 04 | 16 | 01 | 03 | 01 | 03 | 01 | 04 | 26 |
| II | 03 | 12 | 02 | 06 | 02 | 06 | - | - | 24 |
| III | 01 | 04 | 01 | 10 | 03 | 09 | - | - | 23 |
| IV | - | - | 01 | 15 | - | - | - | - | 15 |
| | | | | | | | | TotalCredits | 88 |

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## M.TECH (PARTTIME)-COMMUNICATION SYSTEMS–R-2022

### SEMESTERI–VI CURRICULUM SEMESTER

#### SEMESTER I

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22248S11BP | Applied Mathematics for Electronics Engineering | 3 | 1 | 0 | 4 |
| 2 | 22271C12P | Advanced Digital Signal Processing | 3 | 1 | 0 | 4 |
| 3 | 22271C13P | Advanced Digital Communication Techniques | 3 | 1 | 0 | 4 |
| | | Practical | | | | |
| 4 | 22271L14P | Communication Systems Lab-I | 0 | 0 | 3 | 3 |
| | | | | | Total | 15 |

#### SEMESTER II

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271C21P | Mobile Communication Networks | 4 | 0 | 0 | 4 |
| 2 | 22271C22P | Advanced Microwave Systems | 4 | 0 | 0 | 4 |
| 3 | 22271E23_P | Elective-I | 3 | 0 | 0 | 3 |
| | | Practical | | | | |
| 4 | 22271L24P | Communication Systems Lab-II | 0 | 0 | 3 | 3 |
| 5 | 192TECWRP | Technical Writing/Seminars | 0 | 0 | 3 | 3 |
| | | | | | Total | 17 |

#### SEMESTERIII

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271C31P | Electromagnetic Interference and Compatibility | 4 | 0 | 0 | 4 |
| 2 | 22271C32P | Advanced Radiation Systems | 4 | 0 | 0 | 4 |
| 3 | 22271E33_P | Elective–II | 3 | 0 | 0 | 3 |
| | | | | | Total | 11 |

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SEMESTER I V

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271C41P | Wireless Sensor Networks | 4 | 0 | 0 | 4 |
| 2 | 22271C42P | Optical Networks | 4 | 0 | 0 | 4 |
| 3 | 22271E43_P | Elective-III | 3 | 0 | 0 | 3 |
| | | Project | | | | |
| 4 | 22271P44P | Project Work Phase– I | 0 | 0 | 10 | 10 |
| | | | | | Total | 21 |

SEMESTER V

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | | Theory | | | | |
| 1 | 22271E51_P | Elective-IV | 3 | 0 | 0 | 3 |
| 2 | 22271E52_P | Elective-V | 3 | 0 | 0 | 3 |
| 3 | 22271E53_P | Elective-VI | 3 | 0 | 0 | 3 |
| | | | | | Total | 9 |

SEMESTER VI

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22271P61P | Project Work Phase –II | 0 | 0 | 15 | 15 |
| | | | | | Total | 15 |
| | | | | | TOTAL NO.OF CREDITS | 88 |

## LIST OF ELECTIVES

Elective-I (SEMESTER-II)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E23AP | High Speed Switching Architecture | 3 | 0 | 0 | 3 |
| 2. | 22271E23BP | DSP Processor Architecture and Programming | 3 | 0 | 0 | 3 |
| 3. | 22271E23CP | Digital Speech Processing | 3 | 0 | 0 | 3 |

Elective-II(SEMESTER-III)

| S.N | SUBCODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22271E33AP | Internetworking and Multimedia | 3 | 0 | 0 | 3 |
| 2. | 22271E33BP | Digital Image Processing | 3 | 0 | 0 | 3 |
| 3. | 22271E33CP | LASER Communication | 3 | 0 | 0 | 3 |

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## M.TECH(PART TIME)-COMMUNICATIONSYSTEMS–R-2022

### Course Structure and Credit Distribution

| Sem. | Core Courses | | | | Elective Courses | | Foundation Courses | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 02 | 08 | 01 | 03 | - | - | 01 | 04 | 15 |
| II | 02 | 08 | 02 | 06 | 01 | 03 | - | - | 17 |
| III | 02 | 08 | - | - | 01 | 03 | - | - | 11 |
| IV | 02 | 08 | 01 | 10 | 01 | 03 | - | - | 21 |
| V | - | - | - | - | 03 | 09 | - | - | 09 |
| VI | - | - | 01 | 15 | - | - | - | - | 15 |
| | | | | | | | | Total Credits | 88 |

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Introduction to Microcontroller

## COURSE OBJECTIVE

- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.
- To understand the basic concepts of Embedded Systems and working of a general purpose 8- bimicroprocessor operations.
- Analyze how to access Microcontroller ports

## Syllabus

**Module – 1**
**The 8051 Instruction Set**

- Program Status Word
- Addressing Modes
- Arithmetic Instructions
- Logical Instructions
- Data Transfers
- External RAM
- Lookup Tables

**Module – 2**
**Common Features Description Vectors and assignment**

- 8051 Architecture Block Diagram
- Special Function Registers
- Oscillator and Clock Circuit
- CPU Timing
- Port Structures and Operation

**Module – 3**
**Serial Interface**

- Baud Rates
- Baud Rate Selection Table for UART
- Internal Baud Rate Generator (BRG)
- Using Timer 1 to Generate Baud Rates
- Using Timer 2 to Generate Baud Rates
- More About Mode 0

**Module – 4**
**Framing Error Detection**

- Automatic Address Recognition
- Multiprocessor Communications
- Broadcast Address
- Reset Addresses

**Module – 5**
**UART Registers & Interrupts**

- SCON Register
- T2CON Register
- PCON Register
- BDRCON Register
- How Interrupts Are Handled
- External Interrupts
- Response Time

## COURSE OUTCOME

- At the end of the course the student will be able to:
- Be familiar with the composition, design, and implementation
- Be familiar with reading and understanding processor and component datasheets
- Be familiar with working on a team to create and apply microcontroller
- Be familiar with the basics of interfacing hardware and software
- Be exposed to history of embedded interfaces

**Processor:** Atmel 8051 Microcontrollers

**Course Duration:** 45 Hours

**Eligibility:** III year Agriculture students

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## R programming Syllabus

**Module – 1**

Introduction and preliminaries, organize scientific and technical data

- The R environment
- R and the window system
- R commands, case sensitivity, etc
- Executing commands from or diverting output to a file
- Data permanency and removing objects

**Module – 2**

Simple manipulations; numbers and vectors PID algorithms

- Vectors and assignment
- Vector arithmetic
- Generating regular sequences
- Logical vectors
- Character vectors
- Index vectors; selecting and modifying subsets of a data set

**Module – 3**

Arrays and matrices intrinsic attributes: mode and length

- Array indexing. Subsections of an array
- The array() function
- Generalized transpose of an array
- Matrix facilities
- Forming partitioned matrices, cbind() and rbind()
- The concatenation function, c(), with arrays
- Frequency tables from factors

**Module – 4**

Lists and data frames

- Constructing and modifying lists
- Data frames
- The read.table() function
- The scan() function
- Accessing builtin datasets
- Editing data

**Module – 5**

Grouping, loops and conditional execution

- Grouped expressions
- Named arguments and defaults
- Assignments within functions
- Analysis of variance and model comparison
- Generalized linear models
- The glm() function
- Some non-standard models

**COURSE OUTCOME**

At the end of the course the student will be able to:

1. Do statistical analysis and data visualization
2. Analyze the results of experiments
3. Crunch the data gathered in pre-clinical trials

Software Used: R 4.3.1

Course Duration: 45 Hours:

Eligibility: II year ECE and EEE students

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## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ON

# INTRODUCTION TO LABVIEW

### ABOUT THE INSTITUTION

Ponnaiyah Ramajayam Institute of Science and Technology (PRIST), a Deemed University (U/s 3 of the UGC Act 1956), is one of the renowned units of Ponnaiyah Ramajayam Institutions, which are serving for more than 25 years in promoting quality education and research for our Indian community, since its Inception. The institution is now brimming with many social responsibilities, particularly in promoting quality education through research.

### ABOUT THE DEPARTMENT

The department of Electronics and Communication Engineering came into existence in 2008 with an objective to impart quality education to mee today's competitive environment.

Department has well experienced and dedicated faculty with strong commitment to provide a vibram learning environment to the students in order to help them exce.To keep pace with the current technological trends, the department has a well designed, constantly reviewed syllabus to incorporate all advancements in existing and emerging technologies which gives the students a holistic and pragmatic view of the present scenario of industry.

The Department has state-of-the-art laboratories, such as VLSI lab, Digital Image Processing Lab, Circuit Simulation Lab, Communication Lab, and higher end software like MATLAB, PSPICE,, Xilinx, IAR,L-Sim & N-Sim

The Department runs an undergraduate course in B. Tech - Electronics and Communication Engineering and postgraduate programme like M. Tech in Communication Systems.Department also offers part time programmes in B. Tech - Electronics and Communication Engineering and M. Tech - Communication Systems.

### Introduction to LabView

LabVIEW is a graphical programming environment software that is optimized for engineers and scientists. Developed by National Instruments, this software uses a visual approach to programming and is a great program for beginner programmers. You can create visual charts like data flow charts and connect hardware created by NI and other vendors. The programming environment software is available for Apple Mac, Linux, and Microsoft Windows PC 32-bit and 64-bit operating systems. MATLAB is another programming environment that is similar to LabVIEW. MATLAB is geared toward numbers whereas LabVIEW focuses on visualizations. While MATLAB computes and processes data, LabVIEW gathers and tests information. Simulink is another alternative app that is created by MathWorks, the same developers of MATLAB. The Simulink user experience is more comparable to LabVIEW since diagrams are used in both applications.

LabVIEW

### COURSE OBJECTIVE

1. Use LabVIEW to create data acquisition, analysis and display operations
2. Create user interfaces with charts, graph and buttons
3. Use the programming structures and data types that exist in LabVIEW
4. Use various editing and debugging techniques

### Lab View Syllabus

**Module – 1**

**Lab View over MATLAB**

- Organize scientific and technical data
- Populate the data into flow charts
- Illustrative charts
- Control instruments and virtual instruments
- Hardware integration

**Module – 2**

**Algorithms and languages used**

- PID algorithms
- Add-on algorithms
- Graphical programming language called G
- Custom user interfaces
- Connector and Icon Pane

**Module – 3**

**Navigating Labview**

- Menus and tools
- Creating and using labview projects
- Labview front panel and block diagram
- Searching for controls, vis, and functions

**Module – 4**

**Troubleshooting and Debugging**

- Build a simple labview application Web Developoent
- Various debugging and error-checking techniques in labview
- Problems with block diagram organization
- Problems with data passing within a block diagram

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School Of Engineering And Technology
Department of ECE

# MOBILE PHONE TECHNOLOGIES

## Module 1 (Basic Electronics)

The first module will act as a bridging course for those students who do not have any prior knowledge about the field. For others, who already have prior knowledge about electrical and electronic engineering, this module will help them revise these concepts.

- Basic Electronics - Current, Voltage, AC Current & DC Current, Resistor, Transistor, Capacitor, Diode, Inductor / Coil, Transformer, Integrated Circuit
- Introduction to Digital Electronics
- Study of various Components (parts) inside a Mobile Phone
- Various Components of Mobile Phones
- Study on Components : Speaker / Ringer, Microphone, Vibrate Motor, Display, Drivers, Power Switch, Fuse, Real Time Clock and Quartz Crystal
- What is a Multimeter and How to use a Multimeter
- How to use DC Power Supply
- Use of Battery Booster
- Understanding Circuit Diagrams
- Study of Various Tools and Equipment used in Mobile Phone Repairs

## Module 2 (Mobile Communication)

The second module introduces the student to mobile communication and the technology used. It gives an insight about the basic concepts of mobile communication and various technology standards used around the world, its advantages and disadvantages etc.

- Basics of Mobile Communication
- Introduction to Mobile Phone Technology
- Introduction to Working Principal of Mobile

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- Handoff
- Mobile Station
- Base Station Subsystem
- SIM (Subscriber Identification Module)
- Network and Switching Subsystem
- GSM (Global System for Mobile)
- Advantages of GSM Technology
- CDMA (Code Division Multiple Access)
- Advantages of CDMA Technology
- Introduction of GPRS (General Packet Radio Service)
- Frequency of 4G Bluetooth
- Wi-Fi
- Wi-max (Basic Concepts)

**Module 3 (Circuits and Different Sections on Motherboard)**

The third module introduces the students to various sections on the motherboard of a mobile phone device, its functions, uses and benefits for the mobile phone user

- Power Circuit
- Charging Circuit
- Light Circuit
- SIM Circuit
- Display Circuit
- Keypad Circuit
- Touch Screen Circuit
- Audio Circuit
- Memory card Circuit
- Speaker Circuit
- Microphone Circuit
- Vibrator Circuit
- Network Circuit
- Bluetooth Circuit
- Wi-fi Circuit

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**Module 4 (Hardware Repair)**

The fourth module focuses on hardware and teach the students how to handle and replace various electronic parts. It will help them to learn all the hardware repair procedures in a more comprehensive manner.

- Introduction and Study of Basic Circuit Board
- Motherboard Introduction
- Details of various components on the PCB
- Assembling & Disassembling of different Mobile Phones
- Soldering & De-soldering of Components by using a Soldering Iron
- Soldering & De-soldering of Components by using a Rework Station
- Reheating and Mounting of various BGA and SMD chips
- Ultrasonic Cleaning Procedure
- Names of Different IC's
- How to Identify various IC's
- Study of Different ICs (chips) used on the Motherboard
- Introduction to SMD Components and Testing SMD Components
- Working on SMD/ BGA ICs and the PCB
- BGA IC Re-Balling and Installing
- Installing and Removing Connector, Display flex, Folding and Sliding Handset Flex Cable
- Water Damage and Washing of Mobile Phone with CTC
- Testing of Various Parts and Components
- Circuit Tracing of Different Section of Mobile Phone
- Fault finding & Troubleshooting
- Jumpers and Jumpering Techniques
- Troubleshooting through Circuit Diagrams
- Repairing Procedure for different Hardware Faults
- Checking, Heating and Technique to Remove
- Hot and Cold Testing
- Voltage Tracing and different volts used in Mobile Phone
- Dead set Repairing

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**Module 5 (Software Repair)**

The fifth module focuses on software issues which are some of the most common ones faced by Smartphone users. Sometimes, a software problem can lead to hardware abnormalities as well. This module will teach you how to perform various software repairing techniques.

- Operating Systems
- 9 Different Types of Mobile Operating Systems
- Mobile Phone Applications
- Knowledge about IMEI, IMSI, ESN, PIN, PUK, MTSO, SECURITY LOCK, Default Codes of different Mobile Phones and Factory Resets
- Detailed study of various faults arising due to Corrupt Software
- Introduction of various flasher boxes and software
- Flashing of various brands of handsets
- Removing virus from infected phones
- Unlocking of handsets through codes and/or software
- Use of various secret codes
- FRP lock removal
- How to Flash Mobile with Flash File easily
- Pattern Lock Removal
- Unlock and Lock phone
- Mobile EMEI number Repairing
- Mobile repair with Miracle Box
- Mobile repair with Z3X Box
- How to download Mobile Flashing File, Driver, Mobile Application from the Internet
- Fault Finding & Troubleshooting

**Module 6 (Basic and Advanced Troubleshooting)**

After receiving a customer's complaint, it is important to understand where the problem of the phone lies - hardware or software; and then

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repair it accordingly. This is where the troubleshooting module will come in handy. This module will teach you how to troubleshoot the problems in a mobile phone almost like an experienced mobile phone repair technician.

- Fault finding, Troubleshooting and Repairing of various Faults
- Standard Repair Procedure for Hardware related Faults
- Standard Repair procedure for Software related Faults
- Water Damaged repair Techniques
- Circuit Tracing, Jumper Techniques and Solutions
- Troubleshooting through Schematic Diagrams
- Use of internet for Troubleshooting Faults
- Advanced Troubleshooting Techniques

**Module 6 (Additional Learning)**

To be a successful mobile phone repair technician, one needs to know more than just the technical aspects of fixing a phone. This module aims to teach some additional topics to help you become a better mobile phone repair engineer.

- Revision of Topics already covered in the previous modules
- Technical Guidance for starting and Managing your own Mobile Phone Service Center
- Guidance to Successfully work as a Mobile Phone Technician
- Procuring Tools, Equipments, Spare Parts and Accessories
- Business Ethics and Dealing with Customers
- Promoting your Mobile Phone Repair Business

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# LIST OF ELECTIVES

## ELECTIVE - I (SEMESTER V)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20152E56A | Object Oriented Programming | 3 | 0 | 0 | 3 |
| 2. | 20152E56B | Medical Electronics | 3 | 0 | 0 | 3 |
| 3. | 20152E56C | Operating Systems | 3 | 0 | 0 | 3 |
| 4. | 20152E56D | Robotics and Automation | 3 | 0 | 0 | 3 |
| 5. | 20152E56E | Nano Technology and Applications | 3 | 0 | 0 | 3 |
| 6. | 20152E56F | Human Rights | 3 | 0 | 0 | 3 |
| 7. | 20152E56G | Total Quality Management | 3 | 0 | 0 | 3 |

## ELECTIVE – II (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20152E66A | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 2. | 20152E66B | Advanced Digital Signal Processing | 3 | 0 | 0 | 3 |
| 3. | 20152E66C | MEMS and NEMS | 3 | 0 | 0 | 3 |
| 4. | 20152E66D | Multimedia Compression and Communication | 3 | 0 | 0 | 3 |
| 5. | 20152E66E | CMOS Analog IC Design | 3 | 0 | 0 | 3 |
| 6. | 20152E66F | Wireless Networks | 3 | 0 | 0 | 3 |
| 7. | 20152E66G | Intellectual Property Rights | 3 | 0 | 0 | 3 |
| 8. | [illegible] | Opto-electronics | 3 | 0 | 0 | 3 |

## ELECTIVE – III (SEMESTER VII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20152E76A | Advanced Wireless Communication | 3 | 0 | 0 | 3 |
| 2. | 20152E76B | Cognitive Radio | 3 | 0 | 0 | 3 |
| 3. | 20152E76C | Foundation Skills in Integrated Product Development | 3 | 0 | 0 | 3 |
| 4. | 20152E76D | Machine Learning Techniques | 3 | 0 | 0 | 3 |
| 5. | 20152E76E | Electronics Packaging and Testing | 3 | 0 | 0 | 3 |
| 6. | 20152E76F | Mixed Signal IC Design | 3 | 0 | 0 | 3 |
| 7. | 20152E76G | Disaster Management | 3 | 0 | 0 | 3 |
| 8. | [illegible] | [illegible] | 3 | 0 | 0 | 3 |

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### ELECTIVE – IV (SEMESTER VIII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20152E81A | Electro Magnetic Interference and Compatibility | 3 | 0 | 0 | 3 |
| 2. | 20152E81B | Low Power SoC Design | 3 | 0 | 0 | 3 |
| 3. | 20152E81C | Photonic Networks | 3 | 0 | 0 | 3 |
| 4. | 20152E81D | Compressive Sensing | 3 | 0 | 0 | 3 |
| 5. | 20152E81E | Digital Image Processing | 3 | 0 | 0 | 3 |
| 6. | 20152E81F | [illegible] | 3 | 0 | 0 | 3 |

### ELECTIVE - V (SEMESTER VIII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20152E82A | Video Analytics | 3 | 0 | 0 | 3 |
| 2. | 20152E82B | DSP Architecture and Programming | 3 | 0 | 0 | 3 |
| 3. | 20152E82C | Satellite Communication | 3 | 0 | 0 | 3 |
| 4. | 20152E82D | Soft Computing | 3 | 0 | 0 | 3 |
| 5. | 20152E82E | Principles of Speech Processing | 3 | 0 | 0 | 3 |
| 6. | 20152E82F | Fundamentals of Nano Science | 3 | 0 | 0 | 3 |
| 7. | 20152E82G | PLC And SCADA | 3 | 0 | 0 | 3 |

## LIST OF OPEN ELECTIVES

### OPEN ELECTIVE – I (SEMESTER V)

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1. | CSE | 20150OE54A | Database Management Systems | 3 | 0 | 0 | 3 |
| 2. | | 20150OE54B | Cloud Computing | 3 | 0 | 0 | 3 |
| 3. | | 20150OE54C | Software Architecture | 3 | 0 | 0 | 3 |
| 4. | EEE | 20153OE54A | Industrial Nano Technology | 3 | 0 | 0 | 3 |
| 5. | | 20153OE54B | Energy Conservation and Management | 3 | 0 | 0 | 3 |
| 6. | | 20153FE54C | Computer aided design of electrical apparatus | 3 | 0 | 0 | 3 |
| 7. | MECH | 20154OE54A | Renewable Energy Sources | 3 | 0 | 0 | 3 |
| 8. | | 20154OE54B | Automotive Systems | 3 | 0 | 0 | 3 |
| 9. | | 20154FE54C | Electronics And Microprocessor | 3 | 0 | 0 | 3 |
| 10. | CIVIL | 20155OE54A | Air Pollution and Control Engineering | 3 | 0 | 0 | 3 |
| | | 20155OE54B | Geographic Information System | 3 | 0 | 0 | 3 |
| | | 20154FE54C | Drinking Water Supply And | 3 | 0 | 0 | 3 |

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|---|---|---|---|---|---|---|---|
| | | | Treatment | | | | |
| 13. | ECE | 20152OE54A | Basics of bio medical instrumentation | 3 | 0 | 0 | 3 |
| 14. | | 20152OE54B | Sensors and transducers | 3 | 0 | 0 | 3 |
| 15. | | 20152OE54C | Microprocessor And Micro Controller | 3 | 0 | 0 | 3 |

**OPEN ELECTIVE – II (SEMESTER VII)**

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1. | CSE | 20150OE74A | Introduction to C Programming | 3 | 0 | 0 | 3 |
| 2. | | 20150OE74B | Data Structures and Algorithms | 3 | 0 | 0 | 3 |
| 3. | | 20150OE74C | Web Technology | 3 | 0 | 0 | 3 |
| 4. | EEE | 20153OE74A | Basic Circuit Theory | 3 | 0 | 0 | 3 |
| 5. | | 20153OE74B | Introduction to Renewable Energy Systems | 3 | 0 | 0 | 3 |
| 6. | | 20153AFE74C | Power electronics for renewable energy systems. | 3 | 0 | 0 | 3 |
| 7. | MECH | 20154OE74A | Industrial Safety | 3 | 0 | 0 | 3 |
| 8. | | 20154OE74B | Testing of Materials | 3 | 0 | 0 | 3 |
| 9. | | 20154FE74C | Nuclear Engineering | 3 | 0 | 0 | 3 |
| 10. | CIVIL | 20155OE74A | Green Building Design | 3 | 0 | 0 | 3 |
| 11. | | 20155OE74B | Waste Water Treatment | 3 | 0 | 0 | 3 |
| 12. | | 20154FE74C | Fundamentals Of Aeronautical Engineering | 3 | 0 | 0 | 3 |
| 13. | ECE | 20152OE74A | Robotics | 3 | 0 | 0 | 3 |
| 14. | | 20152OE74B | Electronic devices | 3 | 0 | 0 | 3 |
| 15. | | 20152OE74C | Wireless Communication | 3 | 0 | 0 | 3 |

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**20152OE54C MICROPROCESSORS AND MICROCONTROLLERS** **L T P C**
**3 0 0 3**

**OBJECTIVES:**

- To understand the Architecture of 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To interface microprocessors with supporting chips.
- To study the Architecture of 8051 microcontroller.
- To design a microcontroller based system

**UNIT I THE 8086 MICROPROCESSOR** **9**

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

**UNIT II 8086 SYSTEM BUS STRUCTURE** **9**

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

**UNIT III I/O INTERFACING** **9**

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

**UNIT IV MICROCONTROLLER** **9**

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

**UNIT V INTERFACING MICROCONTROLLER** **9**

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the students should be able to:**

- Understand and execute programs based on 8086 microprocessor.
- Design Memory Interfacing circuits.
- Design and interface I/O circuits.
- Design and implement 8051 microcontroller based systems.

**TEXT BOOKS:**


1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. (UNIT I-III)
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011. (UNIT IV-V)


**REFERENCES:**


1. Douglas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", TMH, 2012.


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2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

| 20152OE74C | WIRELESS COMMUNICATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques

**UNIT I WIRELESS CHANNELS** 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

**UNIT II CELLULAR ARCHITECTURE** 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity-trunking & grade of service – Coverage and capacity improvement.

**UNIT III DIGITAL SIGNALING FOR FADING CHANNELS** 9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

**UNIT IV MULTIPATH MITIGATION TECHNIQUES** 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

**UNIT V MULTIPLE ANTENNA TECHNIQUES** 9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**The student should be able to:**

- Characterize a wireless channel and evolve the system design specifications
- Design a cellular system based on resource availability and traffic demands
- Identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration.

**TEXT BOOKS:**

1. Rappaport,T.S., —Wireless communicationsll, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)
2. Andreas.F. Molisch, —Wireless Communicationsll, John Wiley – India, 2006. (UNIT III,V)

**REFERENCES:**

1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011
2. Van Nee, R. and Ramji Prasad, —OFDM for wireless multimedia communications, Artech House, 2000
3. David Tse and Pramod Viswanath, —Fundamentals of Wireless Communication, Cambridge University Press, 2005.
4. Upena Dalal, —Wireless Communication, Oxford University Press, 2009.

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20152E76H SPEECH PROCESSING

**COURSE OBJECTIVES:**

1. To acquire the fundamentals of the digital signal processing that allows them to assimilate the concepts related to the speech processing.
2. To introduce the fundamentals of speech signal processing.
3. To present basic principles of speech analysis.
4. To give an overview of speech processing applications including speech enhancement, speech recognition and speaker recognition.

**COURSE OUTCOMES:**

**After successful completion of the course, the students are able to**

1. understand the mechanism of human speech production and digital models of speech signals.
2. apply standard digital signal processing tools to analyze speech signals in terms of their Time and frequency domain representations.
3. understand Linear Predictive analysis of speech signal and different pitch period estimation methods.
4. understand the Homomorphic processing of speech signal and applications of speech processing, including speech enhancement.
5. understand the applications of speech processing including speaker recognition and speech recognition.

**UNIT I**

**Introduction :** Introduction, Fundamentals of Digital Speech Processing, The Mechanism of speech production, Acoustic phonetics: vowels, diphthongs, semivowels, nasals, fricatives, stops and affricates, Applications of Speech Signal Processing, Digital Models for Speech Signals: Vocal Tract, Radiation, Excitation, The complete Model.

**UNIT II**

**Speech Analysis :** Short-Time Speech Analysis : Windowing , Spectra of Windows , Time-Domain Parameters: signal analysis in Time Domain, Short-Time average magnitude, Short-Time Average zero-crossing rate (ZCR) and Short-Time auto correlation function Short-Time Average Magnitude Difference Function, Frequency Domain (Spectral) Parameters : Short-Time Fourier Transform Analysis, Spectral Displays, Formant Estimation and Tracking.

**UNIT III**

**Linear predictive coding (LPC) of Speech :** Introduction, Basic principles of Linear predictive Analysis, Solution of the LPC Equation: Cholesky Decomposition Solution for covariance method, Durbin's Recursive Solution for the Autocorrelation Equations, Frequency domain interpretation of mean squared prediction error, Applications of LPC parameters: pitch detection using LPC parameters and Formant analysis using LPC parameters. Pitch Period

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UNIT IV

Decision Making using Parallel Processing Approach ,Pitch Period Estimation using Autocorrelation Function

**Homomorphic Speech processing :** Homomorphic Speech processing: Introduction, Homomorphic systems for Convolution, The complex cepstrum of speech, The Homomorphic Vocoder.

**Speech enhancement :** Introduction, Background, Nature of interfering sounds, speech enhancement techniques: spectral subtraction, Multi-Microphone Adaptive Noise Cancellation.

**UNIT V**

**Speech Recognition :** Basic pattern recognition approaches, Preprocessing, Parametric Representation, speech recognition systems: Isolated Digit Recognition system and continuous Digit Recognition system.

**Speaker Recognition :** Verification vs recognition, Speaker Recognition Systems: speaker verification system and speaker identification system.

**LEARNING RESOURCES:**

**TEXT BOOK(s):**


1. L.R. Rabiner and R.W. Schafer - Digital Processing of Speech Signals, Pearson, 2009.
2. Douglas O' Shaughnessy - Speech Communications: Human & Machine, Second Edition, Oxford University Press, 2004.


**REFERENCE BOOK(s):**


1. Thomas F. Quatieri - Discrete Time Speech signal Processing principles and practice, Third Edition, Pearson Education, 2009.
2. Dr.Shaila D.Apte - Speech and Audio Processing, First Edition, WILEY Precise Textbook, 2015.


**20152E81F POWER ELECTRONICS**

UNIT I POWER SEMI-CONDUCTOR DEVICES
Study of switching devices. SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT — Triggering and commutation circuit for SCR Introduction to Driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS
2-pulse, 3-pulse and 6-pulseconverters– performance parameters –Effect of source inductance—Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III DC TO DC CONVERTERS
Step-down and step-up chopper-control strategy– Introduction to types of choppers-A, B, C, D and E- Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.


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UNIT IV INVERTERS

Single phase and three phase voltage source inverters (both1200 mode and 1800 mode)– Voltage& harmonic control–PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM — Introduction to space vector modulation –Current source inverter. Applications-Induction heating, UPS.

UNIT V AC TO AC CONVERTERS

Single phase and Three phase AC voltage controllers–Control strategy- Power Factor Control — Multistage sequence control -single phase and three phase cyclo converters — Introduction to Matrix converters, Applications –welding.

OUTCOMES: • Ability to determine the suitable device for the application.
- Ability to design of semiconductor device and its parameters.
- Ability to design of protection circuits and control circuits
- Ability to determine the reliability of the system.

REFERENCES

1. B.W Williams 'Power Electronics Circuit Devices and Applications'..
2. Rashid M.H., " Power Electronics Circuits, Devices and Applications ", Prentice Hall India, Third Edition, New Delhi, 2004
3. MD Singh and K.B Khanchandani, "Power Electronics", Tata McGraw Hill, 2001.
4. Mohan, Undeland and Robins, "Power Electronics – Concepts, applications and Design, John Wiley and Sons, Singapore, 2000.
5. Joseph Vithayathil, Power Electronics: Principles and Applications, Delhi, Tata McGraw- Hill, 2010

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20152E82G | PLC AND SCADA | L T P C
3 0 0 3

**COURSE OBJECTIVES:**

To know about the basics of PLC and Automation
To understand the importance of Automation
To explore various types and manufactures of PLCs.
To introduce types of programming languages of PLC and some exercise few programs

**UNIT I INTRODUCTION** **(7+2 SKILL) 9**

Programmable Logic Controller (PLC)- Block diagram of PLC- Programming languages of PLC- Basic instruction sets- Design of alarm and interlocks- Networking of PLC- Overview of safety of PLC with case studies- Process Safety Automation: Levels of process safety through use of PLCs- IEC 61131-3 Standard - Application of international standards in process safety control.

**UNIT II IEC 61131-3** **(7+2 SKILL) 9**

Rails- Rungs- Relay Logic- Latch switch- Timers- Counters- Boolean logics- Math Instructions- Data manipulation Instructions- Requirement of communication networks for PLC, PLC to PC Communication to computer- FBD equivalent to LL- FBD Programming- IL- SFC-ST.

**UNIT III SCADA** **(7+2 SKILL) 9**

Elements of SCADA system- History of SCADA, Remote Terminal Unit- Discrete control- Analog control, Master Terminal Unit- Operator interface.

**UNIT IV HART and Field Bus** **(7+2 SKILL) 9**

Introduction- Evolution of signal standards- HART communication protocol- communication modes- HART networks- HART commands- HART and OSI model- Field bus- Architecture- Basic requirements of field Busstandard- Field bus Topology- Interoperability- Interchangeability.

**UNIT V PLC PROGRAMMING** **(7+2 SKILL) 9**

Exercise in Programming Languages from IEC 61131-3. Traffic Light Control- Two way- Four way – Water Level Control- Automatic Material Sorting System- Automatic Bottle Filling System, Code Converters- DC motor Control- Alarm Circuit.

**TOTAL : 45 PERIODS**

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**SKILL DEVELOPMENT ACTIVITIES (Group Seminar/Mini Project/Assignment/Content Preparation / Quiz/ Surprise Test / Solving GATE questions/ etc)** 10

1 Taking Local area to implement simple closed loop system for any system using PLC.
2 Making a complete automated control loop with Supervisory and HMI system.
3 Implementing an Alarm based control scheme and run in a simulated environment.
4 Designing an entire PLC logic for filling and draining water tank automatically.

**COURSE OUTCOMES:**

**CO1** Understand the basics and need for Automation in industries .
**CO2** Explain the logic and flow of any particular programming written for a process .
**CO3** Apply the knowledge to design or improve an existing program to increase productivity of any process .
**CO4** Breakdown SCADA architecture and communication protocols.
**CO5** Build and logic in any of the programming languages from IEC- 61131- 3 standard .

**TEXT BOOKS:**


1. Frank D. Petruzella, "Programmable Logic Controllers", 5th Edition, McGraw- Hill, New York, 2019.
2. Stuart Boyer A, "SCADA: Supervisory control and data Acquisition", Fourth Edition, ISA- The Instrumentation, Systems, and Automation Society,2010


**REFERENCES**


1. Bolton. W, "Programmble Logic Controllers", Elsevier Newnes, 6th Edition 2015.


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| 20152E56H | Optoelectronics | LPTC<br>3003 |
|---|---|---|

**Course Objectives:**
Teach fundamentals of light interaction with Semiconductor materials and vice-versa and to be able to understand how some of the optoelectronic devices like, LED, Laser Diode, Photodiodes and Photo-voltaic cells work.

**Course Outcomes:**
Student would be able to understand and explain the following: 1) PN junction diode working in homo junction and Heterojunctions, 2) Band diagrams, space charge region formation, 3) basic laser operation and difference between semi-conductor lasers and other lasers like He-Ne (gas laser) or NdYAG laser, 4) working of LED. 5) advantage of Heterostucture Laser diodes 7) photodiode types and their respective advantages like PIN diode and APD's & basic operation of Photovoltaic devices.

**Unit-1Semiconductor Science (review):** Semiconductors and Energy Bands, Band gap Diagrams, pn junctions; Science and engineering of light emitting diodes.

**Unit-2Stimulated Emission Devices:** Laser Diodes, Fabry-Perot and distributed-feedback lasers; vertical-cavity surface-emitting lasers.

**Unit-3Photodetectors:** pn junction, photodiode science and operation, avalanche and heterojunction photodiodes, phototransistors.

**Unit-4Photovoltaic Devices:** Solar energy spectrum, device principles, I-V characteristics, equivalent circuit, temperature effects, materials, devices, and efficiencies.

**Unit-5Polarization and Modulation of light:** Polarization, propagation in anisotropic media, birefringent devices, optical activity, electro-optic effects, integrated optical modulators, acousto-optic modulators, magneto-optic modulators;

**Complement technologies and future outlook: Organic and molecular optoelectronics;

**References:**

1. S. O. Kasap, Optoelectronics and Photonics: Principles and Practices, 1st ed., Pearson Education,2001.
2. S. L. Chuang, Physics of Photonic Devices, 2nd ed., New York: Wiley, 2009.
3. Saleh and Teich, Fundamentals of Photonics, 2nd ed. Wiley Interscience 2007.


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Dr. B.Chandrasekaran, M.Sc(Ag), Ph.D.,
F.(ISA), F.ISR( FOA, Rome), C.SRINM (IRRI), Prod. Advocate (APO, Japan)
Dean (Academic),
School of Agriculture

Date:16.05.2022

## CIRCULAR

All the staff members are requested to attend the Board of Study Meeting scheduled on 18.05.2022( Wednesday) between 10.00 AM to 12.30 PM at Dean cabin. They are also kindly are requested not to apply for any kind of leave or permission or OD on the BOS meeting day.

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## SCHOOL OF AGRICULUTRE

## BOARD OF STUDIES MEETING 2022-2023

## AGENDA

**Date: 18.05.2022**

| S. No | Subject |
|---|---|
| **Welcome Address** | |
| 1. | Welcome Address by the council chairman |
| **Items for reporting to the Board of Studies Meeting** | |
| 2. | 1. To consider the inclusion of add on and audit course in existing curriculum<br>2. To confirm the minutes of the pre board of studies meeting. |

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### SCHOOL OF AGRICULTURE

### MINUTES OF MEETING

The meeting board of studies in School of Agriculture was held on 18th May 2022 Wednesday at 10.00 am. Under the chairmanship of Dr. A. Sathiyavelu

The following members were present for the meeting

**Name and Designation**

1. Dr. A. Sathiyavelu
   Professor, Member
2. Dr. B. Chandrasekaran
   Dean, Chairman
3. Prof. N. Ilanchezhian
   Professor, Member
4. Dr. P. Selvaraj
   Professor, Member
5. Dr.A.Udayakumar
   Professor , Member
6. Dr. K. Kumarakuru
   Associate Professor, Member
7. Mr. S. Tamilcovane
   Assistant Professor, Member
8. Mrs. S.R.Rajam
   Assistant Professor, Member
9. Dr. A. Velayutham, Ph.D.,
   Dean, Agricultural college and Research Institute,Eachangkottai, Thanjavur.
   **Academic Expert – External Member**
10. Mr. K. K. Magudapathi, M. Sc., (Agri)
    Dunhills Phyto Herbs,211, Velayuthasamy Complex,Muthur Road, Vellakoil, Tiruppur (
    **Industrial Expert – External Member**

The Chairman, Board of Studies in the School of Agriculture welcomed the members and briefed about the existing curriculum and syllabus for B.Sc (Hons.) Agri programme.

The minutes of meeting are as follows

1. The department of academic council has suggested adding the value added course in the syllabus for the entrepreneurship development and introducing the emerging topics instead of old elective course and experiential learning. The board of study accept the above

2. The following courses are suggested by Dr. A. Velayutham, Dean, Agricultural college and research institute, Echankottai, Thanjavur for elective course and experiential learning.

- Edible mushroom cultivation
- Vermi technology
- Integrated farming system
- Environmental microbiology
- Aquaculture
- Bio composting
- Nano technology in agriculture
- Plant tissue culture
- Remote sensing
- Food security
- Soil hydrology
- Soil improvement by organic method
- Organic agriculture
- Smart farming
- Drone technology
- Bio inoculants
- Terrace gardening
- Aqua ponics with organic
- Aeroponics
- Industrial agro forestry
- Marine bio diversity

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- Small millets cultivation and value addition

The list of new value added course

**List of new value added course:**

- Certificate course on Commercial Bee Keeping
- Certificate course on Mushroom Cultivation
- Certificate course on Roof Garden

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## LIST OF NEW COURSE (2022-2023)

| S.NO | PROGRAMME NAME | COURSE CODE | COURSE |
|---|---|---|---|
| 1 | B.Sc. (Hons) Agriculture | 18 OPT 201 A | Roof gardening |
| 2 | B.Sc. (Hons) Agriculture | 18 OPT 201B | Digital faming |
| 3 | B.Sc. (Hons) Agriculture | 18 OPT 201 C | Edible mushroom cultivation |
| 4 | B.Sc. (Hons) Agriculture | 18 OPT 201 D | Vermi technology |
| 5 | B.Sc. (Hons) Agriculture | 18 OPT 301A | Integrated farming system |
| 6 | B.Sc. (Hons) Agriculture | 18 OPT 301B | Environmental microbiology |
| 7 | B.Sc. (Hons) Agriculture | 18 OPT 301C | Aquaculture |
| 8 | B.Sc. (Hons) Agriculture | 18 OPT 301 D | Bio inoculants |
| 9 | B.Sc. (Hons) Agriculture | 18 OPT 302 A | Modern irrigation management |
| 10 | B.Sc. (Hons) Agriculture | 18 OPT 302 B | Nano technology |
| 11 | B.Sc. (Hons) Agriculture | 18 OPT 302 C | Plant tissue culture |
| 12 | B.Sc. (Hons) Agriculture | 18 OPT 302 D | Remote sensing |
| 13 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Food security |
| 14 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Soil hydrology |
| 15 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Soil improvement by organic method |
| 16 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Smart farming |
| 17 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Drone technology |
| 18 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Terrace gardening |
| 19 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Aquaponics |
| 20 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Farm management |
| 21 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Marine bio diversity |
| 22 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Small millets cultivation with value addition |
| 23 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Aeroponics |
| 24 | B.Sc. (Hons) Agriculture | 18 EXP 401/402 | Azolla cultivation |

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## Semester – wise distribution of courses

**I Semester**

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 AGR 101 | Fundamentals of Agronomy | 3(2+1) |
| 2 | 18 AGR 102 | Agricultural Heritage* | 1(1+0) |
| 3 | 18 AGR 103 | Introduction to Forestry | 2(1+1) |
| 4 | 18 AEX 101 | Rural Sociology & Educational Psychology | 2(2+0) |
| 5 | 18 AEX 102 | Human Values & Ethics (non gradial) | 1(1+0) |
| 6 | 18 GPB 101 | Introductory Biology | 2(1+1) |
| 7 | 18 HOR 101 | Fundamentals of Horticultre | 2(1+1) |
| 8 | 18 SAC 101 | Fundamentals of Soil Science | 3(2+1) |
| 9 | 18 BIC 101 | Fundamentals of Plant Biochemistry and Biotechnology | 3(2+1) |
| 10 | 18 ENG 101 | Comprehension & Communication Skills in English | 2(1+1) |
| 11 | 18 NSS / NCC 101 | NSS/NCC/Physical Education & Yoga Practices | 2(0+2) |
| | | Total | 23(14+9) |

**II Semester**

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 AGR 104 | Introductory Agro-meteorology & Climate Change | 2(1+1) |
| 2 | 18 AEC 101 | Fundamentals of Agricultural Economics | 2(2+0) |
| 3 | 18 AEN 101 | Fundamentals of Entomology | 3(2+1) |
| 4 | 18 AEX 103 | Fundamentals of Agricultural Extension Education | 3(2+1) |
| 5 | 18 AGM 101 | Agricultural Microbiology | 2(1+1) |
| 6 | 18 GPB 102 | Fundamentals of Genetics | 3(2+1) |
| 7 | 18 CRP 101 | Fundamentals of Crop Physiology | 2(1+1) |
| 8 | 18 PAT 101 | Fundamentals of Plant Pathology | 3(2+1) |
| 9 | 18 SWE 101 | Soil and Water Conservation Engineering | 2(1+1) |
| | | Total | 22(14+8) |

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**III Semester**

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 AGR 201 | Crop Production Technology - I (Kharif Crops) | 2(1+1) |
| 2 | 18 AGR 202 | Education of Tour | 1(0+1) |
| 3 | 18 AEC 201 | Agricultural Finance and Co-operation | 2(1+1) |
| 4 | 18 AMP 201 | Livestock and Poultry Management | 3(2+1) |
| 5 | 18 ENS 201 | Environmental Studies and Disaster Management | 3(2+1) |
| 6 | 18 FMP 201 | Farm Machinery and Power | 2(1+1) |
| 7 | 18 GPB 201 | Fundamentals of Plant Breeding | 3(2+1) |
| 8 | 18 HOR 201 | Production Technology for Vegetables and Spices | 2(1+1) |
| 9 | 18 COM 201 | Agro-Informatics | 2(1+1) |
| 10 | 18 MAT 201 | Statistical Methods | 2(1+1) |
| 11 | 18 AGR 203 | Farming System & Sustainable Agriculture | 1(1+0) |
| | | **Total** | **23(13+10)** |

**IV Semester**

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 AGR 204 | Crop Production Technology - II (Rabi Crops) | 2(1+1) |
| 2 | 18 AGR 205 | Irrigation Water Management | 2(1+1) |
| 3 | 18 AEC 202 | Agricultural Marketing Trade & Prices | 3(2+1) |
| 4 | 18 AEX 201 | Communication Skills and Personality Development | 2(1+1) |
| 5 | 18 ERG 211 | Renewable Energy and Green Technology | 2(1+1) |
| 6 | 18 HOR 202 | Production Technology for Fruit and Plantation Crops | 2(1+1) |
| 7 | 18 PAT 201 | Principles of Integrated Pest and Disease Management | 2(1+1) |
| 8 | 18 SAC 201 | Problematic Soils and their Manage.nent | 2(1+1) |
| 9 | 18 SST 201 | Principles of Seed Technology | 3(2+1) |
| 10 | 18 OPT 201 | Elective Course | 3(2+1) |
| | | **Total** | **23(13+10)** |

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## V Semester

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 GPB 301 | Crop Improvement - I (Kharif Crops) | 2(1+1) |
| 2 | 18 AGR 301 | Rainfed Agriculture & Watershed Management | 2(1+1) |
| 3 | 18 AGR 302 | Practical Crop Production - I (Kharif Crops) | 2(1+1) |
| 4 | 18 AEN 301 | Pests of Crops and Stored Grain and their Management - I | 3(2+1) |
| 5 | 18 AEX 301 | Entrepreneurship Development and Business Communication | 2(1+1) |
| 6 | 18 HOR 301 | Production Technology for Ornamental Crops, MAP and Landscaping | 2(1+1) |
| 7 | 18 PAT 302 | Diseases of Field and Horticultural Crops and their Management - I | 3(2+1) |
| 8 | 18 SAC 301 | Manures, Fertilizers and Soil Fertility Management | 3(2+1) |
| 9 | 18 IPR 301 | Intellectual Property Rights | 1(1+0) |
| 10 | 18 OPT301 | Elective Course | 3(2+1) |
| Total | | | 23(14+9) |

## VI Semester

| S. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| 1 | 18 AGR 303 | Geoinformatics and Nano-technology and Precision Farming | 2(1+1) |
| 2 | 18 GPB 302 | Crop Improvement - II (Rabi Crops) | 2(1+1) |
| 3 | 18 AGR 304 | Practical Crop Production - II (Rabi Crops) | 2(1+1) |
| 4 | 18 AGR 305 | Principles of Organic Farming | 2(1+1) |
| 5 | 18 AEC 301 | Farm Management, Production & Resource Economics | 2(1+1) |
| 6 | 18 AEN 302 | Pest of Horticulture Crops and Management of Beneficial Insects | 2(1+1) |
| 7 | 18 FSN 301 | Principles of Food Science and Nutrition | 2(2+0) |
| 8 | 18 HOR 302 | Post-Harvest Management and Value Addition of Fruits and Vegetable | 2(1+1) |
| 9 | 18 PAT 302 | Diseases of Field and Horticultural Crops and their Management - II | 2(1+1) |
| 10 | 18 PCA 301 | Protected Cultivation and Secondary Agriculture | 2(1+1) |
| 11 | 18 OPT 302 | Elective Course | 3(2+1) |
| Total | | | 23(13+10) |

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VII Semester

| VII Semester | | | | |
|---|---|---|---|---|
| No. | Course Code | Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA) | | |
| | | Activites | No. of weeks | Credit Hours |
| 1 | 18 AEX 401 | General orientation & On campus training by different faculties | 1 | 14 |
| | | Village attachment | 8 | |
| | | Unit attachment in Univ./ College. KVK/ Research Station Attachment | 5 | |
| | | Plant clinic | 2 | 02 |
| | | Agro-Industrial Attachment | 3 | 04 |
| | 18 PRJ 401 | Project Report Preparation, Presentation and Evaluation | 1 | 02 |
| | | Total weeks for RAWE & AIA | 22 | 22 |

- **Agro-Industrial Attachment:** The students would be attached with the agro-industries for a period of 3 weeks to get an experience of the industrial environment and working.
- Educational tour will be conducted in break between IV & V Semester or VI & VII Semester

**RAWE Component-I**

**Village Attachment Training Programme**

| Sl. No. | Activity | Duration |
|---|---|---|
| 1 | Orientation and Survey of Village | 1 week |
| 2 | Agronomical Interventions | 1 week |
| 3 | Plant Protection Interventions | 1 week |
| 4 | Soil Improvement Interventions (Soil sampling and testing) | 1 week |
| 5 | Fruit and Vegetable production interventions | 1 week |
| 6 | Food Processing and Storage interventions | |
| 7 | Animal Production Interventions | 1 week |
| 8 | Extension and Transfer of Technology activities | 1 week |

**RAWE Component-II**

**Agro Industrial Attachment**

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides, Post harvest-processing-value addition, Agri-finance institutions, etc.

**Activities and Tasks during Agro-Industrial Attachment Programme**

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry
- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students

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- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students

**Modules for Skill Development and Entrepreneurship:** A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the **VIII Semester.**

**VIII Semester**

| No. | ourse Code | ourse Title | redit Hours |
|---|---|---|---|
| 1 | 18 EXP 401 | Experiential Learning - Module I | 0+10 |
| 2 | 18 EXP 402 | Experiential Learning - Module II | 0+10 |

**Experiential Learning:** A student can select two experiential learning out of the following and offer during 8th semester.

| S. No. | Title of the module | Credits |
|---|---|---|
| 1 | Roof gardening | 0+10 |
| 2 | Digital farming | 0+10 |
| 3 | Edible mushroom cultivation | 0+10 |
| 4 | Vermi technology | 0+10 |
| 5 | Integrated farming system | 0+10 |
| 6 | Environmental microbiology | 0+10 |
| 7 | Aquaculture | 0+10 |
| 8 | Bio inoculants | 0+10 |
| 9 | Modern irrigation management | 0+10 |
| 10 | Nano technology in agriculture | 0+10 |
| 11 | Plant tissue culture | 0+10 |
| 12 | Remote sensing | 0+10 |

**Elective Courses:** A student can select three elective courses out of the following and offer during 4th, 5th and 6th semesters.

| S. No. | Courses | Credit Hours |
|---|---|---|
| 1 | Food security | 3(2+1) |
| 2 | Soil hydrology | 3(2+1) |
| 3 | Soil improvement by organic method | 3(1+2) |
| 4 | Smart farming | 3(2+1) |
| 5 | Drone technology | 3(2+1) |
| 6 | Terrace gardening | 3(2+1) |
| 7 | Aquaponics with organic | 3(2+1) |
| 8 | Aeroponics | 3(1+2) |
| 9 | Farm management | 3(2+1) |
| 10 | Marine bio diversity | 3(2+1) |
| 11 | Small millets cultivation with value addition | 3(2+1) |
| 12 | Azolla cultivation | 3(2+1) |

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**18 OPT 201D– Vermi technology**

Definition, Habitat of vermicomposting earthworms, Scientific names of native and exotic vermicomposting earthworms (Native Indian earthworms: Perionyx excavatus, Perionyx ceylanensis, European earthworms: Eisenia fetida, Etsemaandrei, South African earthworms. Eudriluseugeniae), Selective features of earthworm species for vermicomposting Principle of vermicomposting, Components of the vermicomposting system (Appropriate species of earthworms with suitable population characteristics, proper substrate, optimum environmental factors under Indian condition, Design and operations to be implemented) Methods of vermicomposting (a) Low cost floor beds, (b) Tank system; Management during vermicomposting, Products of vermicomposting earthworm biomass (vermiprotein) and vermicompost Definition of vermicompost, Physicochemical features of vermicompost, Role of earthworm and vermicompost in growth of plants, Vermiwash and its utility in agriculture.

**18 OPT 201C - Edible mushroom cultivation**

**UNIT-I** :Edible and non-edible mushroom (Historical account, most commonly cultivated mushrooms in the world, distribution and production in various countries).

**UNIT-II** :Mushroom cultivation- Cultivation practices - pure culture, composts and their preparation,

Preparation of compost & cultivation of Agaricusbisporus, Pleurotusflabelltus, harvest.

**UNIT-III** : Pure culture of mushrooms and their nutritional requiremenis. Definition of spawn, substrate for spawn, types of spawn, methods of spawn production, characteristic of a good spawn, storage of spawn.

UNIT-IV :Pests and diseases of Edible mushrooms (Environmental, fungal, bacterial, viral, insect

pests and Nematode diseases and competitor moulds Economics of mushroom cultivation.

UNIT-V: Precautions in mushroom cultivation (precaution to be taken while selecting the area. spawn

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preparation, spawn run, during cropping harvesting etc

**18 OPT 302C- Plant tissue culture**

UNIT-I

History of plant tissue culture, Laboratory set up Basic principles of plant tissue stock preparation,

callus culture. Tonpotency of cells, ditferenteanon, dedifferentiation and redifferentiation

UNIT-II

Methodology Sterilization (physical and chemical methods) Plant cell culture methods, Culture media, Media and their types Phytohormones. MS and BS

UNIT-III

Callus induction sub culture, metabolic patterns in callus culture, Morphogenesis in callus culture

UNIT-IV

Endosperm culture media requirements, morphogenetic potential application Embryo culture culture

requirements applications

UNIT-V

Tissue culture and crop improvement Agrobacterium mediated gene transfer technology

**18 OPT 301B -Environemtal microbiology**

Unit 1:Plant Growth Promotory Rhizobacteria and their metabolites. Mechanism of action for biotic and abiotic stress management.Biological Nitrogen Fixation, Biochemistry of

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nitrogen fixation, nodulation-early and late events, molecular biology of nitrogenase activity

Unit II:Biofertilizers history of biofertilizers, sources of nitrogen and the importance of biofertilizers, description and characteristics of biofertilizers-Rhizobium, Azotobacter, Azospirillum, Blue Green Algae, Azolla, Phosphate solubilizing microorganisms, VAM) Biofertilizer production technology-strain selection, sterilization, growth and fermentation, standards and quality control, biofertilizer application technology, constraints in the commercialization of biofertilizer technology

Unit III: Microbial services in green house gases mitigation, natural resource management and restoration ecology. Microbial ecology of green house gas (methane) producing and consuming bacteria from different ecosystems. Impact of different environmental drivers on ecologically beneficial microbial community and their biomass, Beneficial microbial services in wasteland reclamation and restoration of marginal lands. Microbial biomass as soil fertility index of different agriculture and forest ecosystems.

Unit-IV:Influence of land use change (LUC) on ecosystem services and agro-environmental sustainability.

**18 OPT 301C - Aquaculture**

Unit I Current status, problems and prospects of coastal aquaculture and seed resources.

Unit II Broodstock management: availability, collection, transport, captive rearing, maturation. Nutritional requirements of fishes (cobia, grouper, pompano,seabass, milkfish, mullets, pearlspot) and shellfishes (shrimps, crabs, lobsters, mussels and oysters).

Unit III Hatchery technology and management (cobia, grouper, pompano, seabass,milkfish, mullets, pearlspot, shrimps, crabs, lobsters, mussel & oysters).

Unit IV Culture practices of selected finfishes and shellfishes:

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to financing agriculture, enabled by or integrated with ICT, including mobile financial services, branchless banking, ATMs, and smartcards. While the digital revolution is reaching rural areas in many developing countries, the rural-urban digital divide remains, and rural women face a triple divide: digital, rural, and gender. This module looks at the benefits of ICT when placed in the hands of men and women working in agriculture and rural areas. It examines the challenges that must be overcome and provides recommendations for rural communities to take full and equal advantage of ICT

Unit 4: Strengthening Agricultural Market Access with ICT and Digital Tools

Farmers use mobile phones to build a network of contacts and draw on this wider expertise to obtain critical information more rapidly. The mobile phone, its special applications, and the Internet are essentially becoming management tools for farmers, especially in relation to market intelligence. Greater access to information helps farmers make better decisions about transportation and logistics, price and location, supply and demand, diversification of their product base, and access to inputs. ICT also facilitates market research, increasingly using live information. This market information strengthens farmers' position in their day-to-day trading. Over time, market intelligence enables them to focus on satisfying consumers' and buyers' demands and on developing relationships with stakeholders in the next stage of the value chain. The key development challenge lies in assembling and disseminating this information in a timely manner, not just to traders or larger-scale farmers but also to smallholders.

Unit 5: Using ICT for Remote Sensing, Crowdsourcing, and Big Data

This module consists of three sections. (1) Remote sensing, (2) Crowdsourcing and crowd mapping, and (3) Big data for analytics

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**18 EXP 401 & 402- Azolla cultivation**

Unit-1 :AZOLLA CULTIVATION : Definition and Historical development of Azolla production.

Economic importance of Azolla.

Unit-II: Azolla as biofertilizer, Nutritional values and composition of Azolla sp. Pit preparation for Azolla cultivation

Unit-III: Mass cultivation of Azolla, Requirements for the Growth of Azolla, factors affecting Azolla growth

Unit-IV: Composition of Media for Azolla production, Types of Azollasp

Unit- V: Production of Azolla in small scale and large scale. Harvesting, marketing and its uses in Azolla.

**18 EXP 401 & 402- Aqauponics**

Introduction and overview Aquaponics - Aquaponic Systems and maintenance- Aquaponics and its management- Practical component

**18EXP 401 & 402- Farm management**

Introduction- Strategic Planning - Review of interrelationship between financial statements and cash flow projections - Optimal Capital Structure and Financial Leverage- Linear Programming - Risk Management- Ownership Transfer- Emergency Procedures

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**18 EXP 401 & 402- Terrace gardening**

Introduction to terrace gardening- containers selection and soil preparation- plant selection and care – watering and fertilizing techniques- pest and disease management

**18 EXP 401 & 402- Smart farming**

Introduction to climate smart agriculture- climate smart crop production-climate smart livestock production- climate smart soil land management -water management – for climate smart agriculture –

climate smart fisheries and aquaculture- climate smart forestry.

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## VALUE ADDED COURSE SYLLABUS

### COMMERCIAL BEE KEEPING

Unit 1: Honey bee species, castes, social biology and communication in honey bees - Bee pasturage and preparation of bee floral calendar Honey bees for crop pollination and seed production.

Unit 2: Stingless bees, little bees, rock bees conservation and honey harvest - Beehives,beekeeping equipments specification and uses, visit to manufacturing unit - Hiving feral Indian bee colony, site selection for apiary, visit to migratory bee keeping sites, visit to commercial cerana bee farm

Unit 3: Honey extraction, processing, purity testing and value addition, visit to honey processing unit-Hive inspection, maintenance of hive records, management in nectar flow season, dearth period, management of swarming, absconding and Jaying workers - Dividing, uniting bee colonies, artificial feeding, protecting bees from om pesticides - Insect, mite and bird enemies of honeybees, brood and adult diseases

Unit 4: Mass queen rearing and production of mating nucleus, visit to beekeeping society - Methods of collection of bees wax, bee pollen, propolis, bee venom, royal jelly - Visit to commercial mellifera bee farm

Unit 5:- Marketing and economics of honey and bee products, preparation of bee keeping projects for bank funding

### MUSHROOM CULTIVATION

UNIT 1: Different types of mushroom, Morphology Edible and poisonous type edible mushrooms-Pleurotus, Agaricus, Volvariella and Calocybe nutritional values and pharmacological values-preparation of culture media pure culture techniques- sterilizing techniques-media - glassware - maintenance of culture

Unit 2: Mother spawn production-type of spawn-Multiplication of bed spawn - Substrates for mushroom cultivation and their preparation -mushroom cultivation techniques for Agaricus, Pleurotus, Calocybe and Volvariella maintenance of spawn running and cropping room- harvest,packing and storage of Pleurotus, Agaricus and Calocybe.

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THANJAVUR - 613 403, TAMIL NADU.

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Unit 3: Problems in cultivation of Agaricus, Pleurotus, Calocybe and Volvariella pests, diseases and weed moulds, abiotic disorders - management strategies - Biodegradation of coirpith - estimation

Unit 4: Post harvest technology of Agaricus, Pleurotus, Calocybe and Volvariella - methods of preservation -Drying: solar, cabinet, fluidized bed and freeze drying Packing methods and storage Controlled atmospheric storage modified atmospheric storage and canning - Cost analysis.

Unit 5: Mushroom recipes of Agaricus, Pleurotus, Calocybe and Volvariella Cooking methodsvalue added products - instant food mixes-Cost analysis. Project preparation- principles of mushroom farm enterprise management-cost estimation

**KITCHEN GARDEN**

**Unit I: characteristics of kitchen garden** - Vegetableoccupyanimportantplaceinourdailylifeparticularlyforvegetarians.Vegetables are the only source to increase not only the nutritive values of foods but also itspalatability

**Unit II: Kitchen Garden Site Selection**- There will belimited choicefor the selection of sitesforkitchen gardens.Thefinalchoice is usually the backyard of the house.

**UnitIII : Landpreparation**- Firstly a through spade digging is made to a depth of 30-40 cm. stones, bushes andperennial weeds are removed.

**UnitVI : Sowingandplanting** - Seeds of transplanted crops like tomato, Brinjal and Chilli can be sown in nursery beds orpots one month in advance by drawing lines.

**UnitV : Harvesting**

**AGRI TOURISM**

**Unit I:** Agritourism - as part of rural development and tourism. Definition and forms. Strengths and weaknesses.

**Unit II:** Business projects - their content and development. Economic and environmental aspects of agritourism.

**Unit III:** Characteristics of quality and their grant.

**Unit IV:** Field exercises in agro-tourism farms and facilities.

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**Unit V:** Excursion on the international exhibition focusing on tourism, rural tourism and agritourism.

**POST HARVEST TECHNOLOGY**

**Unit 1:** Post harvest technology of vegetable crops

**Unit II:** Post harvest technology of fruit crops

**Unit III:** Value addition flowers

**Unit IV:** Processing of plantation crop, spices, Medicinal plants and aromatic plants

**NON CHEMICAL FARMING**

**Unit 1:** Introduction (Definition of organic farming and an Overview of organic farming) Systems Concept/Theory (Components, interactions, structures, hierarchies)

**Unit II:** Initiatives taken by the central and state governments, NGOs and other organizations for promotion of organic agriculture in India. Organic nutrient sources and their fortification organic manures- methods of composting

**Unit III:** Nutrient use in organic farming-scope and limitations. Nutrient management inorganic farming. Organic ecosystem and their concepts

**Unit IV:** Fundamentals of insect, disease and weed management under organic mode of production-cultural-biological methods-non chemical pest & disease management. Botanicals pyrethrum, neem seed kernel extract, neem seed powder, soluble neem formulations, neem oil

**Unit V:** Inspection certification labelling and accreditation procedures for organic products. Processing - economic consideration and viability. Marketing and export potential of organic products-national economy

**ROOF GARDENING**

**Unit 1:** Introduction- Understand the role of a Rooftop Gardener Familiarize with the scope and importance of gardening/rooftop gardening Develop basic aesthetic sense of gardening

**Unit 2:** Design Rooftop garden- Interpret and implement the common design principles used in designing the rooftop garden. Explain the different factors to be considered for the layout of the

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rooftop garden Make use of rooftop garden accessories and designer pots/containers as per the availability of space Demonstrate pot gardening or container gardening Identify ideal plants, shrubs, seasonal flowers, climbers etc. for rooftop gardening (apt root and shoot growth). Prepare appropriate soil mixture or growing medium for rooftop plants.

Unit 3: Grow and maintain the condition of plants- Grow, propagate and ensure maintenance of the plants. Undertake potting and repotting operations. Undertake bonsai planting. Follow the standard procedures of timely training, pruning, removing the dead and old parts of the plants for their healthy growth and improved quality.

Unit 4: Use and maintain the gardening tools, containers and other equipment- Identify different garden tools and equipment and their uses to be used in roof top gardens. Ensure proper use and cleanliness of various hand tools. Identify ideal type of containers from available options as per the requirement of plant and aesthetic sense Ensure correct handling of containers used for roof gardens

Unit 5: Monitor the plants and identify any potential damage- Identify common types of plant pest and diseases Ensure appropriate precautionary and corrective measures to spread and

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SCHOOL OF COMMERCE AND BUSINESS MANAGEMENT

DEPARTMENT OF COMMERCE

MINUTES OF BOARD OF STUDIES MEETING

2022-2023

The Board Of Studies Meeting For The Department Of Commerce Is Held On 06.05.2022 At 10.Am,In MBA (PSB) BLOCK ,Prist Deemed To Be University ,Thanjavur Under The (Dr.S.Rajendran Chairman ,Bos)

**The Following Members Were Present:**

Dr.S.Rajendran(Chairperson/HoD / Bos Member)

Dr.R.Saminathan (External Expert-Academic / Bos Member)

CA. S. Venkataraman (External Expert- Industry / Bos Member)

Dr.R.Selvaraj (Professor/Bos Member)

Dr.S.Kamaraju (Professor / Bos Member)

Dr.G.Karthiga (Associate Professor / Bos Member)

Dr.V.Sridevi (Associate Professor/ Bos Member)

Dr.R.Rajavarthini (Assistant Professor/ Bos Member)

Dr.D.Sharmilarajan (Assistant Professor/ Bos Member)

K.Sathya (Special Invitee-Dean/ Bos Member)

M.Revathi (Special Invitee-Alumnus/Alumna)

S.Kaviya (Special Invitee-Current student )

The Chairman (Bos) Welcomed All The Members And Presented The Feedbacks About Existing Curriculum Received From Various Stack Holders And Also From The Department Academic Advisory Committee.

The Members Of The Board Have Unanimously Discussed And Carefully Revolved The Existing Syllabus For B. Com,B.Com Ca ,M.Com,M.Phil,In Details End Made The Necessary No Changes In ( B.Com., B.Com Ca ,M Com.,MPhil).

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THANJAVUR - 613 403

**There Were Introduce The Following Discipline Specific Elective Courses :**

| NAME OF THE PROGRAMME | NAME OF THE COURSE | COURSE CODE | YEAR OF INTRODUCTION |
|---|---|---|---|
| B. Com | Indian Economy | 20161DSC55C | 2022 |
| B. Com | Business Mathematics | 20161DSC55D | 2022 |
| B. Com | Consumer Protection and Consumer Rights | 20161DSC55E | 2022 |
| B. Com | Merchant Banking | 20161DSC55F | 2022 |
| B. Com | E-Commerce and its Applications | 20161DSC64C | 2022 |
| B. Com | Industrial Organization | 20161DSC64D | 2022 |
| B. Com | Practical Auditing | 20161DSC64E | 2022 |
| B. Com | Industrial Relation | 20161DSC64F | 2022 |
| B.Com CA | Portfolio Management | 20198DSC55C | 2022 |
| B.Com CA | International Marketing | 20198DSC55D | 2022 |
| B.Com CA | Rural Economics | 20198DSC55E | 2022 |
| B.Com CA | International Economics | 20198DSC55F | 2022 |
| B.Com CA | Management Principles and Applications | 20198DSC64C | 2022 |
| B.Com CA | Computerized Accounting System | 20198DSC64D | 2022 |
| B.Com CA | Business Tax Procedures and Management | 20198DSC64E | 2022 |
| B.Com CA | Fundamentals of Investment | 20198DSC64F | 2022 |
| M. Com | Consumer Affairs and Customer Care | 20261DSC15C | 2022 |
| M. Com | Financial Market | 20261DSC15D | 2022 |
| M. Com | Information Technology in Business | 20261DSC25D | 2022 |
| M. Com | Macro and Indian Economy | 20261DSC25D | 2022 |
| M. Com | GST and Indirect Taxes | 20261DSC34C | 2022 |
| M. Com | Communication in Management | 20261DSC34D | 2022 |
| M. Com | Indirect Tax Law | 20261DSC44C | 2022 |
| M. Com | Principles of Micro Economics | 20261DSC44D | 2022 |

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The Following Value Added Non Diploma and Certificate Course (2022-2023)

| S.No | COURSE TITLE | COURSE CODE |
|---|---|---|
| 1 | Diploma in Event Management | 226IEM |
| 2 | Certificate Course in Intellectual Property Rights | 226IIPR |
| 3 | Certificate Course in Mutual Fund Operations | 226IMF |
| 4 | Certificate Course in E-Filing of Income Tax(IT&TDS) | 226IEFT |
| 5 | Certificate Course in GIS Skills for Youth | 226IGSY |
| 6 | Certificate Course Preparatory for NET/SET Examinations | 226INET |

**The Following Members And chairman signature**

Dr. S.Ramachandran (Chairperson-IQAC) (Ex-Officio Member)

Dr. R. Somasundaram (External Expert-Academic- Ex-Officio Member)

CA. S. Venkataraman (External Expert- Industry- Ex-Officio Member)

Dr. R. Selvaraj (Professor-Ex-Officio Member)

Dr. S.Kanimozhi (Professor - Ex-Officio Member)

Dr. G.Kanthiga (Associate Professor - Ex-Officio Member)

Dr. V.Sridevi (Associate Professor- Ex-Officio Member)

Dr. R. Rajavasudhevi (Assistant Professor-Ex-Officio Member)

Dr. D.Udayakumari (Assistant Professor- Ex-Officio Member)

K. Sathya (Special Invitee-Dean)- Ex-Officio Member)

M.Revathi (Special Invitee-Alumnus Alumni)

S.Kaviya (Special Invitee -Current student )

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## SCHOOL OF COMMECRE AND BUSINESS MANAGEMENT

### DEPARTMENT OF COMMERCEB.Com., -

### REGULATION 2020

## COURSE STRUCTURE

### SEMESTER – I

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11 | Tami – I/Advanced English-I/Hindi-I/ French - I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 20161SEC13 | Basic Accounting | 4 | 1 | 0 | 4 |
| 20167SEC14 | Business Environment | 3 | 1 | 0 | 3+ |
| 20161AEC15 | Marketing | 3 | 0 | 0 | 3 |
| 20161AEC16 | Business Economics | 3 | 1 | 3 | 3 |
| | Total | 21 | 3 | 3 | 17 |
| | AUDIT COURSE | | | | |
| 20ILSCIC | Indian Constitution | - | - | - | 2 |
| 20ILSCUV | Universal Human Values | - | - | - | 2 |

### SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC21/ 20111AEC21/ 20132AEC21/ 20135AEC21 | Tamil – II/ Advanced English-II/Hindi-II/ French – II | 4 | 0 | 0 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| 20111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 20161SEC23 | Business Accounting | 4 | 1 | 1 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| 20161SEC24 | Ethics in Business | 3 | 1 | 1 | 3 |
| 20161AEC25 | Business Statistics | 3 | 1 | 1 | 3 |
| | | | | | |
| 20161SEC26 | Business Organization and Management | 3 | 0 | 0 | 3 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| | | | | | |
| 20161RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **21** | **3** | **3** | **18** |
| | **AUDIT COURSES** | | | | |
| 201LSCCS | Communication Skills | - | - | - | 2 |
| 201SSCBE | Basic Behavioral Etiquette | - | - | - | 2 |

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SEMESTER – III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 20110AEC31/ 20132AEC31/ 20111AEC31/ 20135AEC31 | Tamil – III/Hindi-III/Advanced English-III/ French – III | 4 | 0 | 0 | 2 |
| 20111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 20161SEC33 | Cost Accounting | 2 | 1 | 2 | 4 |
| 20161SEC34 | Banking Theory Law and Practice | 2 | 1 | 1 | 3 |
| 20161AEC35 | Business Law for Managers | 2 | 0 | 2 | 3 |
| 20161AEC36 | Essential of Business Communication | 2 | 0 | 1 | 3 |
| | | | | | |
| | RESEARCH SKILL BASED COURSE | | | | |
| 20161RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 18 | 2 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 20115COA | Office Automation | - | - | - | 2 |

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## SEMESTER – IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 20110AEC41/ 20111AEC41/ 20132AEC41/ 19135AEC41 | Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV | 4 | 0 | 0 | 2 |
| 20111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 20161SEC43 | Partnership Account | 3 | 1 | 2 | 4 |
| 20161SEC44 | Advertising and Sales Promotion | 3 | 1 | 1 | 3 |
| 20UENSTU45 | Environmental Studies | 2 | 0 | 1 | 3 |
| 20161AEC46 | Company Law and Secretarial Practice | 3 | 0 | 1 | 3 |
| 20161AEC47 | Office Management | 3 | 0 | 1 | 2 |
| | **Total** | **19** | **2** | **6** | **19** |
| | **AUDIT COURSE** | | | | |
| 20ULSCLS | Leadership and Management Skills | - | - | - | 2 |
| 20USSCAQ | General Aptitude and Quantitative Ability | | | | 2 |

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## SEMESTER – V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| | | | | | |
| 20161SEC51 | Corporate Accounting | 4 | 1 | 2 | 4 |
| 20161SEC52 | Financial Management | 3 | 1 | 1 | 4 |
| 20161SEC53 | Financial Services | 3 | 1 | 1 | 4 |
| 20161SEC54 | Computer Application in Business | 3 | 1 | 1 | 4 |
| 20161DSC55- | Discipline Specific Elective – I | 3 | 0 | 1 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 20161BRC57 | Participation in Bounded Research | - | - | - | 1 |
| | **Total** | **16** | **4** | **6** | **19** |
| | **AUDIT COURSE** | | | | |
| **201ACLSPSL** | Professional Skills | - | - | - | 2 |

## SEMESTER – VI

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20161SEC61 | Management Accounting | 3 | 1 | 2 | 5 |
| 20161SEC62 | Entrepreneurship and Small Business Management | 3 | 1 | 1 | 5 |
| 20161SEC63 | Auditing | 3 | 1 | 1 | 4 |
| 20161DSC64– | Discipline Specific Elective – II | 3 | 0 | 2 | 2 |
| 201__OEC(2 Digit Course Name ) | Open Elective | 4 | 0 | 0 | 2 |
| **20161PRW66** | Project Work | - | - | - | 4 |
| **20161PROEE** | Program Exit Examination | - | - | - | 1 |
| | **Total** | **16** | **3** | **6** | **23** |
| | **AUDIT COURSE** | | | | |
| **201SSCIM** | Interview Skills Training and Mock Test | - | - | - | 2 |
| **201LSCCE** | Community Engagement | - | - | - | 1 |
| **201TERP9** | Tally ERP | - | - | - | 2 |
| | **Total Credits -Programme** | | | | **116** |
| | **Total Credits - Audit Courses** | | | | **21** |

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## DISCIPLINE SPECIFIC ELECTIVE

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|
| V | 20161DSC55A | Stock Exchange Practice |
| | 20161DSC55B | Cooperative Law and Practice |
| | 20161DSC55C | |
| | 20161DSC55D | Indian Economy |
| | 20161DSC55E | Business Mathematics |
| | 20161DSC55F | Consumer Protection and Consumer Rights |
| | | Merchant Banking |
| VI | 20161DSC64A | Income Tax Law and Practice |
| | 20161DSC64B | Co-Operation Theory |
| | 20161DSC64C | E-Commerce and its Applications |
| | 20161DSC64D | Industrial Organization |
| | 20161DSC64E | Practical Auditing |
| | 20161DSC64F | Industrial Relation |

## OPEN ELECTIVE

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|

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| | | |
|---|---|---|
| VI | 201TAOEC | Tamil Ilakkiya Varalaru |
| | 201ENOEC | Journalism |
| | 201MAOEC | Development of Mathematical Skills |
| | 201PHOEC | Instrumentation |
| | 201CHOEC | Food and Adulteration |
| | 201MBOEC | Wild Life Conservation |
| | 201CSOEC | Web Technology |
| | 201CAOEC | E-Learning |

## B.COM CREDIT DISTRIBUTION

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 10 | 06 | - | - | - | 01 | 17 |
| II | 10 | 07 | - | - | 01 | - | 18 |
| III | 10 | 07 | - | - | 02 | - | 19 |
| IV | 09 | 07 | - | - | - | 03 | 19 |
| V | - | 16 | 02 | - | 01 | - | 19 |
| VI | - | 16 | 02 | 02 | - | 03 | 23 |
| Total | 39 | 59 | 04 | 02 | 04 | 07 | 115 |

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SCHOOLOFCOMMERCEANDBUSINESSMANAGEMENT
DEPARTMENTOFCOMMERCE

B.Com, COMPUTER APPLICATION- REGULATION

2020COURSESTRUCTURE

SEMESTER–I

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11 | Tami– I/Advanced English-I/Hindi-I/ French-I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 20198SEC13 | Financial Accounting | 4 | 1 | 1 | 4 |
| 20198SEC14 | Business Management | 3 | 1 | 1 | 3 |
| 20198AEC15 | Information Technology | 3 | 1 | 1 | 4 |
| 20198AEC16 | Operating System | 3 | 0 | 0 | 2 |
| | | | | | |
| | Total | 21 | 3 | 3 | 17 |
| | AUDITCOURSE | | | | |
| 20ILSCIC | Indian Constitution | - | - | - | 2 |
| 20ILSCUV | Universal Human Values | - | - | - | 2 |

SEMESTER–II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC21/ 20111AEC21/ 20132AEC21/ 20135AEC21 | Tamil–II/Advanced English-II/Hindi-II/ French-II | 4 | 0 | 0 | 2 |
| 20111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 20198SEC23 | Business Accounting | 5 | 1 | 0 | 4 |
| 20198AEC24 | Business Law | 4 | 1 | 0 | 4 |
| 20198AEC25 | ProgramminginC | 4 | 1 | 0 | 4 |
| | | | | | |
| | PRACTICAL | | | | |
| 20198SEC26L | ProgramminginCLab | 0 | 0 | 3 | 2 |
| | RESEARCH SKILLBASEDCOURSE | | | | |
| | I | | | | |
| 20198RLC27 | ResearchLedSeminar | - | - | - | 1 |
| | Total | 21 | 3 | 3 | 18 |
| | AUDITCOURSES | | | | |
| 20ILSCCS | Communication Skills | - | - | - | 2 |
| 20ISSCBE | Basic Behavioral Etiquette | - | - | - | 2 |

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SEMESTER–III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC31/ 20132AEC31/ 20111AEC31/ 20135AEC31 | Tamil-III/Hindi-III/Advanced English-III/French-III | 4 | 0 | 0 | 2 |
| 20111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 20198SEC33 | Cost Accounting | 3 | 1 | 2 | 4 |
| 20198SEC34 | BankingTheoryLaward Practice | 3 | 0 | 1 | 4 |
| 20198AEC35 | ProgramminginC++ | 2 | 1 | 0 | 3 |
| | PRACTICAL | | | | |
| 20198AEC36 | ProgramminginC++lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | RESEARCH SKILLBASEDCOURSE | | | | |
| 20120RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 18 | 2 | 6 | 19 |
| | AUDITCOURSE | | | | |
| 201LSCOA | Office Automation | - | - | - | 2 |

SEMESTER–IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC41/ 20111AEC41/ 20132AEC41/ 19135AEC41 | Tamil-IV/Advanced English-IV/Hindi-IV/French-IV | 4 | 0 | 0 | 2 |
| 20111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 20198SEC43 | Auditing | 3 | 1 | 1 | 3 |
| 20198SEC44 | Business Statistics | 3 | 1 | 2 | 4 |
| 20198AEC45 | VisualBasicProgramming | 3 | 0 | 0 | 4 |
| 201ENSTU47 | Environmental Studies | 2 | 0 | 0 | 2 |
| | PRACTICAL | | | | |
| 20198AEC46L | VisualBasicProgramming Lab | 0 | 0 | 3 | 2 |
| | Total | 19 | 2 | 6 | 19 |
| | AUDITCOURSE | | | | |
| 201LSCLS | Leadership and Management Skills | - | - | - | 2 |
| 201SSCAQ | General Aptitude and Quantitative Ability | | | | 2 |

SEMESTER– V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| | | | | | |
| 20198SEC51 | Corporate Accounting | 4 | 1 | 3 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 20198SEC5 | Business Economics | 3 | 1 | 1 | 4 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 20198SEC53 | Financial Management | 3 | 1 | 2 | 4 |
| 20198SEC54 | Software Engineering | 3 | 1 | 0 | 4 |
| 20198DSC55_ | Discipline Specific Elective-I | 3 | 0 | 1 | 2 |
| | RESEARCH SKILLBASEDCOURSE | | | | |
| 20120BRC56 | Participation in Bounded Research | - | - | - | 1 |
| | Total | 16 | 4 | 6 | 19 |
| | AUDITCOURSE | | | | |
| 201ACLSPSL | Professional Skills | - | - | - | 2 |

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20198SEC61 | Management Accounting | 3 | 1 | 2 | 5 |
| 20198SEC62 | IncomeTaxLawandPractice | 3 | 1 | 1 | 5 |
| 20198SEC63 | Database Management System | 3 | 1 | 1 | 4 |
| 20198DSC64_ | Discipline Specific Elective-II | 3 | 0 | 2 | 2 |
| 201_OEC65 (Digit Course Name) | Open Elective | 4 | 0 | 0 | 2 |
| 20198PRWeb | Project Work | - | - | - | 4 |
| 20198PROEE | Program Exit Examination | - | - | - | 1 |
| | Total | 16 | 3 | 6 | 23 |
| | AUDITCOURSE | | | | |
| 201SSCIM | Interview Skills Training and Mock Test | - | - | - | 2 |
| 201LSCCE | Community Engagement | - | - | - | 1 |
| 201TERP9 | Tally ERP9 | - | - | - | 2 |
| | Total Credits-Programme | | | | 116 |
| | Total Credits - Audit Courses | | | | 21 |

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## SEMESTER – VI

### DISCIPLINESPECIFICELECTIVE

| SEMESTER | COURSECODE | COURSETITLE |
|---|---|---|
| V | 20198DSC55A<br>20198DSC55B | Management Information System Stock Market Practice |
| | 20198DSC55C | |
| | 20198DSC55D | Portfolio Management |
| | 20198DSC55E | International Marketing |
| | 20198DSC55F | Rural Economics |
| | | International Economics |
| VI | 20198DSC64A<br>20198DSC64B | E-Commerce<br>Wed Designing |
| | 20198DSC64C | Management Principles and Applications |
| | 20198DSC64D | Computerized Accounting System |
| | 20198DSC64E | Business Tax Procedures and Management |
| | 20198DSC64F | Fundamentals of Investment |

### OPENELECTIVE

| SEMESTER | COURSE CODE | COURSETITLE |
|---|---|---|
| VI | 201TAOEC<br>201ENOEC<br>201MAOEC<br>201PHOEC<br>201CHOEC<br>201MBOEC<br>201CSOEC<br>201CAOEC | TamilIlakkiyaVaralaru/<br>ournalism<br>DevelopmentofMathematicalSkills/<br>nstrumentation<br>Food and<br>AdulterationWildLifeC<br>onservationWebTechn<br>[illegible]<br>[illegible] |

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B.Com- CACreditDistribution

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 10 | 06 | - | - | - | 01 | 17 |
| II | 10 | 07 | - | - | 01 | - | 18 |
| III | 10 | 07 | - | - | 02 | - | 19 |
| IV | 09 | 07 | - | - | - | 03 | 19 |
| V | - | 16 | 02 | - | 01 | - | 19 |
| VI | - | 16 | 02 | 02 | - | 03 | 23 |
| Total | 39 | 59 | 04 | 02 | 04 | 07 | 115 |

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COURSE STRUCTURESEMESTER – I

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | SEMESTER I | | | | |
| 20261SEC11 | Marketing research and Consumer Behavior | 4 | 0 | 0 | 4 |
| 20261SEC12 | Human Resource management | 4 | 0 | 0 | 4 |
| 20261SEC13 | Services Marketing | 5 | 0 | 0 | 4 |
| 20261SEC14 | Advanced Cost Management | 4 | 1 | 0 | 4 |
| 20261DSC15 – | Discipline Specific Elective - I | 5 | 0 | 0 | 4 |
| 20261RLS16 | Research Led Seminar | - | - | - | 1 |
| | Total | 28 | 1 | 0 | 21 |
| | SEMESTER – II | | | | |
| 20261SEC21 | Quantitative Techniques For Decision Making | 5 | 1 | 0 | 4 |
| 20261SEC22 | Total Quality Management | 5 | 0 | 0 | 4 |
| 20261SEC23 | Advanced Management Accounting | 5 | 1 | 0 | 4 |
| 20261SEC24 | Securities Analysis and Portfolio Management | 5 | 0 | 0 | 4 |
| 20261DSC25 - | Discipline Specific Elective – II | 5 | 0 | 0 | 4 |
| 20261RMC26 | Research Methodology | 3 | 0 | 0 | 2 |
| 20261BRC27 | Participation in Bounded Research | - | - | - | 2 |
| | Total | 28 | 2 | 0 | 24 |
| | SEMESTER - III | | | | |
| 20261SEC31 | Project Planning and Control | 5 | 1 | 0 | 5 |
| 20261SEC32 | Advanced Corporate Accounting | 5 | 2 | 0 | 5 |
| 20261SEC33 | Brand Management | 5 | 2 | 0 | 5 |
| 20261DSC34 - | Discipline Specific Elective – III | 5 | 0 | 0 | 4 |
| 202 - OEC35 | Open Elective | 4 | 0 | 0 | 3 |
| 20261SRC36 | Participation in Scaffold Research (Societal Project ) | - | - | - | 2 |
| | Total | 24 | 5 | 0 | 24 |
| | SEMESTER - IV | | | | |
| 20261SEC41 | Income Tax Law and Tax Planning | 5 | 2 | 0 | 5 |
| 20261SEC42 | International Business | 5 | 1 | 0 | 5 |
| 20261SEC43 | Co- Operation in India and Abroad | 5 | 1 | 0 | 5 |

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| | | | | | |
|---|---|---|---|---|---|
| 20261DSC44 - | Discipline Specific Elective - IV | 5 | 0 | 0 | 4 |
| 20261PRW45 | Project Work | - | - | - | 6 |
| 20261PEE | Program – Exit Examination | | | | 2 |
| | **Total** | **20** | **4** | **0** | **27** |
| | **Total Credit For the Programme** | - | - | | **96** |

**DISCIPLINE SPECIFIC ELECTIVE COURSES**

| SEMESTER | COURSE TITLE |
|---|---|
| I | Strategic Management<br>Organizational Behaviour<br>Consumer Affairs and Customer Care<br>Financial Market |
| II | Corporate Legal Frame Work<br>Retail Management<br>Information Technology in Business<br>Macro and Indian Economy |
| III | Indian Financial System<br>International Marketing<br>GST and Indirect Taxes<br>Communication in Management |
| IV | Customer Relationship Management<br>International Financial Management<br>Indirect Tax Law<br>Principles of Micro Economics |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| III | a) Writing for the media<br>b) Applicable Mathematics Techniques<br>c) Bio-medical Instrumentation<br>d) Green Chemistry<br>e) Herbal Medicine<br>f) M-Marketing |

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B.COM
Indian Economy
20161DSC55C

COURSE OUTCOME
Contemporary Issues in Indian Economy shall provide basic knowledge on national income accountings, various issues involved in agricultural, industrial, financial, trade sectors, public institutions and finally human resources development.

Chapter 1
Growth and development

- Economic Growth in India: National Income Determination, GDP, GNP, NDP, NNP, Personal Income
- Economic Growth versus Economic Development
- Measures of Economic Development: Human Development Index, Green GDP, Gross National Happiness Index
- Economic and Social Development in India: Millennium Development Goals
- Sustainable Development Goals and India

Chapter 2
Issues related to planning

- Issues related to planning in India
- Planning in India: Bombay Plan; People's Plan; Mahalanobis Plan; Wage-Good Model, Gandhian Plan
- Mobilization of Resources

Chapter 3
Inflation

- Inflation in India: CPI, WPI, GDP Deflator, Inflation Rate
- Types of Inflation: Demand Pull, Cost-Push, Stagflation, Structural Inflation, Deflation, and Disinflation
- The Cost of Inflation

Chapter 4
Monetary policy in India

- Monetary Economics: Barter System, Definition, Function and Evolution of Money
- Monetary Policy in India: Inflation, deflation, Recessionary and Inflationary Scenarios
- Monetary Policy tools and Money Supply in India
- Monetary Policy Agreement in India

Chapter 5
Banks & Financial markets

- Banking in India: Definition, Functions, and Types of Banks
- Development Finance Institutions: IFCI, ICICI, SIDBI, IDBI, UTI, LIC, GIC
- Nationalisation of Banks
- Banking Sector Reforms in India: Narasimhan Committee 1&2, Nachiket Mor Committee, P J Nayak Committee
- Problem of Non Performing Assets in India
- Non-Banking Financial Companies in India
- Financial Inclusion in India: Need and future: PMJDY, Payment Banks and Small Banks

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Business Mathematics
20161DSC55D

COURSE OUTCOMES

Confidence in Mathematical Skills: Participants will gain increased confidence in their ability to perform calculations, interpret numerical data, and apply mathematical concepts to solve business-related problems.

COURSE OBJECTIVE:

Studying this subject would improve the mathematical abilities and statistical skills of the students and help them in understanding related concepts.

Unit 1

Percentage: Meaning, practical use and computation of percentages.

Unit 2

Ratio, Proportion and Variation : Inverse ratio, continued ratio. Direct proportion and inverse proportion. Application to partnership.

Unit 3

Profit and Loss : Problems involving cost price selling price, market price trade discount and cash discount.

Unit 4

Commission and Brokerage : Rate of commission, types of commission agents, problems

Unit 5.

Simple and Compound Interest: Concept of principal rate of interest, period and amount by simple and compound interest. Calculation of compound interest when compounded quarterly half yearly and annually.

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Consumer Protection and Consumer Rights
20161D5C55E

Objective:

This paper seeks to familiarize the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit 1:

Conceptual Framework: Consumer and Markets: Concept of Consumer, Nature of markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP) and Local Taxes, Fair Price, labelling and packaging. Experiencing and Voicing Dissatisfaction: Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers: Internal and External Complaint handling: Corporate Redress Systems and Public Redress Systems

Unit 2:

The Consumer Protection Act, 1986 Objectives and Basic Concepts: Consumer, goods, service, defect in goods, deficiency in service, spurious goods and services, unfair trade practice, restrictive trade practice. Organisational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels, Basic Consumer Rights. Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

Unit 3:

Grievance Redress Mechanism under the Consumer Protection Act, 1986: Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy to be provided; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit 4:

Industry Regulators and Consumer Complaint Redress Mechanism: Banking: RBI and Banking Ombudsman Insurance: IRDA and Insurance Ombudsman Telecommunication:

TRAI Food Products: FSSAI (an overview) Electricity Supply: Electricity Regulatory Commission Advertising: ASCI

Unit 5:

Consumerism in India: Consumer Movement in India: Evolution of Consumer Movement in India. Formation of consumer organizations and their role in consumer protection, recent developments in

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Merchant Banking
20161DSC55f

Objectives

- To examine Financial Services management as an important and contemporary area of financial management
- To understand the various financial services and their future
- To determine the most suitable financial service, given the situations and contingencies

Unit-I

Financial Services Industry – Emergence – Developments – Fund Based and Non-fund based activities – modern activities – New Financial Products and Services, Innovative Financial Instruments – Challenges Ahead.

Unit-II

Merchant Banking - Issues Management Intermediaries – Merchant Bankers/Lead Managers – Underwriters – Bankers, Brokers and Registrars to an Issue and Share Transfer Agents– Debenture /Trustees – Portfolio Managers – Issue Management Activities/Procedures – Eligibility norms – Pricing of Issues – Promoters' contribution – Issue of Indian Depository Receipts (IDR) – Issue Advertisement – Issue of Debt Instruments – Book building – Green shoe Option – Initial Public Offer through Stock Exchange Online System – Preferential Issues – Qualified Institutional Placement.

Unit-III

Factoring and Forfeiting - Modus Operandi, types, functions – Factoring in India - Bills Discounting – Real estate Industry – Housing Finance – Housing Finance system – National Housing Bank – Refinance scheme for HFCs – Asset Liability Management - Securitization – Mortgage Based Securitization – Reverse Mortgage Loan (RML) Securitization of Standard Assets

Unit-IV

Mutual Funds - Origin, Types of Mutual Funds, Importance, Mutual Funds Industry in India – SEBI's directives for Mutual Funds, Private Mutual Funds, Asst Management company – Unit Trust of India – Evaluation of Performance of Mutual Funds – Money Market Mutual Funds -RBI Guidelines – Venture Capital: Meaning, Origin, Importance, Methods, India Scenario.

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Unit-V Insurance - Meaning, Types, Insurance Industry in India and related reforms – Other Financial Services - Credit Cards - Credit Rating: Regulatory framework – Credit Rating Agencies – Rating Process and Methodology - Rating symbols/Grades – Pension Plan.

References

Khan. M.Y., FINANCIAL SERVICES, Tata McGraw Hill, New Delhi, 2001. Gurusamy, MERCHANT BANKING AND FINANCIAL SERVIES, Tata McGraw Hill, New Delhi, 3/ed. 2009.

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E-Commerce and its Applications
20161D5C54C

Objective This course is designed to give an overall knowledge of e-commerce and it's technologies as well as designing a web page.

Unit 1 :

Fundamentals of E-commerce- definition- features- need & essential requirements- Parties to E-commerce transactions- environment-E-commerce & trade Cycle - Internet concepts- Private network- Public network (VPN)- Intranet & its applications- Extranet

Unit 2 :

Business Strategy in an Electronic Age -Value Chain-Competitive Advantage-Business strategies

Unit 3 :

E-commerce Types :Inter-organizational transaction- Purchasing online After sales online-internet trading relationship-B2B- EDI & its impact on BusinessB2C- Intra-organizational E-commerce– Supply chain management.

Unit 4:

Electronic-business E-business solution entity- electronic Customer Relationship Management & it's strategies- Strategies for web auctions- virtual communications & web portals- E-shopping.

Unit 5:

Electronic payment Systems Digital Payment Requirements- Digital Token based Electronic Payment Systems Classification of New Payment Systems Properties of E-cash- Cheque Payment Systems on internet- Risk and Electronic Payment Systems- Designing Electronic Payment System- Digital Signature.

Suggested Readings:

1. Rayudu- C.S - "E-commerce E-business"- Himalaya Publishing House Mumbai.

2. Whiteley David "E-commerce: Strategy- Technologies and Applications"- Tata McGraw Hill-New Delhi- New York.

3. Kalakota- Ravi & Whinston- Andrew B.- "Frontiers of Electronic Commerce" - Addison-Wesley- Massachusetts.

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Industrial Organization
20161DSC64D

COURSE OBJECTIVES:

Industrial Organization studies the strategic behavior of firms in the market with respect to production, pricing, employment and other choices. One of its main foci is to understand why markets are not perfectly competitive, and what the interaction is between market structure and a firm's behavior.

**Introduction**

(a) What is a firm?

(b) Review: The firm's problem

(c) Market structure: monopoly, monopsony, market power

(d) Antitrust Laws

**2. Goods, Industries and Competitive Strategy**

(a) Competitive Advantage and Industry Analysis

(b) Internet Markets

(c) Information Goods

**3. Monopoly: Pricing and Other Strategies**

(a) Price Discrimination

(b) Pricing in Online Markets

(c) Product Differentiation

(d) Durable Goods and Dynamic Pricing

(e) Switching Costs and Lock-in

(f) Advertising

**4. Strategic Interaction (between firms)**

(a) Review: Game Theory

(b) Static Oligopoly

(c) Collusion and Cartels

(d) Reputation

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5. Contractual Relationships Between Firms

(a) Innovation and Patents

(b) Mergers

(c) Vertical Integration and Restraints

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Practical Auditing
20161DSC64E

**UNIT – I**

Meaning and definition of auditing – Distinction between auditing and accounting – objectives – Advantages and limitations of audit – scope of audit – classifications of audits – Audit planning, meaning – Audit programme, meaning, objectives and contents – audit note book, contents, usefulness of audit note book – Audit working papers, meaning, Ownership and custody – Test checking and Routine checking, meaning- Internal control, meaning , definition, objectives, Techniques for evaluation of internal control system – Internal check, meaning, objectives, difference between internal control, Internal check and internal audit.

**UNIT II**

Vouching, meaning and definition, objectives – Trading transactions – audit of ledger- Serutinizing of ledgers – vouching of cash receipts and payments. Vouching of outstanding assets and liability – verification, meaning objectives and process – valuation of assets and liabilities– Distinction between verification and valuation.

**UNIT III**

Depreciation and reserves – meaning – Auditor's duty with regard to depreciation – Reserves and provisions Distinguish between reserves and provisions – Depreciation of wasting Assets.

**UNIT IV**

Appointment of auditors – appointment of first auditor – appointment by various governments – filling of casual vacancy – Appointment by special resolution – Re-appointment and holding company as appointment failing on the auditor of Auditorship – Removal of auditor – Remuneration – auditors fees – qualification and disqualifications – Duties of the company auditor – Rights and powers of auditors – Different classes of auditors – Audit Report – Preparation and Presentation.

**UNIT V**

EDP audit – meaning – Division of auditing in EDP environment – Impact of computerization on audit approach – online computer system audit – Types of online computer systems – audit around with the computers – procedure of audit under EDP system.

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Industrial Relation
20161DSC64F

Objectives:

To sensitize the students with the basics of Industrial Relations and Employee Relations To impart information's about Industrial Relations as an important aspect of Industrial Management.

Module 1:

INTRODUCTION: Concept of Industry and Industrial Relations. Development of Industry and Industrial Relations. Meaning of Employee Relations and its difference with Industrial Relations. Nature and Scope of Industrial Relations as an inter-disciplinary subject. Tripartite Scheme of Industrial Relations. Approaches to Industrial Relations -Sociological Approach – Psychological Approach -Marxian Approach -Trusteeship Approach

Module 2:

State of Industrial Relations Meaning of Good and Poor Industrial Relations Causes for poor industrial relations. Indicators of Poor Industrial Relations

a. Absenteeism

b. Labor Turn Over

c. Industrial Indiscipline

d. Grievances [with special reference to women employees in India]

e. Strikes

f. Lock outs

Module 3:

TRADE UNIONS AS AN ESSENTIAL COMPONENT OF INDUSTRIAL RELATIONS Definitions of Trade unions. Reasons for formation of trade unions. Characteristics of Trade Unions. Functions of Trade Unions Problems faced by Trade unions and future of trade unions

Module 4:

COLLECTIVE BARGAINING Concept. Essential Pre requisites for collective bargaining. Levels of Collective Bargaining-Plant Level, Industry Level and National Level The collective Bargaining Process Advantages and disadvantages of collective bargaining

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Module 5:

Labour Laws and Industrial Relations Meaning of Labour Laws. Importance of Labour Laws in Industrial Relations. Few examples of Labour Laws, specific to India, with a brief introduction The Industrial Disputes Act, 1947, The Payment of Wages Act, 1936, The EPF (and Miscellaneous Provisions) Act,1952, The ESI Act, 1948

BOOKS FOR REFERENCE:


1. Gandhi, M.K., Capital and Labour, Bharatiya Vidya Bhavan, Mumbai,1998

2. Gandhi M K: Satyagraha in South Africa,Bharatiya Vidya Bhavan, Mumbai, 1998

3. Karl Marx & Frederick Engels: Manifesto of the Communist Party, Progress Publishers, Moscow, 1986


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Portfolio Management
20198DSC55C

| | Learning Objectives |
|---|---|
| 1. | To become familiar with various Investment avenues and Portfolio Construction |
| 2. | To understand the Equity Shares, Preference Shares and Bonds valuation models |
| 3. | To learn about long-term and short-term investment analysis tools |
| 4. | To analyse with Portfolio theories. |
| 5 | To gain knowledge in Portfolio performance methods. |

**Course Units**

**UNIT I** (12 hrs)

**Investment and Portfolio Management**

Investment – Meaning – Nature and scope of Investment – Investment vs Speculation – Type of Investors – Investment Avenues – Factors influencing the investment choice – Portfolio Management: Meaning and significance, Active Vs Passive portfolio management – Strategic Vs Tactical asset allocation – Factors Affecting Investment Decisions in Portfolio Management.

**UNIT II** (12hrs)

**Valuation of Securities**

Bond: Introduction – Reasons for issuing Bonds – Features of Bond – Types of Bonds – Determinants of bond safety – Bond Prices, Yields and Interest Rates – Measuring Price Volatility of Bonds-Macaulay Duration and Modified Duration – Preference Shares: Introduction – Features of Preference Shares – Preference Shares Yield – Holding Period Return – Yield to Call –Concept of Present Value – Equity Share Valuation Models.

**UNIT III** (12 hrs)

**Fundamental Analysis and Technical Analysis**

Fundamental Analysis: Objectives – Economic Analysis, Industry Analysis, Company Analysis –Technical Analysis: Meaning – Assumptions – Pros and cons of technical analysis–Differences between fundamental analysis and technical analysis – Dow Theory – Types of Charts – Chart Patterns – Trend Analysis – Support Line and Resistance Line – Volume Analysis – Indicators and Oscillators – Simple Moving Average – Exponential Moving Average – Relative Strength Index – Bollinger Band – Elliot Wave Theory.

**UNIT IV** (12hrs)

**Efficient Market Hypothesis**

Efficient Market Hypothesis – Markowitz Model, Arbitrage Pricing Theory – Sharpe's Single index portfolio selection method – Capital Asset Pricing Model (CAPM).

**UNIT V** (12hrs)

**Portfolio Performance Evaluation**

Portfolio Performance Evaluation – Meaning – Need for Evaluation – Methods of calculating Portfolio return – Sharpe's Ratio – Treynor's Ratio – Jansen's Differential Returns – Portfolio Revision – Need for Portfolio Revision – Formula Plans.

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International Marketing
20198DSC55D

| |
|---|
| **COURSE OBJECTIVE:** To familiarize the students to the basic concepts of international business management |
| **COURSE OUTCOME:** Students would be familiar with global business environment, global strategic management practices and get acquainted with functional domain practices. They would be familiar with conflicts situations and ethical issues in global business. |
| UNIT-I Nature and scope of international business-Growing relevance of international business-Types, Importance of international business. Business environment - internal and external environment. Economic and political Environment-Economic roles of Government-Demographic environment-Cultural environment.<br><br>UNIT-II International Economic Institutions-IMF, World Bank, UNCTAD, UNIDO, GATT, WTO-organizational Structure, objectives and functions<br><br>UNIT-III International Trade- Theories-Adam Smith, David Ricardo, Heckshor-Ohlin, and Leontief Paradox, Government influence on trade-protectionism. Exim policy of India-Export promotion measures-SEZ-objectives of SEZ -BoP vs BoT-Components of BoP.<br><br>UNIT IV MNCs- Benefits to host country-problems of MNCs -MNCs in India. Transfer of technology-levels,channels-methods of technology transfer-International investments-Significance and types of international investments-FDI ,FII- factors affecting FDI-Cross-border M&As.<br><br>UNIT-V Globalisation and business - Features of globalization-essential conditions for globalization-foreign market entry strategies-Pros and cons of Globalisation.Global competitiveness-determinants and its pillars-IT revolution and Business Environment |
| **TEXT/ REFERENCES**<br>Francis Cherunilam," International Business Environment", Himalaya Publishing House Mumbai, 4th Edition<br>K.Aswathappa, "Essentials of Business Environment-Text,Cases &Exercises", Himalaya Publishing House, Mumbai. 12th Revised Edition. |

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Rural Economics
20198DSC55E

Unit 1

Rural Economy of India Features of Rural Economy Role and Importance of Animal Husbandry in Rural Economy Place of agriculture in Rural Economy.

Unit 2

Agricultural Productivity: Farm Size, Land Utilization and Cropping Pattern, Agricultural Productivity Causes of Low Productivity in Agricultural, measures taken to improve the productivity.

Unit 3

Rural Poverty and Unemployment : Causes, Extent, various Rural Development Programmers for reducing the rural Poverty and Unemployment.

Unit 4

Rural Industrialization : Need, Importance and problems of Agro-based Industries Small-scale and Cottage Industries.

Unit 5

Rural Finance : Need and Sources of rural Finance, Problem of Rural Indebtedness and its relief measures.

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International Economics
20198DSC55F

**COURSE OBJECTIVES:**

- To familiarize students with concepts of economics and its relevant in business scenario
- To understand the applications & implications of economics in decision-making and problem solving.
- To Understand the optimal point of productivity of a firm.
- To describe the pricing strategies that are consistent with evolving marketing needs
- To Provide insights to the various market structures in an economy.

**UNIT I**

Nature and scope of managerial economics – definition of economics – important concepts of economics – relationship between micro, macro and managerial economics – nature and scope – objectives of firm.

**UNIT II**

Demand analysis – Theory of consumer behavior – Marginal utility analysis – indifference curve analysis Meaning of demand – Law of demand – Types of demand-Determinants of demand – Elasticity of demand – Demand forecasting.

**UNIT III**

Production and cost analysis – Production – Factors of production – production function – Concept – Law of variable proportion – Law of return to scale and economies of scale – cost analysis – Different cost concepts – Cost output relationship short run and long run – Revenue curves of firms – Supply analysis.

**UNIT IV**

Pricing methods and strategies – Objectives – Factors – General consideration of pricing – methods of pricing – Dual pricing – Price discrimination.

**UNIT V**

Market classification – Perfect competition – Monopoly – Monopolistic competition – Duopoly – Oligopoly.

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Management Principles and Applications
20198DSC64C

**AIM:** To enhance production and productivity, decrease cost of production and maximize prosperity both for employer and employees having common interests.

**LEARNING OBJECTIVES:**

- To impart knowledge about evolution of management.
- To provide understanding on planning process and importance of decision making in organization.
- To learn the application of principles in organization.
- To study the process of effective controlling in organization.
- To familiarize students about significance of ethics in business and its implications.

**UNIT – I**

Management: Importance – Definition – Nature and Scope of Management - Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.

**UNIT – II**

Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Nature and Types of Policies – Decision–making – Process of Decision – making – Types of Decision.

**UNIT - III**

Organizing: Types of Organizations – Organization Structure – Span of Control and Committees – Departmentalization – Informal Organization- Authority – Delegation – Decentralization – Difference between Authority and Power – Responsibility.

**UNIT – IV**

Direction – Nature and Purpose. Co- ordination – Need, Type and Techniques and requisites for excellent Co-ordination – Controlling – Meaning and Importance – Control Process.

**UNIT – V**

Definition of Business ethics - Types of Ethical issues -Role and importance of Business Ethics and Values in Business - Ethics internal - Ethics External – Environment Protection - Responsibilities of Business.

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Computerized Accounting System
20198DSC64D

Course Objective

This course aims to make students understand and to acquire basic knowledge in the Computerized accounting systems and its applications in the area of business.

Course Outcomes

On Successful completion of the Course, Students will be able to: CO 1: Compare the differences between manual accounting and Computerized accounting and develop skills to master the practical aspects of Computerized accounting. CO 2: Prepare Final accounts of Sole traders and maintain other registers and reports pertaining to accounts and Inventory.

UNIT-I:

Introduction to Computerized Accounting: Introduction – Importance - Application - Advantages and disadvantages – Difference between Manual Accounting and Computerized Accounting – Features of Accounting packages.

UNIT II

Company Creation and Accounting Masters Creation of Company- steps-selecting a company-closing a company-alter -delete a company – Accounts Groups-Predefined Groups– Ledgers – create-alter- delete, voucher types – short cut keys- Voucher Entry-display - alter – delete – Features – Accounting Features- Inventory Features-Configuration menu– Day Book – Cash and Bank Books-Rectification of Error altering the transactions- Bank Reconciliation Statement.

UNIT-III

Accounts with Inventory Creation of Stock Groups – display-alter-delete-Stock categories – creation - Stock items create-display-alter-delete – Good owns - Units of Measure - Inventory Vouchers-Display of inventory reports & statements.

UNIT IV

Final Accounts and Report Generation Final Accounts of Sole Traders: Trial Balance - Profit and Loss Account - Balance Sheet Preparation of Final Accounts-Generation of Reports-Account Books – Registers - Statement of Accounts.

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Business Tax Procedures and Management
20198DSC64E

| | Learning Objectives |
|---|---|
| 1 | To identify deductions from gross total income and computation of income for different classes of assesses |
| 2 | To understand the procedure for filing of returns and tax planning |
| 3 | To analyse the structure on international business taxations |
| 4 | To assess Goods and Services Tax and filing GST returns |
| 5 | To compute customs duty as per Customs Act |

**Course Units**

**UNIT I** **(18 hrs)**

**Assessment of persons**

Tax Exemptions for Agricultural Income-Deductions to be made in computing total income (80G, 80GGB & 80GGC, 80IA, 80IAB, 80IAC, 80IB, 80IBA, 80ID, 80IE, 80JJA, 80JJAA, 80LA, 80M, 80P, 80PA) – Assessment of Firms, AOP, BOI, Company and Co-operative society.

**UNIT II** **(18 hrs)**

**Tax Returns and Tax planning**

Return of income: Statutory obligation, Return Forms, Time for filing of return, Revised return, Modified return-Assessment - Tax Deducted at Source - Advance payment of Tax: Persons liable to pay, Due date, Computation - Payment in pursuance of order of Assessing Officer, Consequences on non-payment. – Tax planning, Tax avoidance and Tax evasion - Tax planning and specific management decisions: Make or buy, Own or lease, Retain or replace, Shut down or continue.

**UNIT III** **(18 hrs)**

**International business taxation**

International business taxation – Taxation of Non-resident – Double taxation relief - Transfer pricing and other anti-avoidance measure - Application and interpretation of tax treaties - (Double taxation avoidance agreement - DTAA) - Equalization levy.

**UNIT IV** **(18 hrs)**

**Goods and Services Tax**

Goods and Services Tax: GST Act, 2017 - Registration – Procedure for registration under Schedule III – Amendment of registration – Rates of Tax of IGST, CGST, SGST/UGTST- Assessment of GST - Self-assessment – Provisional assessment – Scrutiny of returns – Assessment of non filers of returns – Assessment of unregistered persons – Assessment in certain special cases – Tax Invoice – Credit and Debit Notes – Payment of Tax – Input Tax Credit - Anti profiteering – Filing of Returns- Penalties – Prosecution – Appeal and Revision.

**UNIT V** **(18 hrs)**

**Customs Act, 1962**

Customs Act, 1962 Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition

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Fundamentals of Investment
20198D5C64F

Objective:

To familiarize the students with different investment alternatives, introduce them to the framework of their analysis and valuation and highlight the role of investor protection.

Unit I

Investment Environment The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets (Equity, Mutual funds, Debt), the Indian securities market, the market participants (Stock exchanges, Stock brokers, Clearing House, Depositories, Depository Participants, FIIs, Domestic institutional investors, Individual investors), Online and offline trading in securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on returns.

Unit II

Analysis of Equity and Debt Instruments

(a) Fixed Income Securities Bond features, types of bonds, estimating bond yields, Bond Pricing, types of bond risks, default risk and credit rating, Bond market indices.

(b) Approaches to Equity Analysis Introduction to Fundamental Analysis, Technical Analysis, dividend capitalization models, and price-earnings multiple approach to equity valuation, Intrinsic value, Price to Book value ratio.

Unit III

Portfolio Analysis and Financial Derivatives Portfolio and Diversification, Portfolio Risk and Return; Mutual Funds; Introduction to Financial Derivatives; Financial Derivatives Markets in India

Unit IV:

Investor Protection Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressed system, insider trading, investor awareness and activism.

References

1. Jones, C.P. Investments Analysis and Management, Wiley, 8th ed.

2. Chandra, Prasanna. Investment Analysis and Portfolio Management, McGraw Hill Education

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Consumer Affairs and Customer Care
20261DSC15C

Objective:

This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Unit 1:

Conceptual Framework Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology.

Unit 2:

The Consumer Protection Law in India 15 Lectures Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.

Unit 3:

Grievance Redressal Mechanism under the Indian Consumer Protection Law Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Unit 4:

Role of Industry Regulators in Consumer Protection

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electrcity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

Unit 5: Contemporary Issues in Consumer Affairs 13 Lectures Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

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Financial Market
20261DSC15D

COURSE OBJECTIVES:

To train a strong foundation for the students in the different areas of financial market • To develop the skills required for applying the concepts and techniques in the field of financial market. • To build a strong attitude in the minds of students to work efficiently and effectively.

Unit 1 - Concept of Management-Definitions, Characteristics, Management & Administration, Different Concepts, Management by Communication, Management by Systems, Management by Results, Management by Participation, Management by Motivation, MBE, MBO –Functions of management

Unit 2 - Planning – Meaning, Nature, Definition, significance, Process, Types, Importance, Principles, Steps – Planning and forecasting, Planning and Decision, Making and Planning and Control.

Unit 3 - Organizing –definitions, Principles of Organization, Formal & informal Organizations, Steps, Importance, Organization Development, Problems in Organization, Delegation - Centralization and Decentralization–Span of Control, Types or Forms of Organization - Organizational goals – Determination of Organizational goals and Determinants of Organizational goals.

Unit 4 - Directing- Meaning , Definitions, Nature of Directions, Elements of Direction, Directing and Other Managerial Activities, Importance of Direction-Orders and Instructions, Supervision, Essentials of Effective Supervision and Principles of Direction.

Unit 5 - Leading – Meaning, Functions, Qualities of good leader – Leadership Styles - Motivation-Meaning, Nature Definitions, Benefits, Modern Theories of Motivation – McGregor's Theory, Maslow's hierarchy of Needs Theory - Herzberg's Theory.

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Information Technology in Business
20261DSC25D

Unit I - Calculus

Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

Unit II - Multiple Integrals And Applications

Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

Unit III - Analytical Solid Geometry

Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

Unit IV - Differential Equations

Exact equations. First order linear equations, Bernoulli's equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit V - Differential Equations (Higher order)

Linear differential equations of higher order – with constant coefficients, the operator D - Euler's linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Books

1. Venkataraman, M. K. Engineering Mathematics (First Year). Second Edition, The National Publishing Company, Madras, 2001.

Reference Books

1. Bali, N. P, and Manish Goyal. A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

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Macro and Indian Economy
20261DSC25D

Objectives: To enable the students to understand the principles, practices and application in Micro Finance.

**UNIT I** Introduction: Evolution: Impact and Importance: Micro Financial Services: Steps initiated in Development of Micro finance

**UNIT II** Role of Regulatory body in Micro finance: Rural Credit system: Self Help groups (SHG): What is SHG: Features of SHG: Objectivity of SHG: Role of SHG in Micro finance: Self Help group promoting institutions (SHPI): Formation of SHG: Credit Linkage

**UNIT III** Micro Finance Services: Weaker Sections: SHG-Bank Linkage: Banks and Financial Intermediaries: SHG-Thrift, credit, and Other Financial Services

**UNIT IV** Formation and development of Micro Services: Micro Finance Institutions: Role of MFI in developing Micro Finance: Enhancing Institutional Finance

**UNIT V** Micro Finance and Rural Development: Micro Credit Institutions: Non Government Organization (NGO) Prospects of Micro Finance: RBI Role in Regulating: Bank's Role in Micro Finance: Growth of Micro Finance: Development of Micro Finance: Credit Plans: Credit Schemes: social Banking.

**Reference Books**

1. Micro finance and poverty reduction by susan johnson and bren rogaly – Oxfam 1997
2. Indian micro finance-the challenges of rapid growth-by prabu ghate – Sage 2007
3. Micro finance hand book – by joana ledger wood – E book
4. Commercial banks in micro finance- by malcolm harper and sukhwinder singh arurow – Teri Press 2005.

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GST and Indirect Taxes
20261DSC34C

COURSE OBJECTIVES:
GST it is a destination based tax on consumption of goods and services. It is proposed to be levied at all stages right from manufacture up to final consumption with credit of taxes paid at previous stages available as set off. In a nutshell, only value addition will be taxed and burden of tax is to be borne by the final consumer

UNIT-1

Concept of goods and service tax GST, Main features of GST implemented in India, Background, Causes for adoption and implementation of GST, Favorable impacts and difficulties of GST, Evaluation and suggestion of GST, Classification of GST Dual and Integrated GST, Important terms

UNIT-2

Registration under GST provision and process. Amendment and cancellation of registration, Practical problems relating to registration. Supply of goods and services-Meaning, Scope and types. Determination of time and place of supply of goods and services. Levy and collection of tax. List of exempted goods and services with practical problems.

UNIT-3

Determination of taxable value of goods and services. Items included and deductions against taxable value. Practical problems related to computation of taxable value of goods and services supplied. Tax rates applicable on supply of goods and services. Practical problems relating to calculation of GST payable on goods and services supplied.

UNIT-4

Composition levy- eligibility, provisions, rules, rates and practical problems. Provisions and rules regarding input tax credit. Practical problems relating to calculation of ITC. Performa and preparation of tax invoice. Payment of GST, Return and assessment provisions and process. Job work and reverse charge-provisions and rules. Maintenance of accounts and records. Refund of tax.

UNIT-5

Provision of integrated GST regarding interstate supply. Calculation of Taxable supply and tax payable under IGST and adjustment. GST council and administration. Introduction and brief background of customs duty. Important definitions - Goods, Dutiable goods, Person In-charge, Indian customs water, types of customs duty. Valuation for custom duty, items to be included and excluded in customs value, computation of Assessable value and Custom duty (Practical).

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Communication in Management
2026IDSC34D

COURSE OBJECTIVES:

- be able to define public relations and identify instances of public relations in multiple contexts
- have an advanced understanding of theories and principles or communication management,
- be able to synthesize broader management knowledge with the principles of communication management.

UNIT -I

Theory of Communication

- Meaning, Features, Uses, Cycle, Feedback, Advantages
- Barriers
- 7 C's of Communication

UNIT 2

Reading Skills

- Close Reading
- Skimming
- Scanning

UNIT 3

Writing Skills

- Summarizing
- Paraphrasing
- Note-making
- Essays- Expository Essay, Descriptive Essay, Narrative Essay
- Letter Writing- Formal Letter, Informal Letter

Speaking Skills

- Oral Presentation- Audio-Visual aids, Audience & Feedback, Delivery of Presentation, Handling Questions
- Group Discussion- Culture & History, Current Affairs, Society-related
- Public Speaking- Public Speech, Extempore
- Interview- Personal, Conversational, Public

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Indirect Tax Law
20261DSC44C

COURSE OBJECTIVES:
To gain expert knowledge about the indirect tax laws in force and the relevant rules and principles emerging from leading cases, to provide an insight into practical aspects and apply the provisions of laws to various situations and to understand the various external auditing requirements under tax laws
Introduction What is GST Need for GST in India
- Cascading effect of tax
- Non-integration of VAT and Service Tax causes double taxation
- No CENVAT Credit after manufacturing stage to a dealer
- Cascading of taxes on account of levy of CST Inter-State purchases
- The existing Indirect Tax frame work in India suffer from various duties and taxes at Central as well as at State level:
- Non Ailment of Seamless ITC
- Tedious Process of Issuance and collection of CST Forms and losses suffered due to them
- Sharing of Data between Centre and States and various Boards

One Nation-One Tax Dual GST Model
- Central Goods and Services Tax Act, 2017 (CGST)
- State Goods and Services Tax Act, 2017 (SGST)/
- Union Territory Goods and Services Tax Act, 2017 (UTGST)
- Integrated Goods and Services Tax Act, 2017 (IGST

Goods and Services Tax Network (GSTN)
- The functions of the GSTN (i.e. Role assigned to GSTN)
- Constitution (101st Amendment) Act, 2016 GST Council
- Guiding principle of the GST Council
- Functions of the GST Council
- Body of GST Law

Time of Supply under GST Time of Supply in case of Goods Time of Supply in case of Services Time of Supply in case of change in Rate of Tax

Place of Supply under GST Need for determination of Place of Supply Place of Supply in case of Goods Place of Supply in case of Services Place of Supply in case of Online Information Database Access and Retrieval (OIDAR) Services

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Principles of Micro Economics
20261DSC44D

COURSE OBJECTIVES:
This course intends to expose the student to the basic principles in Microeconomic Theory and illustrate with applications. It covers the decision-making behaviour of consumers and producers, and the functioning of markets.

UNIT-1

. Introduction a. Problem of scarcity and choice: scarcity, choice and opportunity cost; production possibility frontier; economic systems. b. Demand and supply: law of demand, determinants of demand, shifts of demand versus movements along a demand curve, market demand, law of supply, determinants of supply, shifts of supply versus movements along a supply curve, market supply, market equilibrium. c. Applications of demand and supply: price rationing, price floors, consumer surplus, producer surplus. d. Elasticity: price elasticity of demand, calculating elasticity - percentage formula, the midpoint formula, elasticity along a straight line demand curve, elasticity and total revenue determinants of price elasticity, other elasticities.

UNIT-2

. Consumer Theory Budget constrain, concept of utility, diminishing marginal utility, Diamond-water paradox, income and substitution effects; consumer choice; indifference curves, derivation of demand curve from indifference curve and budget constraint.

UNIT-3

Production and Costs a. Production: behaviour of profit maximising firms, production process, production functions, law of variable proportions, choice of technology, isoquant and isocost lines, cost minimizing equilibrium condition. b. Costs: costs in the short run, costs in the long run, revenue and profit maximizations, minimizing losses, short run industry supply curve, economies and diseconomies of scale, long run adjustments.

UNIT-4

Market Structures a. Perfect Competition Assumptions, demand and revenue, equilibrium of the firm in the short run and long run; long run industry supply curve: increasing, decreasing and constant cost industries; allocative efficiency under perfect competition.

b. Theory of a Monopoly Firm Concept of imperfect competition; short run and long run price and output decisions of a monopoly firm; concept of a supply curve under monopoly; comparison of perfect competition and monopoly, social cost of monopoly, price discrimination; natural monopoly.

TEXT: Case, Karl E. & Ray C. Fair, Principles of Economics, Pearson Education, 8th edition, 2007.

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2022-2023

## VALUE ADDED NEW DIPLOMA AND CERTIFICATE COURSE SYLLABUS

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Academic year 2021-2025
[illegible]
Course: Intellectual Property Rights
Subject Code: [illegible]

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

Definitions of intellectual property Rights, International & National legal instruments Applications of Copyright Act 1957, Scope of protection of computer program Applications of patents to computer technology

Text& References:

- W.R.Cornish, Intellectual Property, Sweet&Maxwell, London(2000)
- Arul Singh,Competition Law, Eastern Book Company
- Dr.H.K.Saharay, Textbook on Competition Law, Universal Publications
- Brinkhoff Eckrad, Patent Cargo, Wolters Kluwer
- Wiley Publication, Guide to Intellectual Property Law, Education Credits on Intellectual Property

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(600 HOURS)

Course Certificate course in Mutual Fund
Operation

Subject Code: 22MSF

AIMS: To emphasis Basics performance in mutual fund operation

COURSE OBJECTIVES:

To provide basic knowledge about the Growth and Role of Mutual funds

To understand Investor Perception and Expectation of Mutual funds in

OUTCOMES:

- Students will be able to explain the [illegible]
- Students will be able to [illegible]

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V

BOOKS FOR REFERENCE:

1. [illegible]

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Academic year 2022-2023
(ODD SEMESTER)

Course: Certificate in Filing of Income Tax
(BBTA339)
Subject Code:226IET

AIM: To explore Better performance in Filing of Income Tax

OBJECTIVES

- To help the students to understand the relevance and significance of Tax.
- To facilitate the students in understanding the various Provisions of I.T.Act.

OUTCOME:
The students will understand the procedure for computing taxable income from different heads, Filing of returns, Set off and carry forward of losses and Deductions applicable to an individual.

UNIT I Income from Capital Gain Capital Gain Meaning, Short term and Long term Capital Gain, Capital Gain in connection with Sale/transfer, Cost of Improvement, Cost of Acquisition, Indexation, Capital gain exempted from tax, Income Exempt from Capital Gain, Computation of capital gain and Computation of Tax liability.

UNIT II Income from other sources Computation, Dividends, Deductions, Computation of taxable income and tax liability of individuals.

UNIT III Income of Other persons included in Assessee's Total Income, Clubbing of Income, Clubbing provisions, Husband, Wife, Minor children, Individuals, Association of persons, Set off, Carry forward and set off of loss.

UNIT IV Deductions from Gross Total Income, Deductions under Chapter VI A, Computation of Total Income, Assessment of Individual, Computation of Tax.

UNIT V Income Tax Authorities and Procedure of Assessment, Income Tax Authorities, Powers of the Central Board of Direct Taxes (CBDT), Commissioner of Income Tax and Income Tax officers, Tax return Procedure, Self Assessment and Regular Assessment.

TEXTBOOKS:
1. Taxmann's Principles of Income Tax and Practice, Girish Ahuja
2. Direct Taxes Law and Practice, Vinod K. Singhania

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Academic year: 2021-2022
Course: Certificate Course in Life Skills for Youth
Subject Code: 22HLSY

AIM: To emphasize Better performance in life skills for youth

OBJECTIVES

- The Life Skills Education aims to reinforce existing knowledge and positive attitudes and values along with the prevention of negative attitudes and risky behaviors.
- Life Skills Education aims to focus on the prevention of personal and social development and the promotion of health and way of good living.

OUTCOMES

- Gain Self Competency and Confidence
- Develop Emotional Competency
- Gain Intellectual Competency
- Gain knowledge through Professional Competency

Unit-I

Understanding Life Skills: Life Skills Meaning, need for life skills, Different approaches to life skills

Unit-II

Life Issues Related with Adolescents: Managing Emotions, Meaning, Handling conflicts, Building self-confidence

Unit-III

Core Competency for Skilled Professionals: Questioning and self-assessment, Positive attitudes, Developing Work Ethics

Unit-IV

Core Competency for Skilled Professionals: Communication skills, Teamwork, Interpersonal skills, Time and Stress management

Unit-V

Knowing Yourself: Building self-awareness, assessing the Aspirations, Setting Goals for the Life

BOOK(S) FOR REFERENCE:

- Dr. Radhakrishnan Nair, Life Skill Education, Sonia Nair, 2007
- Dr. Vivek Bhatia, Life Skill Education for Adolescents, Vijay Publications, 2007

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Academic year: 2022-2023
Certificate Course in Pregnancy for 10+2/10+3 Examination
Subject Code: 22ACO2

AIMS: To [illegible]

COURSE OBJECTIVES:

- To help the students to choose the area where they are interested
- To develop competence in [illegible]
- To train them by conducting [illegible]
- To enhance their ability to [illegible]

OUTCOMES:

- Confidence level of the students will be improved which necessary for interview and for career placement drives
- Students will [illegible]
- Students will [illegible]

Unit I: Business Environment and Its Contextual Dynamics

- Concepts and elements of business environment: Economic environment: Economic systems, Economic policies: Objectives and Fiscal policy, Political environment: Role of government in business, Legal environment: Consumer Protection Act, 1986, Socio-cultural factors and their influence on business, Corporate Social Responsibility (CSR), Globalization and business
- Scope and importance of international business: Globalization and internationalization, Drivers of globalization, Modes of entry into international business
- Theories of international trade: Mercantilism, Absolute advantage, Comparative advantage, Heckscher-Ohlin theory, Porter's diamond theory
- Foreign direct investment (FDI) and Foreign portfolio investment (FPI): Concept, FDI Vs FPI, Costs and benefits of FDI, Trends and future prospects, Foreign Exchange Market: Concept, Functions, Types of exchange rates, Factors affecting exchange rates
- Balance of payments (BOP): Components and measurement, Disequilibrium in BOP

Unit II: Business Economics

- Meaning and scope of business economics • Objectives of business firms • Demand analysis: Law of demand, Elasticity of demand and its measurement, Relationship between AR and MR
- Consumer behavior: Utility analysis, Indifference curve analysis • Law of Variable Proportions: Law of Returns to Scale
- Theory of cost: Short-run and long-run cost curves
- Price determination under different market forms: Perfect competition, Monopolistic competition, Oligopoly, Price leadership model, Monopoly, Price discrimination
- Pricing practices: Price skimming, Price penetration, Peak load pricing

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Unit 3: Business Finance

- Scope and sources of finance, Lease financing
- Cost of capital and time value of money
- Capital structure
- Capital budgeting decisions: Conventional and scientific techniques of capital budgeting analysis
- Working capital management, Dividend decisions: Theories and policies
- Risk and return analysis, Asset securitization

Unit 4: Business Statistics and Research Methods

- Research: Concepts and types, Research designs
- Data: Collection and classification of data
- Sampling and estimation: Concepts, Methods of sampling – probability and nonprobability methods, Sampling distribution, Central limit theorem, Standard error, Statistical estimation
- Hypothesis testing: z-test, t-test, ANOVA, Chi-square test – Mann Whitney and Wilcoxon Kruskal Wallis test (Overall), Rank correlation test
- Report writing

Unit 5: Marketing Management

- Marketing: Concept and approaches, Marketing research, Marketing mix, Strategic marketing planning, Market segmentation, targeting and positioning
- Product decisions: Concepts, Product mix, Decisions, Product life cycle, New product development
- Pricing decisions: Factors affecting price determination, Pricing policies and strategies
- Promotion decisions: Role of promotion in marketing, Promotion methods – Advertising, Personal selling, Publicity, Sales promotion tools and techniques, Promotion mix
- Distribution decisions: Channels of distribution, Channel management

Books for Reference:

- [illegible] Editorial Board, UGC NET/JRF Exam: Commerce – Paper II, Ramesh Publishing House New Delhi
- Dr. L.N. Seth and Madan Singh, UGC NET / SET / JRF (Paper Pravahan, 2018) edition 1 January 2018
- Pradeepika Ranjan, UGC NET/JRF Exam Solved Papers Commerce, Upkar Publishing House, 2018
- R. Gupta, UGC NET: Commerce (Paper II), National Testing Agency 2018

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SCHOOL OF COMMERCE AND MANAGEMENT

DEPARTMENT OF BUSINESS MANAGEMENT

**Minutes of Board of Studies Meeting**

The Board of Studies meeting for the department of Business Management is held on 06.05.2022 at 10.00 a.m. PRIST Deemed to be University, Thanjavur under the chairmanship of Dr. K. G. Selvan.

**The following members were present:**

Dr K. G Selvan (Chairperson/ HoD)
Dr. N. S. Shibu (External Expert-Academic)
Mr. S. Ravi (External Expert- Industry)
Dr T J Jeyasholan / Prof & Member of BOS
Dr. S. Venkatesh / Prof & Member of BOS
Dr. P Balasubramanian / Prof & Member of BOS
Dr. K Rajalakshmi / Prof & Member of BOS
K Sasikumar / Prof & Member of BOS
P Uma Eswari / Prof & Member of BOS
K. Sathya (Invited Dean)
B. Anuradha (Alumini)
L. Kaviyarasu (Current Student)

The Chairman (BOS) welcomed all the members and presented the feedbacks about existing curriculum received from various Stack holders and also from the department academic advisory committee.

The members of the Board have unanimously discussed and carefully reviewed the existing syllabus for (BBA, MBA and M. Phil) in detail and made the necessary changes in upcoming (BBA, MBA, and M.Phil) as mentioned below.

**Signature of the Chairman & Members**

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The following introduced New Course of (2022 – 2023)

| Name of the Programme | Name of the Course | Course code | Year of Introduction |
|---|---|---|---|
| BBA | Taxation Management | 20160DSC55C | 2022 |
| BBA | Interior Management | 20160DSC55D | 2022 |
| BBA | Statistics for Management | 20160DSC55E | 2022 |
| BBA | Integrated Marketing Communication | 20160DSC55F | 2022 |
| BBA | Marketing Metrics | 20160DSC64C | 2022 |
| BBA | Merger and Acquisitions | 20160DSC64D | 2022 |
| BBA | Social Psychology | 20160DSC64E | 2022 |
| BBA | Performance & Reward Management | 20160DSC63F | 2022 |

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The Board of Studies Discussion on Introduced Value Added Certificate Course.

(2022-2023)

| S.NO | COURSE TITLE | COURSE CODE |
|---|---|---|
| 1 | Diploma in E-Banking | 226EB |
| 2 | Diploma in Tax Procedure & Practices | 226TP |
| 3 | Certificate course in sales and marketing | 226SM |
| 4 | Certificate Course in intelligence for excellences | 226IE |
| 5 | Certificate course in internet things | 226IT |

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Members Signature

Dr K G Selvan (Chairperson/ HoD)
Dr. N. S. Shibu (External Expert-Academic)
Mr. S. Ravi (External Expert- Industry)
Dr T J Jayasholan / Prof & Member of BOS
Dr. S. Venkatesh / Prof & Member of BOS
Dr. P Balasubramanian / Prof & Member of BOS
Dr. K Rajalakshmi / Prof & Member of BOS
K.Sasikumar / Prof & Member of BOS
P Uma Eswari / Prof & Member of BOS
K. Sathya (Invited Dean)
B. Anuradha (Alumini)
L. Kaviyarasu (Current Student)

# BACHELOR OF BUSINESS ADMINISTRATION

## Course Structure-2020

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11 | Tamil - I/Advanced English-I/Hindi-I/ French - I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English I | 4 | 0 | 0 | 2 |
| 20160SEC13 | Principles of Management | 5 | 0 | 0 | 3 |
| 20160SEC14 | Managerial Economics | 5 | 0 | 0 | 3 |
| 20160AEC15 | Business Communication | 5 | 0 | 0 | 4 |
| 20160AEC16 | Business Mathematics and Statistics | 4 | 0 | 0 | 3 |
| 20LSCIC | Indian Constitution | - | - | - | 2 |
| | **Total** | 27 | 0 | 0 | 19 |
| | AUDIT COURSE | | | | |
| 20LSCUV | Universal Human Values | - | - | - | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | SEMESTER II | | | | |
| 20160AEC21/ 20111AEC21/ 20135AEC21 | Tamil II /Hindi II/ Advanced English II | 4 | 0 | 0 | 2 |
| 20111AEC22 | English II | 4 | 0 | 0 | 2 |
| 20160SEC23 | Financial Accounting | 5 | 0 | 0 | 3 |
| 20160SEC24 | Organizational Behavior | 5 | 0 | 0 | 3 |
| 20160AEC25 | Business Environment | 3 | 0 | 0 | 4 |
| 20160AEC26 | Management Information System | 4 | 0 | 0 | 3 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 20160RLC27 | Research Led Seminar | 0 | 0 | 0 | 1 |
| | **Total** | 27 | 0 | 0 | 18 |
| | **AUDIT COURSES** | | | | |
| 20115CCS | Communication Skills | 0 | 0 | 0 | 2 |
| 20155CBE | Basic Behavioral Etiquette | 0 | 0 | 0 | 2 |



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| SEMESTER III | | | | | |
|---|---|---|---|---|---|
| 20110AEC31/ 20131AEC31/ 20111AEC31 | Tamil III / Hindi III/ Advanced English III | 4 | 0 | 0 | 2 |
| 20111AEC32 | English III | 4 | 0 | 0 | 2 |
| 20160SEC33 | Management Accounting | 4 | 0 | 0 | 3 |
| 20160SEC34 | Marketing Management | 4 | 0 | 0 | 3 |
| 20160AEC35 | Business Law | 5 | 0 | 0 | 4 |
| 20160AEC36 | Human Resource Management | 4 | 0 | 0 | 3 |
| RESEARCH SKILL BASED COURSE | | | | | |
| 201609MC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 27 | 0 | 0 | 20 |
| AUDIT COURSES | | | | | |
| 2011SCOA | Office automation | 0 | 0 | 0 | 2 |

| SEMESTER IV | | | | | |
|---|---|---|---|---|---|
| 20110AEC41/ 20131AEC41/ 20111AEC41 | Tamil IV / Hindi IV/ Advanced English IV | 4 | 0 | 0 | 2 |
| 20111AEC42 | English IV | 4 | 0 | 0 | 2 |
| 20160SEC43 | Total Quality Management | 5 | 0 | 0 | 3 |
| 20160SEC44 | Cost Accounting | 4 | 0 | 0 | 3 |
| 20160AEC45 | Retail Management | 4 | 0 | 0 | 4 |
| 20160AEC46 | Industrial Relations and Labor Law | 4 | 0 | 0 | 3 |
| 20112NSTU47 | Environmental Studies | 2 | 0 | 0 | 2 |
| | Total | 27 | 0 | 0 | 20 |
| | AUDIT COURSE | | | | |
| 2011SCLS | Leadership and Management Skills | 0 | 0 | 0 | 2 |
| 2015SCAQ | General Aptitude and Quantitative Ability | 0 | 0 | 0 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| **SEMESTER V** | | | | | |
| 20160SEC51 | Financial Management | 6 | 0 | 0 | 5 |
| 20160SEC52 | Services Marketing | 5 | 0 | 0 | 3 |
| 20160SEC53 | Production and Operations Management | 5 | 0 | 0 | 3 |
| 20160SEC54 | Global Business Management | 6 | 0 | 0 | 4 |
| 20160DSC55C7<br>20160DSC55E | Tourism Management / Integrated Marketing Communication | 5 | 0 | 0 | 3 |
| **RESEARCH SKILL BASED COURSE** | | | | | |
| 20160IRC55 | Participation Bounded Research | 0 | 0 | 0 | 1 |
| | **Total** | **27** | **0** | **0** | **20** |
| | **AUDIT COURSE** | | | | |
| 20IACLSPSL | Professional Skills | 0 | 0 | 0 | 2 |
| **SEMESTER VI** | | | | | |
| 20160SEC61 | Business Policy and Strategic Management | 5 | 0 | 0 | 4 |
| 20160SEC62 | Entrepreneurial Development | 6 | 0 | 0 | 5 |
| 20160SEC63 | Logistics and Supply Chain Management | 5 | 0 | 0 | 4 |
| 20160DSC64 | Marketing Metrics | 5 | 0 | 0 | 3 |
| 20__0EC62<br>(Digit Course Name ) | Open Elective | 4 | 0 | 0 | 2 |
| 20160PRV66 | Project Work | 0 | 0 | 0 | 4 |
| 20160PSE | Preparation for Exit Exam | 0 | 0 | 0 | 2 |
| | Total | 25 | 0 | 0 | 24 |
| | AUDIT COURSE | | | | |
| 20ISSCI61 | Interview Skills Training and Mock Test | 0 | 0 | 0 | 2 |
| 20ISSCI62 | Community Engagement | 0 | 0 | 0 | 1 |
| 20ITERP9 | Tally ERP 9 | 0 | 0 | 0 | 3 |
| **Total Credits -Programme** | | | | | 116 |
| **Total Credits - Audit Courses** | | | | | 21 |

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Discipline Specific Elective Courses

| Semester | Elective No | Course Code | Course Title |
|---|---|---|---|
| V | I | 20160DSC51D | Talent Management |
| | | 20160DSC51E | Statistics for Management |
| VI | II | 20160DSC64D | Mergers and Acquisitions |
| | | 20160DSC64E | Social Psychology/ Performance & Reward Management |
| | | 20160DSC64F | |

Open Elective Courses

| Semester | Course Code | Course Title | Department |
|---|---|---|---|
| VI | 20111OEC | Journalism | English |
| | 20114OEC | Food and Adulteration | Chemistry |
| | 20116OEC | Wild life conservation | Microbiology |
| | 20120OEC | E-Learning | Computer science |
| | 20161OEC | Banking Services | Commerce |

Audit Courses Audit Courses on Soft Skills

| Semester | Elective No | Course Code | Course Title |
|---|---|---|---|
| I | I | 201ACLSICN | Indian Constitution |
| | II | 201ACLSUHV | Universal Human Values |
| II | I | 201ACLSCOS | Communication Skills |
| | II | 201ACSS106E | Basic Behavioral Etiquette |
| III | I | 201ACLSOAN | Office automation |
| IV | I | 201ACLSLMS | Leadership and Management Skills |
| | II | 201ACSSAQA | General Aptitude and Quantitative Ability |
| V | I | 201ACLSPSL | Professional Skills |
| VI | I | 201ACSSIST | Interview Skills Training and Mock Test |
| | II | 201ACLSCET | Community Engagement |
| | | | |

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**BBA 2020 REGULATION**

**PRIST UNIVERSITY, THANJAVUR**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC55C | Taxation Management | 6 | 0 | 0 | 4 |

| | Learning Objectives |
|---|---|
| 1 | To identify deductions from gross total income and computation of income for different classes of assesses |
| 2 | To understand the procedure for filing of returns and tax planning |
| 3 | To analyse the structure on international business taxation |
| 4 | To assess Goods and Services Tax and filing GST returns |
| 5 | To compute customs duty as per Customs Act |

**Course Outcomes**

**Students will be able to:**

| CO No. | CO Statement | Knowledge level |
|---|---|---|
| CO 1 | Apply the provisions of income tax to determine taxable income | K3 |
| CO 2 | Plan taxes | K3 |
| CO 3 | Illustrate the nuances of international business taxation | K2 |
| CO 4 | Apply the provisions of GST | K3 |
| CO 5 | Summarise the provisions of Customs Act | K2 |

**UNIT I**

**Assessment of persons**

Tax Exemptions for Agricultural Income-Deductions to be made in computing total income (80G, 80GGB & 80GGC, 80IA, 80IAB, 80IAC, 80IB, 80IBA, 80ID, 80IE, 80JJA, 80JJAA, 80LA, 80M, 80P, 80PA) – Assessment of Firms, AOP, BOI, Company and Cooperative society.

**UNIT II**

**Tax Returns and Tax planning**

Return of Income: Statutory obligation, Return Forms, Time for filing of return, Revised return, Modified return–Assessment -Tax Deducted at Source - Advance payment of Tax: Persons liable to pay, Due date, Computation - Payment in pursuance of order of Assessing Officer, Consequences on non-payment. – Tax planning, Tax avoidance and Tax evasion - Tax planning and specific management decisions: Make or buy, Own or lease, Retain or replace, Shut down or continue.

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| UNIT III<br>**International business taxation**<br>International business taxation - Taxation of Non-resident - Double taxation relief - Transfer pricing and other anti-avoidance measure - Application and interpretation of tax treaties - (Double taxation avoidance agreement - DTAA) - Equalization levy. |
| UNIT IV<br>**Goods and Services Tax**<br>Goods and Services Tax: GST Act, 2017 - Registration – Procedure for registration under Schedule III – Amendment of registration – Rates of Tax of IGST, CGST, SGST/UGTST- Assessment of GST- Self-assessment – Provisional assessment – Scrutiny of returns – Assessment of non filers of returns – Assessment of unregistered persons – Assessment in certain special cases – Tax Invoice – Credit and Debit Notes – Payment of Tax – Input Tax Credit - Anti profiteering – Filing of Returns- Penalties – Prosecution – Appeal and Revision |
| UNIT V<br>**Customs Act, 1962**<br>Customs Act, 1962:Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition of Importation and Exportation of goods – Valuation of goods for Customs Duty – Transaction Value – Assessable Value – Computation of Assessable Value and Customs Duty. |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC55D | Interior Management | 6 | 0 | 0 | 4 |

## Course Objective

To provide adequate facility for work, relaxation, rest, comfort, privacy, maintenance, aesthetics etc. through interiors. To understand the application of anthropometric measurements and economical evaluation in residential space designing for various activities.

**UNIT- I**

Light: aspects of lighting – physical psychological aspects, color of light color rendition daylight artificial light brightness the visual environment- study of day lighting as a means of providing light within built spaces. Day visual perception and light basic artificial lighting sources, light and visual effects, light revealing architecture designing for artificial lighting quantity and quality integration with daylight ting, computer simulation programs that aid artificial lighting design.

**UNIT- II**

Light distribution, intensity & diffusion, light & visual effect, lighting & conservation, lighting as a system lamping, beam spread, color effects, illumination and calculation, and light manipulation, electricity, electrification systems, voltage, wiring, breakers, fuses and. Lighting fixture and fitting types, output, efficiency & cost.

**Unit- III**

Types of lamps- incandescent, fluorescent & HID lamps, their lighting characteristics & applications. Illumination levels and various tasks and distribution of luminaries for better lighting in the interiors space-transforming light techniques in an apartment, retail store, exhibition space. Design of lighting for various spaces like restaurants, hotel lobbies, institutes, halls, offices and transit facilities.

**Unit- IV**

Color- history of color, effect of colors, color, mixing, color dynamics, color planning in design. Various color system- Muncell system, Oswald system, DIN system, QAS system, color aid system- color system in practice, color terminology, analysis of color wheel, color schemes, psychological- impact of colors, special color issues mixed color effects, effect of texture.

**Unit- V**

Use of colors in various functional contexts; color in historic interiors, color in current practice. Selection of colors for various spaces like restaurants, hotel lobbies, institutes, halls, offices and transit facilities.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC55E | Statistics for Management | 5 | 0 | 0 | 4 |

**COURSE OBJECTIVE**

- Measures of Central Tendency
- Measures of Variation
- Analyze of Time Series
- Understand Index Numbers
- Test Hypothesis

**COURSE OUTCOME:**

CO1- Measures of Central Tendency
CO2 -Measures of Variation
CO3 -Analyze of Time Series
CO4- Understand Index Numbers
CO5- Test Hypothesis

**UNIT I**

Introduction – Meaning and Definition of Statistics – Collection and Tabulation of Statistical Data – Presentation of Statistical Data – Graphs and Diagrams- Measures of Central Tendency – Arithmetic Mean, Median and Mode – Harmonic Mean and Geometric Mean.

**UNIT II**

Measures of Variation – Standard Deviation –Mean deviation – Quartile deviation- Skewness and kurtosis – Lorenz Curve –Simple Correlation – Scatter Diagram – Karl Pearson's Correlation – Rank Correlation – Regression.

**UNIT III**

Analysis of Time Series – Methods of Measuring Trend and Seasonal Variations

**UNIT IV**

Index Numbers – Consumer Price Index – And Cost of Living Indices- Statistical quality control

**UNIT V**

Testing of hypothesis – Chi-Square test, T Test, F Test, ANOVA.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC55F | Integrated Marketing Communication | 5 | 0 | 0 | 4 |

**COURSE OBJECTIVE:** Due to ever increasing business dealings the subject of International Marketing has gained utmost importance in recent times. The world these days, indeed has shrunk and foreign markets have particularly become important especially for a developing country like India. The major objective of this course is to provide an exposure to the area of Marketing in the International perspective.

**COURSE OUTCOME**

**Unit I:** Introduction Integrated Marketing Communication - Concept, Process, Communication Mix, IMC plans- Overview of advertising management; Advertising and IMC process - Advertising Agency - Choosing an advertising agency; Advertising planning and research; Advertising goals - Advertising budget;; Advertising design; Advertising media selection.

**Unit II:** Sales Promotion The scope and role of sales promotion; Types, Planning Sales Promotion Programmes; Consumer oriented sales promotion, Trade oriented sales promotion; Coordinating sales promotion and advertising; Personal Selling, Role, Advantages and Disadvantages, Personal Selling Skills.

**Unit III:** Public Relations, Publicity and Corporate Adverting Public Relations Publicity and Corporate adverting; Public Relations functions; Creating positive image building activities; Preventing or reducing image damage; sponsorship and event marketing; Role of internet in PR.

**Unit IV:** Social and Ethical Aspects of Advertising and Promotion Regulations of Advertising and Promotion in India, regulation of other Promotional Areas, Social Implications of Advertising, Moral and Ethical Issues in Advertising; Advertising to children; Advertising controversial products, Social Aspects of Advertising.

**Unit V:** Evaluation Monitoring and Control Measuring the effectiveness of promotional program; Conducting research to measure advertising effectiveness; Testing process; Establishing the program for measuring the advertising effects; Measuring the effectiveness of other program elements.

TEXT/ REFERENCES


1. George Belch, Michael Belch & Keyoor Purani, Advertising & Promotion- An Integrated Marketing Communications Perspective, TMH, Latest Edition.
2. Kruti Shah and Alan D'Souza, Advertising & Promotions: An IMC perspective, TMH, Latest Edition.
3. Terence A. Shimp, Advertising & Promotion: An IMC approach, Cengage Learning, Latest Edition.


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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC64C | Marketing Metrics | 5 | 0 | 0 | 4 |

**LEARNING OBJECTIVES**

To understand the concepts of marketing management To learn about marketing process for different types of products and services To understand the tools used by marketing managers in decision situations To understand the marketing environment

**Course Outcomes**

- Students will demonstrate strong conceptual knowledge in the functional area of marketing management.
- Students will demonstrate effective understanding of relevant functional areas of marketing management and its application.
- Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.

UNIT - I Market and Marketing: Distinction between marketing and selling – Types of market – Concepts -Functions-Marketing management -Objectives -Importance -Marketing Environment - Marketing Information System.

UNIT - II Market Segmentation: Criteria of effective segmentation – Benefits – Bases for Market segmentation-Factors Influencing Consumer Behavior-Buyer motives-Buying process.

UNIT - III Marketing Mix - Product planning and development – Product mix decisions – New product development – Product life cycle and strategies - Pricing – Meaning – Influencing factors –Objectives –Pricing methods.

**UNIT - IV** Marketing channels -Need and importance – Classification – Types of Intermediaries – Wholesalers – Functions – Retailers – Functions - Physical distribution – Elements of Physical distribution(logistics)

**UNIT - V** Promotion mix - Personal selling –Process - Advertising – Objectives – Types - Sales promotion -Objectives –Sales promotion methods, publicity and public relations.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC64D | Mergers and Acquisitions | 5 | 0 | 0 | 4 |

**COURSE OBJECTIVES**

The objective of this course is to build awareness and basic knowledge of how mergers and acquisitions happen. This course will help them to understand the procedure of implementation from proposal through valuation to integration

**COURSE OUTCOMES**

CO1- Acquire conceptual understanding of Mergers

CO2 -Know about strategic perspective & strategic approaches to M & A.

CO3 -Become aware of the concept of Corporate Restructuring and its methods

CO4 -Know about the Merger Process and process of merger integration

CO5 -Know about various Valuation Approaches

UNIT I

INTRODUCTION: Mergers-in the nature of acquisitions and amalgamations, types of merger – motives behind mergers – theories of mergers – operating, financial and managerial synergy of mergers – value creation in horizontal, vertical and conglomerate mergers – internal and external change forces contributing to M&A activities- understanding cross border acquisitions M&A – strategic perspective- industry life cycle and product life cycle analysis in M&A decision, strategic approaches to M&A- SWOT analysis, BCG matrix, Porter's Five forces model- trends in merger activities India and abroad.

UNIT II

CORPORATE RESTRUCTURING: Corporate restructuring – different methods of restructuring – joint ventures –sell off and spin off – divestitures – equity carve out – leveraged buy outs(LBO) – management buy outs – master limited partnerships – employee stock ownership plans /stock option plan(ESOP)- detailed understanding of all types of restructuring. Merger Process: Dynamics of M&A process- identification of targets negotiation-closing the deal. Five-stage model – due diligence (detailed discussion). Process of merger integration – organizational and human aspects –managerial challenges of M& A

**UNIT III**

VALUATION: Valuation – cost of capital-traditional valuation approaches – discounted cash flow valuation – asset based valuation- brand valuation-firm valuation-equity valuation- FCFE and FCFF- relative valuation-adjusted present value- (Including problems) Methods of financing mergers – cash offer, share exchange ratio – (Including problems) - mergers as a capital budgeting decision

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**UNIT IV**

TAKEOVERS: Takeovers, types, hostile takeover approaches, Takeover defenses –bid resistance strategies-bid defense strategies—pre offer defenses-poison pill defense-shark repellents-post offer defences greenmail-white knight-financialdefensive measures – Coercive offers and defense – antitakeover amendments – impact of takeover defenses on shareholder value.

**UNIT V**

LEGAL, TAXATION, AND ACCOUNTING ASPECTS: Legal and regulatory frame work of M & A – provisions of Companies Act 2013, – SEBI Takeover Code, Provisions of Competition Act. Taxation of Mergers, Acquisitions and Amalgamations: Amalgamation, Demerger – Special provisions for computation of cost of acquisition- Conditions for availing loss and depreciation – Tax Neutrality. Accounting aspects of Mergers: Principal methods of Accounting for mergers and acquisitions – Pooling of Interests Method – Advantages and Disadvantages; Purchase method – advantages and Disadvantages – Use of Purchase method, determination of Purchase price, accounting method in India (Including problems).

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC64E | Social Psychology | 5 | 0 | 0 | 4 |

**COURSE OBJECTIVE**

The goals of social psychology are to understand how individuals and society interact with each other, and how social situations influence people's thoughts, feelings, and behaviors.

**COURSE OUTCOME**

1. To identify key concepts in Social Psychology.
2. To describe major studies in social psychology.
3. To describe competing theories in social psychology.
4. To understand the different methodologies by which social psychology is examined.
5. To relate the concepts to real world events.

UNIT – I

Nature, subject matter, and scope of Social Psychology. Methods of Studying Social Psychology and its importance, Major Themes of social psychology - some theories. Relationship of social psychology with Sociology and Psychology.

UNIT – II

Life Span Development: Infancy and Childhood, Adolescence, Middle Age, Old Age- Cognitive, Emotional, Social and Moral Development. Sensory Perceptual Processes- Sensation, Perception, Memory.

UNIT – III

The self- Executive and organizational functions and Gender and cultural differences. Introspection and self-awareness theory in Psychology Introspection and self-awareness theory in psychology- Definition and examples

UNIT – IV

The ABC model of attitudes- Affect, behavior, and cognition. Implicit Vs. Explicit attitudes- Definition and examples, Persuasion- Types of persuasion Techniques

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UNIT – V

Prosocial behavior -Altruism and prosocial Behavior- Definition and predictors Positive moods and negative state-How positive moods and negative state Relief affect pro social behavior

**References**


David Krech And Richard S Crutchfield: Theory And Problems Of Social Psychology

2. David Krech And Richard S Crutchfield And Egerton LBallachey: Individual And Society

3. Kappuswamy B :Elements Of Social Psychology



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20160DSC64F | Performance & Reward Management | 5 | 0 | 0 | 4 |

**COURSE OBJECTIVES**

The course is designed to promote understanding of issues related to the compensation and rewarding human resources in the organizations and to impart skills in designing analyzing and restructuring reward management systems, policies and strategies.

**UNIT I:** Age concepts, Theories of Wages, Importance, Wage Policy, Criteria for Wage Fixation, Techniques of Wage Determination. Wage Fixation Machinery, Wage Differentials, and Challenges of Remuneration. Impact of compensation and employees benefit on organizational effectiveness; Economic and Behavioral issues in compensation.

**UNIT II:** Role of compensation in organization, Determination of Inter and Intra-industry Compensation Differentials, Internal and External Equity in Compensation Systems. Factors influencing compensation levels, compensation as motivational tool, compensation policy.

**UNIT III:** Conventional reward methods and their inadequacies. Developing reward strategy – skill based pay, broad banding, team based pay, payment by results, and performance related pay, variable compensation. Compensation for executives and R&D staff. Reward structure in new industries (BPO, IT, Hospitality, Tourism, etc.), MNCs and other organizations. Remuneration plan and business strategy.

**UNIT IV:** Profit sharing, payment of bonus. Understanding Different Components of Compensation Packages like Fringe Benefits, Incentives and Retirement Plans, Compensation Practices of Multinational Corporations and Strategic Compensation Systems. Understanding tools in designing, improving and implementing compensation packages.

**UNIT V:** Law relating to payment of wages and bonus in India. Statutory Provisions Governing Different Components of Reward Systems- Working of Different Institutions Related to Reward System like Wage Boards, Pay Commissions, Role of trade unions in compensation management.

SUGGESTED READINGS:


1. Milkovich, Compensation, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.
2. B.D. Singh, Compensation and Reward Management, Excel Books, New Delhi, 2006.
3. Hendorson, Richard. I :Compensation Management: Rewarding Performance, PHI
4. Henderson, Compensation Management in a Knowledge Based World, Pearson Education, New Delhi, 9th Edition.



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2022 – 2023

VALUE ADDED DIPLOMA AND CERTIFICATE COURSE SYLLABUS

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**Academic year: 2022-2023**

**ODD SEMSTER**

**Course: Diploma in Tax Procedure & Practice**

*Subject Code: 2201TP*

AIMS: To emphasis Better performance than the Overall GST

**Objectives:**

- This course to provide knowledge of the Indian tax system.
- To provide a basic knowledge on the role of tax laws in constitution.
- To provide a basic knowledge on State Sales Tax act and rules made there under State Sales Tax Procedure and Practice.

**OUTCOMES:**

To help the students form a clear idea of Managerial Economics. To enable the students understand determination of price under different market forms. To enable the students, understand the creation of consumer and producer equilibrium. To describe the concept of inflation and its consequences in an economy. To illustrate the calculation of national income.

Unit I: Introduction

Amendment to Constitution and GST – Concept of VAT: Meaning, variants and methods, major defects in the structure of indirect taxes prior to GST - Applicability of GST – Types of GST – Benefits of implementing GST – Goods and Services Tax Council.

**Unit II: Definitions under CGST Act**

Aggregate turnover – Agriculturist – Business – Business Vertical – capital goods – electronic commerce operator – fixed establishment – goods – Inward Supply – Job work – Manufacture -Person – services – supplier.

**Unit III: Concept of Supply**

Meaning and Scope of Supply under Section 7 of the CGST Act – Inward and Outward Supply – Tax liability under Section 8 – Determination of Nature of Supply under Section 7 of the IGST Act – Inter-state supply under Section 8 of the IGST Act - Activities to be treated as supply even if made without consideration (Schedule I to the CGST Act)

**Unit IV: Registration under GST**

Persons liable for registration – Aggregate turnover - Persons not liable for registration – compulsory registration cases under Section 24 of the CGST Act – Procedure for registration including verification of the application and approval – Issue of Registration Certificate including Goods and Services Tax Registration Number – cancellation of registration – revocation of cancellation of registration.

**Unit V: Composition levy**

Applicability – Rate of tax of the composition levy – Conditions and restrictions for opting for composition levy – Validity of composition levy.

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Academic year: 2022-2023
ODD SEMESTER

Course: CERTIFICATE COURSE IN E-BANKING
Subject Code: 226IEB

AIMS: To emphasis Better performance of E-Banking.

OBJECTIVES:

To help students assimilates knowledge of various digital products in Banking Sector and different
Payment Systems in India.
There is a need to understand the New Technologies and Digital Disruptions taking place in transformation of Business Models.

OUTCOME:

1. Understand banking and finance system in India.
2. Assignment customers on bank and its product.
3. Build customer relationship in banking sector.
4. Work comfortable with e-banking services and Internet Banking.

Unit – 1

E-Banking: Introduction – Meaning – Definition – Features – use of information technology in banking company – E-banking channels: Automatic Teller Machine – internet Banking – Tele banking – Mobile Banking – IFSC Number.

Unit – 2

ATM: Meaning – Characters – Features – Functions – service available from ATM – Cash Deposit – Cash Withdraw – Amt enquiry – Last few transactions – Balance – fund transfer – ticket booking – payments – ATM card – Pin Number.

Unit – 3

Internet Banking: Introduction – World Wide Web – Net banking account opening – Username and Password – secrecy of maintaining One Time Password – Net Banking Services – Fund Transfer – Make Payment.

Unit – 4

National Electronic Fund Transfer (NEFT): Introduction – Meaning – Functions – services. Real Time Gross Settlement (RTGS): Introduction – Meaning – Functions – Service infrastructure requirement – RTGS transactions.

Unit – 5

Security features SFMS: formats of SFMS – SFMS transaction – security aspects – RAS: requirements of RAS – application – security features of RAS – IT Act: legal status – electronic records Cyber crime and law.

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Academic year: 2022-2023

ODD SEMESTER

Course: Certificate Course in Sales & Marketing

Subject Code: 22CCSM

AIMS: To emphasis Better performance in Sales and Marketing

OBJECTIVES: The objective of the Sales and Marketing course is to give an understanding to make good decisions to market goods and services in a manner to be able to sell as per targets and a never ending demand for it is created in the marketplace

OUTCOMES:

1. To communicate precisely the purpose & objectives of the store to all store team members
2. To explain the importance of effective team communication
3. To understand the concept of team dynamics

UNIT I

Meaning of marketing Management – Functions of Marketing Management – Difference between Marketing Management and Sales Management – Advertising management – Need &Importance –Advertising Strategy– Advertisement Copy – Media Planning – Effectiveness of Advertisement

UNIT II

Marketing manager's responsibility – marketing planning – need, importance and process of planning – Marketing control and marketing audit – types and methods of conducting/reviewing audit – marketing risks – methods of dealing with marketing risks

UNIT III

Sales Management – meaning and scope – functions of sales management –sales policy – selling process – responsibilities of sales manager – AIDA Formula- Need for sales force – recruitment and selection of sales force –training of salesmen – qualities of a good salesman

UNIT IV

Sales office functions – interviews – receiving of orders – handling mails – filing – Record keeping – sales bulletin – Sales promotion – Dealer & Consumer sales promotion tools

UNIT V

Sales Planning –Budgeting & Evaluation – Distribution functions – distribution policy – components of physical distribution

TEXT BOOKS RECOMMENDED:

1. Dr.N.Rajan Nair – Marketing
2. R.S.N. Pillai and Bagavathi – Modern marketing – S.Chand
3. Salesmanship and Advertising – Davar
4. Salesmanship – RSN Pillai and Bagavathi
5. Salesmanship and Publicity – JSK Patel

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**Academic year: 2022-2023**
**ODD SEMESTER**

**Course: Certificate Course in Investment Management**
Subject Code: 22611M

**AIMS:** To emphasis Better performance in Sales and Marketing.

**OBJECTIVES:**

- provide an overview of historical trends and innovations in financial instruments and trading processes
- provide an overview of various financial instruments
- provide insight into the use of finance theory in investment management
- provide an overview of historical trends and innovations in financial instruments and trading processes
- provide an overview of various financial instruments
- provide insight into the use of finance theory in investment management

**OUTCOMES:**

- contrast key characteristics of given financial instruments • briefly recall important historical trends in the operations of markets, trading and financial instruments
- name key facts related to the historical return and risk of bond and equity markets
- relate key facts of the managed fund industry
- define market microstructure and evaluate its importance to investors
- explain the fundamental drivers of diversification as an investment strategy for investors

**UNIT I**

Investment Management – Nature and scope – Objectives – Process – Investment Media – Security and Non-security forms of Investment – get ridged securities – Sources of Investment information.

**UNIT II**

New Issues Market – Methods of Issuing – Parties involved in the new issue market – Secondary market – Stock Exchanges – NSE and BSE – Trading mechanism – online trading – SEBI and Investors protection.

**UNIT III**

Security Analysis – Approaches – Fundamental Analysis – Technical Analysis – Dow Theory – Random Walk Theory – Efficient Market Hypothesis.

**UNIT IV**

Portfolio Analysis – Traditional and Modern approach – Rationale of Diversification of Investments – Markowitz theory – Sharpe Index Model – Capital Asset Pricing Model.

**UNIT V**

Investment companies in India – Types Mutual Fund Operations in India – UTI – SEBI and RBI Guidelines for Mutual Funds.

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Academic year: 2021-2022
Course: certificate course on Intelligence for Excellence

Subject Code: 226108

AIM: To enhance Better performance in Intelligence for Excellence

OBJECTIVES:

- The objective is to provide students with a conceptual framework of Hotel Management, Event Services, Conducting Event and Managing Public Relations.
- To make the students aware about the different events.

OUTCOMES:

- To learn the concepts related to various events.
- Awareness on the process of conducting events.
- Planning and budgeting on the events.

**Intelligence for Excellence**

**Unit I**

Self Intelligence: Intelligence, Definition and Meaning – Intelligence cycle- Self Intelligence- Personality – Strategic thinking – Lateral Thinking- Emotional Intelligence- Self awareness – Motivation – Self regulation- Social awareness – Empathy – Decision making- planning methods- types and steps in making effective decision making

**Unit II**

Multiple Intelligence- Meaning and types of Multiple intelligence- Successful Intelligence- Meaning and types of Successful intelligence-Creative intelligence- Practical Intelligence – Analytical Intelligence.

**Unit III**

Entrepreneurial Intelligence: Definition, Meaning and development of entrepreneurial intelligence – Entrepreneurial intelligence and social advancement- Organization, Definition and meaning – Principles involved in organization – methods of organization – Conflict- Definition and meaning – Sources of conflict – types of conflict – conflict management- Change- Definition and meaning – Types of change – Meaning of change – Managing work and life

**Unit IV**

Spiritual Intelligence: Meaning and Development of Spiritual intelligence- Emotion- Process – Relationship – Charts- Empathy –Spiritual Intelligence- Meaning- Components and tests of spiritual intelligence

**Unit V**

Environmental Intelligence: Understanding and using of Natural Resources- Food- Land- Forest Mineral- Water and Energy- Pollution- Types- Air Pollution, Water Pollution, Noise Pollution, Thermal and Radiation, Specific Absorption Rate (SAR ) values- Issues affecting environment- Population growth – Deforestation- Globalization – Sustainable development- meaning, process, concrete action plans for sustainability

**TEXT BOOK:**

1. Karl Albrecht (2006), "*Social intelligence: The new science of Success*", John Wiley & Sons.
2. Robert J Sternberg (2000), "*Successful Intelligence*", Magma Publishing Co Ltd.

**REFERENCE BOOK:**

1. Daniel Goleman (1995), "*Emotional Intelligence*", Bantam Books.
2. Dorothy A Sisk and Dr Paul Torrance (2001), "Spiritual Intelligence", Creative Education Foundation.

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**Academic year: 2022-2023**

*Course:* Certificate Course on Internet of Things

Subject Code: 22611T

AIMS: To emphasis Better performance on Internet things

COURSE OBJECTIVES

- To help students understand the intricacies of Internet things
- To familiarize them with financial concepts and economic issues.
- To train students in the techniques of business reporting.

## OUTCOMES:

- Students will be able to develop an appropriate portfolio for a given investor and market conditions.
- Students will be able to use adjusted financial statements to produce a sound valuation of a company.

Unit I:

IOT Concepts

Introduction and meaning - definition - Interpretation - importance - Difference - Basic uses - Scope - Emergence of IOT - advantages and disadvantages of IOT, Technologies that led to emergence of IOT

Unit II:

Security, Privacy and Challenges in Internet of Things

Design Challenges - Development Challenges - Security Challenges - Privacy challenges - Other challenges - Data management

Unit III: Emergence of IoT and New Applications

Emergence of IoT - Home - Healthcare - Agriculture - Military - Policies - Construction - other Areas - Relevance of IOT for the future: IOT in everyday life - Internet of Everything - IOT and Individual Privacy

Unit IV:

**Smart city using IoT Integration**

Smart city - emergence - dimensions - adoption for automation - design strategies - factors - IoT for smart cities (case study Smart city Barcelona)

Unit V:

**IOT in Indian scenario**

Emergence of IOT in India - IOT and Aadhaar - IOT for health services - IOT for financial inclusion - IOT for rural improvements

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## SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF BIOTECHNOLOGY

Minutes of Board of Studies Meeting

The Board of Studies meeting for the Department of Biotechnology is held on 05.04.2022 at 12.30 p.m. in, PRIST Deemed to be University, Thanjavur under the chairmanship of Dr. P. Arjun

**The following members were present:**

1. Dr. P. Arjun, Associate Professor (Chairperson, BOS)
2. Dr. L Chinnappa / Dean (Special Invitee)
3. Dr. P. Manemani, Professor (Member, BOS)
4. Dr. Arjun Pandian, Associate Professor, (Member, BOS)
5. Dr. C. Anushia, Associate Professor (Member, BOS)
6. Dr. A. Shajahan, Assistant Professor (Member, BOS)
7. Dr. G. Venkatkumar, Assistant Professor (Member, BOS)
8. Dr. R. V. Shalini, Assistant Professor (Member, BOS)
9. Dr. J. Sebastinraj, Associate Professor, Department of Biotechnology, Jamal Mohamed College, Tiruchirappalli, Tamil Nadu (External Member, BOS)
10. Dr. P. Arulselvam, Managing Director, Scigen Research and Innovation PVT., LTD., Vallam, Thanjavur, Tamil Nadu ( External Member, BOS)
11. Mr. P. Sri Ramji, M. Sc., Special Invitee Alumna, Tower Technician, ATC, Trichy
12. Ms. B. Vincy, M. Sc Biotechnology, PRIST Deemed to be University, Thanjavur

The Chairman of the Board of Studies for UG and PG in Biotechnology welcomed the members. Members analyzed the feedback from various stakeholders and the follow up actions taken. Feedback from alumni that self-learning can be given to students will be taken into consideration when the curriculum is due for change.

The chairman briefed about the programmes and the curriculum. The committee carefully reviewed the curriculum and suggested as below.

The Meeting concluded with thanks from Board of Studies Chairman.

Head of the Department
Department of Biotechnology
School of Arts & Science
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## Department of Biotechnology

## Composition of Board of Studies 2022-2023

| S.No. | Designation | Name | Qualification | Designation & Affiliation | Mail id |
|---|---|---|---|---|---|
| 1 | Chairperson/HoD | Dr. P. Arjun | M.Sc., Ph.D | Associate Professor, Department of Biotechnology, PRIST Deemed to be University, Vallam, Thanjavur. | arjunpandian@prist.ac.in |
| 2 | External Expert-Academic | Dr. J. Sebastinraj | M.Sc., M. Phil., Ph.D | Associate Professor, Department of Biotechnology, Jamal Mohamed College, Tiruchirappalli, Tamil Nadu | sebastinraj@gmail.com |
| 3 | External Expert- Industry | Dr. P. Arulselvam | M.Sc., Ph.D | Managing Director, Scigen Research and Innovation PVT., LTD., Vallam, Thanjavur, Tamil Nadu. | arulbio@gmail.com |
| 4 | Professor | Dr. P. Manonmani | M.Sc., Ph.D | Professor, Department of Biotechnology, PRIST Deemed to be University, Vallam, Thanjavur | manonmani@prist.ac.in |
| 5 | Associate Professor | Dr. C. Anushia | M.Sc., Ph.D | Associate Professor, Department of Biotechnology, PRIST Deemed to be University, Vallam, Thanjavur. | anushia@prist.ac.in |
| 6 | Assistant Professor | Dr. A. Shajahan | M.Sc., Ph.D | Assistant Professor, Department of Biotechnology, PRIST Deemed to be University, Vallam, Thanjavur. | shajahan@prist.ac.in |
| 7 | Assistant Professor | Dr. G. Venkatkumar | M.Sc., Ph.D | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | venkatkumar@prist.ac.in |
| 8 | Assistant Professor | Dr. R.V. Shalini | M.Sc., Ph.D | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur. | shalini@prist.ac.in |
| 9 | Assistant Professor | Dr. J. Hamathi | M.Sc., Ph.D | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | jhamathi@prist.ac.in |
| 10 | Special Invitee-Dean | Dr. L. Chinnappa | M.Sc., M. Phil., Ph.D | Dean, School of Arts and Science, PRIST Deemed to be University, Vallam, Thanjavur. | deanarts@prist.ac.in |
| 11 | Special Invitee-Alumnus/Alumna | Mr. P. Sri Ramji | M.Sc., | Tower Technician, ATC, Trichy | ramji@prist.ac.in |
| 12 | Special Invitee -Current student - UG or PG | Ms. B. Vincy | M.Sc., | Student | vincy@prist.ac.in |

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Dean (Arts & Science)
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Signature of the Chairman & Members

| | |
|---|---|
| 1. Dr. Arjun Pandian | |
| 2. Dr. L. Chinnappa/ Dean | |
| 3. Dr. P. Manonmani | |
| 4. Dr. C. Anushia | |
| 5. Dr. A. Shajahan | |
| 6. Dr.G. Venkatkumar | |
| 7. Dr. R. V. Shalini | |
| 8. Dr. J. Ramathi | |
| 9. Dr. J. Sebastiraj | |
| 10. Dr. P. Arulselvam | |
| 11. Mr. P. Sri Ramji | |
| 12. Ms. B. Vincy | |

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**Department of Biotechnology**
**Minutes of the Board of Studies**

The Board of Studies meeting was held on 04.05.2022. The Chairman DR. ARJUN PANDIAN welcomed the members of the Board of studies and outlined the changes to be made in the following for the board approval.

Item 1. To consider changes in the Curriculum and Syllabi of Bsc Biotechnology, course and approval.

Item 2. To suggest the panel of names for appointment of examiners.

Item 3. Other academic activities in the department.

As per the suggestions and recommendations given by the Stakeholders on the above items discussed, the existing/revised Scheme of Curriculum/Scheme of Examination syllabi and Panel of Examiners is to be followed is annexed herewith for the implementation from the commencement of the Academic year 2020-2021. The Regulations and Syllabus for B.Sc. Biotechnology, M.Sc Biotechnology Courses were discussed in the BOS.

The members after careful scrutiny of the changes to be made unanimously accorded approval for the proposed changes/modifications. They also resolved to authorize the Chairman of Board of Studies to place the changes/modifications now approved by the BOS before the Standing Committee on Academic affairs and Academic Council.

| |
|---|
| Agendum 1: Confirmation of the previous Meeting Minutes |
| Discussion: Minutes of the previous meeting were confirmed and accepted. |
| Resolution: The coordinator read the minutes of earlier meeting and the minutes were reviewed and passed by the members. |

| |
|---|
| Agendum 2: Action taken on the previous Meeting Minutes |
| Discussion: The details of the action taken were reported to the members |
| Resolution: The members expressed satisfaction over the action taken |

| |
|---|
| Agendum 3: To scrutinize the stakeholder feedback on UG, PG curriculum |
| Discussion: 1.More courses covering the entrepreneurship should be offered<br>2. advanced topics to be introduced Fundamental of Biological system paper in BSc syllabus<br>3. More advanced papers should be added in BSc programme |
| Resolution: The board unanimously resolved to make necessary changes as requested by the stakeholders |

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| **Agendum 4:To consider the inclusion of audit course in the curriculum** |
|---|
| Discussion: |
| Resolution: The members of the board resolved to approve the continuation of audit course in the curriculum |

| Agendum 5: **Agendum 5: To consider the introduction of employment oriented add on courses** |
|---|
| Discussion : The existing syllabus gives enough opportunity for employability and there was no urgent need to introduce new add on courses. Also, it was pointed out that, the syllabus should be revised compulsorily if the university decides to offer 4 year BSc programme according to New Education Policy 2022 |
| Resolution: Resolved to introduce some more employment oriented add on courses in the next BOS meeting |

| Agendum 6: To recommend the panel of examiners for BSc, MSc programme Bsc |
|---|
| Discussion: Members suggested the names of the experts who would serve as a panel of examiners for different programs. |
| Resolution: The BOS approved a tentative list of subject experts for paper setting , moderation and examiners (attached as annexure 1. if required few more experts may be included with the permission of the concerned authorities. |

Agendum 7:
Review of curriculum & syllabus of Bsc Biochemistry-regulation-2022

Discussion

- To discuss the modifications in the syllabi for First Bsc Microbiology allied Biochemistry Syllabus.
- As such, the curriculum is revisited and certain changes have been made – by introducing new courses and improving the syllabi of many courses. The honorable members Board of Studies has expressed their appreciations for the changes made commenting that they address the current demands of the Industry Profession.

Resolution:

**Resolved to Improvements in Course Contents of the following paper**

| Course Title | Category | Introduced in |
|---|---|---|
| 22117MC14- Fundamentals of Biotechnology | Core Theory | I semester |
| 22117MCP1- Fundamentals of Biotechnology Lab-I | Core Practical | I semester |

**The following new courses are introduced in the curriculum BSC Biotechnology:**

| Course Title | Category | Introduced in |
|---|---|---|

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The following new courses are introduced in the curriculum B.Sc ., and M.Sc., Biotechnology regulation 2022

| S.No | Programme Name | Year Of Introduction | Course Code | Course Name |
|---|---|---|---|---|
| 1 | B.Sc_BIOTECHNOLOGY | 2022 | 22113AEC13 | Fundamentals of Biotechnology |
| 2 | B.Sc_BIOTECHNOLOGY | 2022 | 22116AEC14 | Microbiology-I |
| 3 | B.Sc_BIOTECHNOLOGY | 2022 | 22117AEC15L | Fundamentals of Biotechnology Lab |
| 4 | B.Sc_BIOTECHNOLOGY | 2022 | 22116AEC16L | Microbiology Lab-I |
| 5 | B.Sc_BIOTECHNOLOGY | 2022 | 22116AEC24 | Microbiology-II |
| 6 | B.Sc_BIOTECHNOLOGY | 2022 | 22116AEC25L | Microbiology Lab-II |
| 7 | B.Sc_BIOTECHNOLOGY | 2022 | 22115AEC34 | Biochemistry-I |
| 8 | B.Sc_BIOTECHNOLOGY | 2022 | 22115AEC35L | Biochemistry Lab-I |
| 9 | B.Sc_BIOTECHNOLOGY | 2022 | 22115AEC44 | Biochemistry-II |
| 10 | B.Sc_BIOTECHNOLOGY | 2022 | 22115AEC45L | Biochemistry Lab-II |
| 11 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54C | The Science of Stem Cells |
| 12 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54D | Forensic Biotechnology |
| 13 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54E | Renewable Energy |
| 14 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54F | Molecular Docking |
| 15 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54G | Medical science |
| 16 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54H | Clinical Engineering |
| 17 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC54I | Clinical Research |
| 18 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC53C | Tools in Biostatistics |
| 19 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC53D | Environmental Biotechnology |
| 20 | B.Sc_BIOTECHNOLOGY | 2022 | 22113DEC63E | Genetics and Society |
| 21 | B.Sc_BIOTECHNOLOGY | 2022 | 22272E25D | System Biology and Bioinformatics |
| 22 | B.Sc_BIOTECHNOLOGY | 2022 | 22113SEC63F | Cell Culture |

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| | | | | |
|---|---|---|---|---|
| | | | | Technique |
| 1 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217SFC21 | Cell & Molecular Biology |
| 2 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC15C | Forensic Identification |
| 3 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC15D | Co-operative Education |
| 4 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC15E | Computer Security and Computer Forensic |
| 5 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC15F | Power System Simulation Laboratory |
| 6 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC21C | Chemical Biotechnology |
| 7 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC21D | Food Industry Rules and Responsibilities |
| 8 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC21E | Artificial Intelligence |
| 9 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC21F | Mathematics for Life Sciences |
| 10 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC34C | Virology |
| 11 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC34D | Bioinformatics Methods |
| 12 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC34E | Biomaterials |
| 13 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC34F | Bioinformatics Biology and Molecular Modeling |
| 14 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC44C | Nanobiotechnology |
| 15 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217DSC44D | Law Skills & Practices & Management |
| 16 | II M.Sc. BIOTECHNOLOGY | 2022 | 22217PSC44E | Pharmacy Marketing |

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| | | |
|---|---|---|
| 22117DSC63B-Pharmaceutical Biotechnology | Core Theory | VI semester |

Dr. K. Arul selvan proposed to included problem based questions for post graduate students

Members of the Board updated the panel of examiners and submitted the same to the Academic Council for its approval.

| Agendum 8: Submission of project proposals for Faculty Development Programs, Major, Minor Research projects and conference/ seminar/ workshop |
|---|
| Discussion: The external members recommended that faculty members and students should also apply for these types for projects to enhance research output of the department. |
| Resolution: Resolved to insist faculty members to submit proposals for Major-Minor research projects to different funding Agencies during academic year. |

**Other Academic Activities:** The students should complete a SWAYAM-300C before the completion of the 6th semester and the course completed certificate should be submitted to the HoD.

Signature:
Chair-HoD
Dept.: Bio Technology
Name: DR. ARUN PANDIAN
Date: 04.05.2022

Signature:
Dean
School: Arts and Science
Name: Dr. K. [illegible] APPA
Date: 4.0[illegible]
Arts & Science
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Mandatory Attachments:

1. Minutes of the previous BoS meeting minutes and report on the follow-up action taken.
2. BoS Meeting 'Notification' sent to all members, including online meeting link.
3. Online Screenshots and geo-tagged photos in the venue.
4. Attendance sheet print of online attendees.
5. Detailed syllabi with PEOs, POs, COs, etc. (in Annexures), if new Programme(s) introduction /Curriculum revision is discussed.

**Note: The 'minutes' of the BoS meeting along with the attachments as listed above must be mailed to the Registrar by the HoD within three days after the meeting, copying Dean concerned, Dean - Academic Affairs and the [illegible] Office.**

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Annexure II - Revised Value added courses

1. Certificate course in MLT
2. Certificate course in Spirulina Cultivation
3. Diploma course in Fermentation Technology
4. Certificate Course in Aquaculture Technology
5. Certificate course in 3D BioPrinting
6. Certificate course in Renewable energy

HOD

DEAN

Head of the Department
Department of Biotechnology
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## SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF BIOTECHNOLOGY

## B.Sc., BIOTECHNOLOGY REGULATION –2022

## COURSE STRUCTURE

| SEMESTER I | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Title | L | T | P | C |
| THEORY | | | | | |
| 22110AEC11/<br>22111AEC11/<br>22132AEC11/<br>22135AEC11 | Language-I(Tamil-I/<br>Advanced English-I/<br>Hindi-I/<br>French-I) | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22117AEC13 | Fundamentals of Biotechnology | 6 | 1 | 0 | 5 |
| 22116AEC14 | Microbiology -I | 6 | 1 | 0 | 4 |
| PRACTICAL | | | | | |
| 22117AEC15L | Fundamentals of Biotechnology Lab | 0 | 0 | 3 | 2 |
| 22116AEC16L | Microbiology Lab-I | 0 | 0 | 3 | 2 |
| | Total | 20 | 2 | 6 | 17 |
| AUDIT COURSE | | | | | |
| 22IACLSICN | Indian Constitution | 0 | 0 | 0 | 2 |
| 22IACLSUHV | Universal Human Values | 0 | 0 | 0 | 2 |
| SEMESTER-II | | | | | |
| Course Code | Course Title | L | T | P | C |
| THEORY | | | | | |
| 22110AEC21/<br>22111AEC21/<br>22132AEC21/<br>22135AEC21 | Language-II(Tamil-II/<br>Advanced English-II/<br>Hindi-II/<br>French-II) | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22117AEC23 | Cell Biology and Genetics | 6 | 1 | 0 | 5 |
| 22116AEC24 | Microbiology-II | 6 | 1 | 0 | 4 |
| PRACTICAL | | | | | |
| 22117AEC25L | Cell Biology and Genetics Lab | 0 | 0 | 3 | 2 |
| 22116AEC26L | Microbiology Lab-II | 0 | 0 | 3 | 2 |
| RESEARCH SKILL BASED COURSE | | | | | |
| 22117RLC27 | Research LED Seminar | - | - | - | 1 |
| | Total | 20 | 2 | 6 | 18 |
| | | | | | |
| 22IACLSCOS | Communication Skills | - | - | - | 2 |
| 22IACSSBBE | Basic Behavioral Etiquette | - | - | - | 2 |

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| SEMESTER-III | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Title | L | T | P | C |
| THEORY | | | | | |
| 22110AEC31/<br>22111AEC31/<br>22132AEC31/<br>22135AEC31 | Language-III(Tamil-III/<br>Advanced English-III/<br>Hindi-III/<br>French-III) | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22117AEC33 | Immunology | 4 | 1 | 0 | 4 |
| 22115AEC34 | Biochemistry-I | 4 | 1 | 0 | 5 |
| PRACTICAL | | | | | |
| 22117AEC35L | Immunology Lab | 0 | 0 | 3 | 2 |
| 22115AEC36L | Biochemistry Lab-I | 0 | 0 | 3 | 2 |
| RESEARCH SKILL BASED COURSE | | | | | |
| 22117RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 18 | 2 | 6 | 19 |
| AUDIT COURSE | | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |

| SEMESTER-IV | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Title | L | T | P | C |
| THEORY | | | | | |
| 22110AEC41/<br>22111AEC41/<br>22132AEC41/<br>22135AEC41 | Language-IV(Tamil-IV/<br>Advanced English-IV/<br>Hindi-IV/<br>French-IV) | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22117AEC43 | Animal Physiology | 4 | 1 | 0 | 4 |
| 22117AEC44 | Molecular Biology | 5 | 1 | 0 | 5 |
| 221ENSTU45 | Environmental studies | 2 | 0 | 0 | 2 |
| PRACTICAL | | | | | |
| 22117AEC46L | Animal Physiology Lab | 0 | 0 | 3 | 2 |
| 22117AEC47L | Molecular Biology Lab | 0 | 0 | 3 | 2 |
| | Total | 19 | 2 | 6 | 17 |
| AUDITCOURSE | | | | | |
| 221ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 221ACSSAQA | General Aptitude and Quantitative Ability | - | - | - | 2 |

| SEMESTER-V | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Title | L | T | P | C |
| THEORY | | | | | |
| 22117AEC51 | Food and Agricultural Biotechnology | 4 | 1 | 0 | 4 |
| 22117AEC52 | Cell and Tissue Culture | 4 | 1 | 0 | 3 |
| 22117AEC53 | Industrial Biotechnology | 4 | 1 | 0 | 4 |
| 22117DSC54_ | Discipline Specific Elective-I | 4 | 1 | 0 | 3 |

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| | | | | | |
|---|---|---|---|---|---|
| **PRACTICAL** | | | | | |
| 22117AEC55L | Food and Agricultural Biotechnology, Tissue Culture Lab | 0 | 0 | 3 | 2 |
| 22117AEC56L | Industrial Biotechnology Lab | 0 | 0 | 3 | 2 |
| **RESEARCHSKILLBASEDCOURSE** | | | | | |
| 22117BRC57 | Participation in Bounded Research | - | - | - | |
| | **Total** | **16** | **4** | **6** | **19** |
| **AUDIT COURSE** | | | | | |
| 221ACLSPSL | Professional Skills | 0 | 0 | 0 | 2 |
| **SEMESTER-VI** | | | | | |
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| **THEORY** | | | | | |
| 22117AEC61 | Plant and animal Biotechnology | 4 | 1 | 0 | 4 |
| 22117SEC62 | Applied Biotechnology | 4 | 1 | 0 | 5 |
| 22117DSC63_ | Discipline Specific Elective - II | 4 | 1 | 0 | 5 |
| 221--OEC(2DIGIT COURSE Name) | Open Elective | 4 | 0 | 0 | 2 |
| **PRACTICAL** | | | | | |
| 22117SEC64L | Plant and Animal Biotechnology Lab | 0 | 0 | 3 | 2 |
| 22117AEC65L | Applied Biotechnology Lab | 0 | 0 | 3 | 2 |
| 22117PRW66 | Project Work | - | - | - | 4 |
| 22117PROPEE | Programme Exit Examination | - | - | - | 1 |
| | **Total** | 16 | 3 | 6 | 23 |
| **AUDITCOURSE** | | | | | |
| 221ACSSIST | Interview Skills Training and Mock Test | - | - | - | 2 |
| 221ACLSCET | Community Engagement | - | - | - | 1 |
| **Total Credits for the Programme** | | | | | **115** |
| **Total Credits-Audit Courses** | | | | | **19** |

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**DisciplineSpecificElectives**

| Semester | DisciplineSpecificElectiveCourses-I |
|---|---|
| V | a) 22117DSC54A – BioinformaticsandBiostatistics<br>b) 22117DSC54B – rDNATechnology<br>c) 22117DSC54C - The Science of Stem Cell<br>d) 22117DSC54D - Patenting in Biotechnology<br>e) 22117DSC54E- Renewable Energy<br>f) 22117DSC54E - Molecular Docking<br>g) 22117DSC54G - Medicinal science<br>h) 22117DSC54H- Clinical Engineering<br>i) 22117DSC54I- Clinical Research |
| | **DisciplineSpecificElectiveCourses-II** |
| VI | a) 22117DSC63A -EnvironmentalBiotechnology<br>b) 22117DSC63B--PharmaceuticalBiotechnology<br>c) 22117DSC63C- Tools in Biostatistics<br>d) 22117DSC63D- Entrepreneurial Biotechnology<br>e) 22117DSC63E - Genetics and Society<br>f) 22117DSC63F- System Biology and Biotechnology<br>g) 22117DSC63G- Cell Culture Technique |

**Open Electives**

| Semester | OpenElectiveCourses |
|---|---|
| VI | a) 221NOEC–Tamil Nakkiya Varalaru<br>b) 221NOEC-Journalism<br>c) 221MAOEC-Development of Mathematical skill<br>d) 221PHOEC-Instrumentation<br>e) 221CEOEC-Food and Adulteration<br>f) 221CSOEC – E-Learning<br>g) 221CAOEC-Web Technology<br>h) 221CMSOEC-Banking service |

**CreditDistribution**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 17 | - | - | - | - | - | 17 |
| II | 17 | - | 4 | - | 1 | - | 18 |
| III | 17 | - | - | - | 2 | - | 19 |
| IV | 17 | - | - | - | - | 2 | 19 |
| V | 15 | - | 9 | - | 1 | - | 25 |
| VI | 6 | 7 | 2 | 2 | 4 | 1 | 27 |
| Total | 89 | 7 | 15 | 2 | 8 | 3 | 125 |

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## SCHOOL ARTS AND SCIENCE

## DEPARTMENT OF BIOTECHNOLOGY

### M.Sc., BIOTECHNOLOGY - REGULATION 2022

### COURSE STRUCTURE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 22217SEC11 | General Microbiology | 6 | 1 | 0 | 5 |
| 22217SEC12 | Molecular Genetics | 6 | 1 | 0 | 5 |
| 22217SEC13 | Biochemistry | 6 | 1 | 0 | 4 |
| 22217SEC14L | Microbiology & Molecular Genetics – Lab | 0 | 0 | 4 | 2 |
| 22217DSC15 | Discipline specific elective I | 5 | 0 | 0 | 4 |
| 22217RLS16 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **23** | **3** | **4** | **21** |
| | **SEMESTER II** | | | | |
| 22217SEC21 | Cell & Molecular Biology | 5 | 1 | 0 | 5 |
| 22217SEC22 | Biophysics & Bioinformatics | 5 | 1 | 0 | 5 |
| 22217SEC23 | Industrial Biotechnology | 5 | 0 | 0 | 4 |
| 22217SEC24L | Molecular Biology & Industrial Biotechnology Lab | 0 | 0 | 4 | 2 |
| 22217DSC25 | Discipline specific elective II | 5 | 0 | 0 | 4 |
| 22217RMC26 | Research Methodology | 3 | 0 | 0 | 2 |
| 22217RIA27 | Participation in Associated Research | - | - | - | 2 |
| | **Total** | **23** | **2** | **4** | **24** |
| | **SEMESTER III** | | | | |
| 22217SEC31 | Genomics | 6 | 1 | 0 | 6 |
| 22217SEC32 | Proteomics | 6 | 1 | 0 | 6 |
| 22217SEC33L | Genomics & Proteomics - Lab | 0 | 0 | 5 | 3 |
| 22217DSC34 | Discipline specific elective III | 5 | 0 | 0 | 4 |
| 222_OEC | Open Elective | 4 | 0 | 0 | 3 |
| 22217SRC35 | Design/socio technical research | - | - | - | 2 |
| | **Total** | **21** | **2** | **5** | **24** |
| | **SEMESTER IV** | | | | |
| 22217SEC41 | Food Technology | 6 | 1 | 0 | 6 |
| 22217SEC42 | Bio instrumentation | 6 | 1 | 0 | 6 |
| 22217SEC43L | Food technology and Bio instrumentation lab | 0 | 0 | 5 | 3 |
| 22217DSC44 | Discipline specific elective IV | 5 | 0 | 0 | 4 |
| 22217PRW45 | Project work | - | - | - | 6 |
| 22217PEE | Programme Exit Examination | - | - | - | 2 |
| | **Total** | **17** | **2** | **5** | **27** |
| | **Total Credits for the Programme** | | | | **96** |

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## Discipline specific Electives

| Semester | Discipline specific Elective Courses-I |
|---|---|
| I | a) 22217DSC15A- Immunology<br>b) 22217DSC15B- Biosafety and biodiversity<br>c) 22217DSC15C- Forensic Identification<br>d) 22217DSC15D- Co-operative Education<br>e) 22217DSC15E- Computer Security and Computer Forensic<br>f) 22217DSC15F- Power System Simulation Laboratory |
| | **Discipline specific Elective Courses-II** |
| II | a) 22217 DSC25A- Endocrinology<br>b) 22217 DSC25B- Bioethics and IPR<br>c) 22217DSC25C- Chemical Biotechnology<br>d) 22217DSC25D- Food Industry Roles and Responsibilities<br>e) 22217DSC25E- Artificial Intelligence<br>f) 22217DSC25F- Mathematics for Life Sciences |
| | **Discipline specific Elective Courses-III** |
| III | a) 22217 DSC34A- Nanobiotechnology<br>b) 22217 DSC34B- Environmental biotechnology<br>c) 22217DSC34C- Ecology<br>d) 22217DSC34D- Biochemical Pathway<br>e) 22217DSC34E- Animal Health<br>f) 22217DSC34F- Translational Biology and Molecular Medicine |
| | **Discipline specific Elective Courses-IV** |
| IV | a) 22217 DSC44A-Gene therapy utilization pharmacology<br>b) 22217 DSC44B- Plant conservation & disaster management<br>c) 22217DSC44C- Biotherapeutics<br>d) 22217DSC44D- Live Stock Production & Management<br>e) 22217DSC44E- Pathology Medicine |

## Open Electives

| Semester | Open Elective Courses |
|---|---|
| III | a) 222ENOEC-Writing for the media<br>b) 222MAOEC-Applicable Mathematics Techniques<br>c) 222PHOEC-Bio-Medical Instrumentation<br>d) 222CHOEC-Green Chemistry<br>e) 222COEC – M-Marketing<br>f) 222CMOEC- Financial Services |

## Credit Distribution:

| Sem | SEC | DSC | OEC | RSB Courses | Others | Total |
|---|---|---|---|---|---|---|
| I | 16 | 6 | - | 1 | - | 23 |
| II | 16 | 6 | - | 4 | - | 26 |
| III | 15 | 6 | 3 | 2 | - | 26 |
| IV | 15 | 5 | - | 6 | 2 | 28 |
| **Total** | **62** | **23** | **3** | **13** | **2** | **103** |

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Head of the Department
Department of Biotechnology
School of Arts & Science
Prist Deemed to be University, Thanjavur

Dean
School of Arts & Science
PRIST Deemed to be University
Thanjavur - 613 403, Tamilnadu.

## THE SCIENCE OF STEM CELL

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC54C | THE SCIENCE OF STEM CELL | 4 | 1 | 0 | 3 |

**Course Objective:** The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

**Module I:** Introduction to stem cells

Definition, properties, proliferation, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

**Module II:** Types of stem cells.

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

**Module III:** Therapeutic applications of stem cells

Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects,Genetic Perspectives for Gene Therapy, Gene Delivery methods: Viral vectors and Non-viral Vectors

**Module IV:** Ethical Issues associated with stem cell-based regenerative medicine field Regulatory and Ethical Considerations of stem cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

**Text & References:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, Alexander nBattler, Jonathan Lee, Springer,

**References:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Beetolotti, Kelya

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## PATENTING IN BIOTECHNOLOGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC54D | PATENTING IN BIOTECHNOLOGY | 4 | 1 | 0 | 3 |

**MODULE 1:**

Basic Concepts of Patenting

**MODULE 2:**

Creating a Patent Landscape

**MODULE 3:**

How to Patent Biotechnology Inventions?

**MODULE 4:**

Patenting Small Chemicals and Compounds

**MODULE 5:**

How IPR is Helping in Growth of the organization

**Reference books:**


- Alexandra George (2006) Globalisation and Intellectual Property, Ashgate publishing company
- Colin Ratledge and Bjorn Kristiansen Basic Biotechnology, Cambridge University Press-2nd Ed,2001
- David Pressman (2016) Patent It Yourself 18th edition, Nolo Publishers
- Maarten Bode, (2008) Taking traditional knowledge to the market, Orient Longman Publisher
- Poornima M Charanthmath, "Entrepreneurship Development – small Business Enterprises", Pearson Education – 2005
- Prabudha Ganguly, (2001) Intellectual Property rights- unleashing the knowledge economy, Tata McGraw Hill Publishing Company Ltd.
- Sudeep Chaudhuri (2005), the WTO and India's Pharmaceutical industry, Oxford University Press.
- Vandana Shiva (2002), Protect or Plunder? Understanding Intellectual Property Rights, Zed Books.



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## RENEWABLE ENERGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC54E | RENEWABLE ENERGY | 4 | 1 | 0 | 3 |

**Unit I: ENERGY**

Solar Radiation Flat Plate and Concentrating Collectors, Solar Direct Thermal Applications, Solar Thermal Power Generation, Fundamentals of Solar Photo Voltaic Conversion, Solar Cells, Solar PV Power Generation, Solar PV Applications. Wind Energy Estimation, Types of Wind Energy Systems

**Unit II: Fuel Technology**

Principles of combustion, Solid, Liquid and Gaseous fuels, Coal as source of energy and chemicals, Coal preparation, Carbonization, Gasification and Liquefaction of coal and lignite

**Unit III: Thermo-chemical conversions:**

Direct Combustion, Technology of Biomass gasification, Pyrolysis and Liquefaction, Bio-Chemical Conversion: anaerobic digestion, alcohol production from biomass, Chemical conversion process: hydrolysis and hydrogenation

**Unit IV: Biomass Gasifiers:**

History, Principle, Design of Biomass Gasifiers, updraft gasifier, down draft gasifier, zero carbon biomass gasification plants

**Unit V: Bio-Energy Systems with Efficient Applications:**

Traditional Stoves, Energy Efficient Cooking and Space heating Stoves, Metal Stoves Improved Gasifier Stoves,

Text Books:

1. Renewble energy resources: Tiwari and ghosal, Narosa publication.
2. Non conventional Energy Sources,Khanna Publication

**Reference Books:**

1. Renewable Energy Sources:Twidell& Weir, CRC Press.
2. Solar Energy/ S.P. Sukhatme, Tata McGraw-Hill.
3. Non Conventional Energy Systems: K M. Mittal, A H WheelerPublishing Co Ltd.
4. Renewable Energy Technologies: Ramesh & Kumar, Narosa publication.
5. Biomass Energy, Oxford &IBH Publication Co.

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## MOLECULAR DOCKING

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC54F | MOLECULAR DOCKING | 4 | 1 | 0 | 3 |

**COURSE OBJECTIVE**

- To learn various software and tools for computer-aided drug designing.
- To make students understand the essential features of the interdisciplinary field of science
-

**UNIT I: Drug Discovery**

Historic development of drug discovery, Modern drug discovery, Molecular modelling-drug targets discovery-target identification, principles of drug ability, Role of Bioinformatics in drug design

**UNIT II: Molecular Mechanics**

Basic Chemistry Review & Drug Discovery - Bio-molecular Structure & their Molecular Interactions and Recognition – Introduction to Methods in 3-D Structure Determination

**UNIT III: Drug – Receptor interaction**

Molecular basis of drug action. Drug Receptor Interaction: Basic ligand concept, agonist, antagonist, partial agonist, inverse agonist. Drug receptor concepts.

**UNIT IV: Drug design**

Prediction of binding site and virtual screening, Drug design -Structure-based drug design, Ligand based drug design, De novo ligand design, Molecular docking-search algorithm, scoring functions, ADMET properties.

**UNIT V: Molecular Docking**

Methods and Tools in Computer-aided molecular design, Molecular Docking- searching Methods – Scoring function-Protein ligand interaction- Docking using AUTODOCK- Pitfalls in docking

**REFERENCES**


1. D. Baxivanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiely Indian Edition, 2001.
2. T K Attwood, D J parry-Smith, Introduction to Bioinformatics, Pearson Education, 1st Edition, 11th Reprint 2005.
3. A. R.Leach - Molecular Modeling Principles and Application, 2nd edition, Longman, Publications, 1996.



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## MEDICINAL SCIENCE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC54G | MEDICINAL SCIENCE | 4 | 1 | 0 | 3 |

**UNIT 1**

Organ function tests—liver, kidney, thyroid Protein synthesis. Vitamins and minerals. Restriction fragment length. polymorphism (RFLP). Polymerase chain reaction (PCR). Radio-immunoassays (RIA).

**UNIT 2**

Inflammation and repair, disturbances of growth and cancer, Pathogenesis and histopathology of rheumatic and ischaemic heart disease and diabetes mellitus.

**UNIT 3**

Diseases caused by and laboratory diagnosis of — Meningococcus, Salmonella, Shigella, Herpes, Dengue, Polio, HIV/AIDS, Malaria, E. Histolytica, Giardia, Candida, Cryptococcus, Aspergillus.

**UNIT 4**

Mechanism of action and side effects of the following drugs: Antipyretics and analgesics, Antibiotics, Antimalaria, Antikala-azar, Antidiabetics

**UNIT 5**

Principles, methods approach and measurements of Epidemiology., Nutrition, nutritional diseases/disorders and Nutrition Programmes. Health information Collection, Analysis and Presentation.

**REFERENCES**


1. Ganong; Guyton and A.K. Jain book
2. Essentials of Medical Pharmacology K D Tripathi
3. Essentials of Forensic medicine and Toxicology Dr. K S Narayan Reddy
4. General Medicine textbook of medicine S N Chugh



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## CLINICAL ENGINEERING

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC541I | CLINICAL ENGINEERING | 4 | 1 | 0 | 3 |

**COURSE OBJECTIVES:**

- This course will provide a basic understanding of the clinical engineering profession, qualifications, roles, activities, and expectations.
- This course will enhance students to practice medical equipment and analyze challenges with their healthcare technology.
- This course will expose students to explore the Health Technology Management systems with medical devices and supportive services with advanced application.

**UNIT I INTRODUCTION**

Clinical engineering: Definition, Evolution, Role, Responsibilities, Functional status, History of clinical engineering and Technology in Health Care System, Enhancing patient safety

**UNIT II MEDICAL TECHNOLOGY MANAGEMENT PRACTICES**

Strategic Medical Technology Planning, Scope , Clinical necessity operational support, strategic planning process – Technology assessment: Technology audit, Budget strategies, Prerequisite for medical technology assessment – Management Practice for Medical Equipment - Device evaluation, Risk reduction, Asset management, ESHTA.

**UNIT III ESSENTIAL HEALTH CARE TECHNOLOGY PACKAGE (EHTP)**

Introduction – Health care technology management – Package development Methodology, Logical framework, Implementation, Information promotion and dissemination – EHTP Justification – EHTP matrix – EHTP advantages – Impact Analysis.

**UNIT IV CLINICAL ENGINEERING PROGRAM INDICATOR**

Clinical engineering: program services, Program database – Clinical Engineering Program management, Program indicator, Managing clinical engineering performance using program indicators – Indicator management process.

**UNIT V ADVANCED TECHNOLOGY FOR PATIENT SAFETY**

Factors Contributing to Medical Errors: Heath Care Reimbursement, Health Care Failure Mode and Effect Analysis (HFMEA), Patient Safety Best Practices Model: Bar coding, Computerized Physician Order Entry (CPOE), and Clinical data repositories – Process analysis

**TEXTBOOKS:**


1. Ernesto Iadanza, Joseph Dyro, "Clinical Engineering Handbook", Elsevier Academic Press, 2014
2. Robert Miniati, "Clinical Engineering from Devices to Systems", Academic Press, 23-Dec- 2015 - Technology & Engineering



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## CLINICAL RESEARCH

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC541 | CLINICAL RESEARCH | 4 | 1 | 0 | 5 |

**UNIT 1 Introduction to Clinical Research**

Introduction to Clinical Research, Terminologies in Clinical Research, Advantages of CR in India

**UNIT 2 Good Clinical Practice (GCP)-ICH E6**

History Development of International Regulations in Clinical Research, Good Clinical Practices, Ethics committee, Investigator Responsibilities

**UNIT 3 Pharmacovigilance**

Medical Management of Adverse Events, Handling Death, Unblinding of Drug, Clinical Safety and Pharmacovigilance, E2A - Clinical Safety and Data Management

**UNIT 4 Drug Development Process**

Overview of Drug Development, Clinical trial phases, BA/BE Studies

**UNIT 5 Clinical Data Management**

CFR Part 11, CRF_Design_2, Introduction to CDM, Data Entry Methods, Query Management, Source data validation

**Text & References:**

- Drug Discovery and Development , 2nd Edition by Raymond G Hill
- Drugs: From Discovery to Approval by Rick Ng

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## TOOLS IN BIOSTATISTICS

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC63C | TOOLS IN BIOSTATISTICS | 4 | 1 | 0 | 3 |

**UNIT 1:**

Elementary concepts in Statistics: Concepts of statistical population and sample from a population; qualitative and quantitative data; nominal, ordinal, ratio, interval data; cross sectional and time series data

**UNIT 2:**

Using R Software's: Difference of mean & proportion, Chi-Square test for independence of attributes and Contingency table, t-test, Paired t-test, Test for correlation in sampling from normal population

**UNIT 3:**

Statistical techniques: Correlation: Pearson product moment correlation, Spearman rank correlation, Partial correlation, Simple linear regression

**UNIT 4:**

Introduction to Regression. **Multiple Regressions:** Multiple linear regression and correlation - Model building and selection - Interpreting regression coefficients and confidence intervals

**UNIT 5:**

**Decision Trees:** Introduction to SPSS Decision Trees – Application of SPSS Decision Trees – Overview of decision tree-based methods (CRT Decision Trees CRT Regression Trees Quest Analysis)

**REFERENCES**


- Dutta, N. K. (2004). Fundamentals of Biostatistics, Kanishka Publishers.
- Gurumani N. (2005). An Introduction to Biostatistics, MJP Publishers.
- Daniel, W. W. (2007). Biostatistics- A Foundation for Analysis in the Health Sciences, Wiley.
- Rohatgi, V.K.& Saleh, A.K.Md. (2001). An Introduction to Probability and Statistics, John Wiley & Sons.
- Rossi R.J. (2010).Applied Biostatistics for Health Sciences, Wiley.



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## GENETICS AND SOCIETY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC63E | GENETICS AND SOCIETY | 4 | 1 | 0 | 3 |

**Unit- 1: Genetics and Society**

Theory of natural selection Application to organic evolution and its social impact. Inherited traits and ethnic groups

**Unit- 2:**

Human Genome Project and Its Impact

**Unit- 3: Testing, Screening and Prevention of Genetic Disease**

Carrier detection and presymptomatic diagnosis. Prenatal diagnosis of genetic disease – invasive and noninvasive Preimplantation genetic diagnosis

**Unit- 4: Ethical Issues**

Ethics Principles – informed consent, informed choice, autonomy confidentiality. Ethical considerations – prenatal diagnosis, population screening, family screening, embryo research, gene therapy.

**Unit- 5: Genetic Counseling:**

Definition Establishing the diagnosis Calculating and presenting the risk Discussing the options, communication and support outcomes in genetic counseling.

References:


1. Emery's– Element of Medical Genetics – Ian. D. Young, Robert. F. Mueller. GeneticsFairbanks, Ralph.
2. Genetic Counseling – Diane. L. Baker, Jane. L. Schuette, Wendy. R. Uhlmann.



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## SYSTEM BIOLOGY AND BIOTECHNOLOGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC63F | SYSTEM BIOLOGY AND BIOTECHNOLOGY | 4 | 1 | 0 | 3 |

**UNIT 1:**
Introduction to Mathematical Modelling, Introduction to Static Networks, Network Biology and Applications

**UNIT 2:**
Reconstruction of Biological Networks, Dynamic Modelling of Biological Systems: Introduction, Solving ODEs & Parameter Estimation

**UNIT 3:**
Evolutionary Algorithms, Guest Lectures on Modelling in Drug Development, Constraint-based approaches to Modelling Metabolic Networks

**UNIT 4:**
Perturbations to Metabolic Networks, Elementary Modes, Applications of Constraint-based Modelling, Constraint-based Modelling Recap, 13C Metabolic Flux Analysis

**UNIT 5:**
Modelling Regulation, Host-pathogen interactions, Robustness of Biological Systems, Robustness and Evolvability, Introduction to Synthetic Biology, Perspectives & Challenges

**Books and References:**


1. Voit E (2012) A First Course In Systems Biology. Garland Science, Uk. ISBN 0815344678
2. Klipp E (2009) Systems biology: a textbook. Wiley-VCH, Uk. ISBN 9783527318742
3. Newman MEJ (2011) Networks: an introduction. Oxford Univ. Press. ISBN 9780199206650



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## CELL CULTURE TECHNIQUES

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22117DSC63G | CELL CULTURE TECHNIQUES | 4 | 1 | 0 | 3 |

**UNIT 1:**

Introduction & biology of cultured cells, Equipments, aseptic techniques, safety protocols

**UNIT 2:**

Culture vessels & media development, Serum-free medium development & sterilization

**UNIT 3:**

Primary culture, secondary culture, cloning & selection

**UNIT 4:**

Cell separation, characterization, differentiation & transformation, Contamination, cryo-preservation & cyto-toxicity

UNIT 5:

Organo-typic culture & specialized cell culture technique

Books and references


- Culture of Animal Cells by R. Ian Freshney
- Cell culture technology: Recent advances and future prospects (Euroscicon Meeting Reports Book 1) by Bruserud, Oystein and Astrid Englezou
- Vertebrate Cell Culture II and Enzyme Technology: Volume 39 (Advances in Biochemical Engineering/ Biotechnology) by A.F. Bückmann and G. Carrea
- Animal Cell Culture and Technology (The Basics) (Garland Science)) by Michael Butler
- The Immortal Life of Henrietta Lacks by Rebecca Skloot


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## FORENSIC IDENTIFICATION

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC15C | FORENSIC IDENTIFICATION | 4 | 1 | 0 | 3 |

**Unit 1**

Forensic Science Unit Introduction, Need, Scope, Concepts and Significance of Forensic Science, History and Development of Forensic Science, Laws and Basic principles of Forensic Science, Branches of forensic science, Organizational set-up of a Forensic Science Laboratory.

**Unit 2**

Tools and techniques in Forensic Science Basic principles of microscopy, spectroscopy, chromatography, Electrophoresis, Enzyme Linked Immunosorbent Assay (ELISA), Radio Immuno Assay (RIA), Measuring and optical instruments.Research methodologies.

**Unit 3**

Fingerprints and Palm prints History and development of Dermatoglyphics , formation of ridges, pattern types, pattern area. Classification of fingerprints- Henry's system of classification, single-digit classification, Extension of Henry's classification, filing, searching and fingerprint bureau. Automated Fingerprint Identification System (AFIS).Modern methodologies in fingerprinting.

**Unit 4**

Foot/ Footwear/Tyre Impressions Importance, Gait pattern, Casting of footprints in different medium, electrostatic lifting of latent footprints, Taking of control samples, Collection, tracing, lifting, casting of impressions, enhancement of footwear impressions, analysis and comparison of foot impressions, moulds, identification characteristics.

**Unit 5**

Lip prints, Ear prints and their significance Nature, location, collection and evaluation of lip prints, Forensic Significance, photography, location, collection and evaluation, taking of control samples of footprints, lip prints and Ear prints for comparison.

REFERENCES:


1. Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression,Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad,2000
2. Mehta, M.K; Indentifiication of Thumb impression & cross examination of Fingerprints, N.M. Tripathi Pub. Bombay, 1980.
3. Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata, 1981.
4. Cowger James F; Friction Ridge Skin- Comparison &Identification of Fingerprints, CRC Press, NY, 1993



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## CO-OPERATIVE EDUCATION

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC15D | CO-OPERATIVE EDUCATION | 4 | 1 | 0 | 3 |

**Course Objectives:**

- Students will increase their discipline-related knowledge
- Students will develop interpersonal and professional skills that allow for successful workforce transition
- Students will develop improved analysis, problem solving and decision-making skills
- Students will learn organizational structure, behavior and function

**Unit 1: Evolution of Co-operation**

Concept – Features – Benefits of Cooperation. Co-operative Principles: Meaning – Evolution of Cooperative Principles – Rochdale Principles – Reformulation of Cooperative Principles by ICA operative Identity Statement 1995: Definition, Values and Principles. – Need and Importance – Arrangements for Co-operative Education and Training in India at Different Levels – ICA- Sectoral Organization

**Unit 2: Co-operative Movement in India**

Genesis of Co-operative Movement in India – Development during Pre-Independence and Post Independence Era; Strategies for Co-operative Development: Co- operative Extension, Co operative Education and Training.

Unit 3:

Various forms of Business Organizations such as Sole Trader partnership firm, joint stock Companies and co-operative societies. - Difference between private firms and co operative Societies

**Unit 4: Non-Agricultural Credit Co-operatives**

Constitution and Functions of Co-operative Urban Banks, Employees Co-operative Credit Societies, Co-operative Housing Societies and Industrial Co-operative Banks-NABARD and RBI.

**Unit 5: Provision Relating to Employees of Cooperatives**

Common Cadre-Recruitment Bureau-Selection, Placement– Offences and Penalties to Employees –Provision Relating to Appeal, Revision-Review- Cooperative Tribunals.

**REFERENCES**


1. Dr. B.S.Mather. Co-operation in India – Sahitya Bhawan, 1999 and2010.
2. A.John Winfred and V.Kulandaiswamy. Co-operative Thought. Rainbow Publications,1987.
3. Government of Tamil Nadu. Tamil Nadu Cooperative Society's Act of 1983 and 1988.



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## COMPUTER SECURITY AND COMPUTER FORENSIC

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC15E | COMPUTER SECURITY AND COMPUTER FORENSIC | 4 | 1 | 0 | 3 |

**Course Objective:**

- Understand the threats in networks and security concepts.
- Understand security services for email.
- Awareness of firewall and it applications.
- To correctly define and cite appropriate instances for the application of computer forensics Correctly
- Collect and analyze computer forensic evidence identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

Course Content:

Module-I:

Ethical hacking, Attack Vectors, Clarification of Terms, Traditional Problems associated with Computer Crimes, Realms of Cyber world, unauthorized access, computer intrusions, white-collar crimes, viruses and malicious code, virus attacks, pornography, software piracy, mail bombs, exploitation, stalking and obscenity in internet, Cyber psychology.

Module-II: Introduction to Digital forensics, Forensic software and handling, forensic hardware and handling, analysis and advanced tools, forensic technology and practices, Biometrics: face, iris and fingerprint recognition, Audio-video evidence collection, Preservation and Forensic Analysis.

Module-III:

Definition and types of cybercrimes, electronic evidence and handling, electronic, Introduction to internet crimes, hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules.

Module-IV:

Basics of Computer Computer organisation, components of computer- input and output devices, CPU, Memory hierarchy, types of memory, storage devices, system softwares, application softwares, basics of computer languages.

Module-V:

Computer Forensics Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications

Text & References:


1. C. Altheide & H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011. ISBN: 9781597495868.
2. Online Course management System: https://esu.digitv2learn.com/



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## PATHOLOGY AND EXPERIMENTAL MEDICINE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC15F | PATHOLOGY AND EXPERIMENTAL MEDICINE | 4 | 1 | 0 | 3 |

**COURSE OBJECTIVES:**

- To possess an in-depth understanding of the fundamentals and principles of various laboratory procedures done in Pathology including blood bank
- To be able to perform routine and special laboratory investigations in haematology and cytology and histopathology laboratory
- To possess a full working knowledge about the functioning and performance all the automated instruments of Haematology, Histopathology, Cytology and Blood Banking
- To be able to function as effective educators and conduct independent research work in the field of Medical Laboratory Technology

**UNIT 1**

General aspects of blood cell formation, Sites of haematopoiesis. Development of blood cells. Morphology and Regulation of haematopoiesis, Red blood cells - Basic aspects of anemia, definition, pathophysiology, classification and clinical features

**UNIT 2**

Basic Structure of mammalian cell, Cell Physiology, Cell cycle and cell division, Chromosome structure, human chromosome complement and methods of demonstration of sex chromatin , Benign Pathological processes affecting the cell

**UNIT 3**

Staining techniques in cytology along with relevant special stains, Use of cytospin centrifuge, Methods of cell block preparation, Biomedical waste management in cytology

**UNIT 4**

Role of cytologic techniques in diagnosis of cancer, Pathology and Cytology of Respiratory tract, urinary tract with a knowledge of distinguishing between normal and abnormal smears. Identifying malignancies. Setting up of the FNAC laboratory service, Organization and quality assurance in Cytology- Internal Quality control and external quality assessment programmes

**UNIT 5**

Evaluation of diagnostic procedure – Sensitivity, Specificity, Predictive values, Likelihood ratio and ROC curve, Testing of hypothesis – concept of hypothesis and statistical significance, Parametric and non-parametric tests.

**REFERENCES:**


1. Bain BJ, Bates I, Laffan MA, Lewis SM. Dacie and Lewis Practical Hematology. Philadelphia: Elsevier Churchill Livingstone.
2. McPherson RA, Pincus MR. Henry's Clinical Diagnosis and Management by Laboratory Methods. Philadelphia: Elsevier Saunders.
3. Koss LG, Melamed MR. Koss's Diagnostic Cytology, and its Histopathologic Bases. Philadelphia: Lippincott Williams and Wilkins.
4. Hoda RS, Hoda SA. Fundamentals of Pap Test Cytology. Humana.
5. Mahajan BK. Methods in Biostatistics, Jaypee.



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## CHEMICAL BIOTECHNOLOGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC25C | CHEMICAL BIOTECHNOLOGY | 4 | 1 | 0 | 3 |

**UNIT 1: Introduction and fundamentals of chemical engineering**

Chemical Engineering in day to life with examples, origin and growth of chemical engineering, chemical engineering job titles/options, unit operations and unit processes concepts, molarity, molality, normality, ppm, density and specific gravity, composition relationships, ideal gases and gas mixtures, real gases, vapour pressure, vapour liquid equilibrium, humidity and saturation.

**UNIT 2: Introduction to Biotechnology**

Biotechnology: History, scope, significance and Ethics. Types of Biotechnology: Microbial, agricultural, animal, plant, aquatic, food, medical; Industrial Organisms: Prokaryotes, Eukaryotes; Metabolic processes: Anabolism and Catabolism

**UNIT 3: Bioproducts and Biosystems Engineering**

Biomass: Baker's Yeast, Algae; Bioproducts: Aminoacids, Organic acids, Antibiotics, Microbial Polysaccharides and Lipids, Bioplastics, Biofertilizers, Enzymes, Biosensors, Vaccines, Monoclonal antibodies; Biofuels: Bioethanol, biogas; Bioremediation for petroleum spill, wastewater treatment.

**UNIT 4: Biochemical Conversion and Refinery concepts**

Biochemical (anaerobic digestion and fermentation) conversion of waste. Biogas characterization, yields, and optimization. Scopes of energy efficiency improvement in power sectors. Energy integration, Gas cleaning. Possible integrated refinery options, techno-economic evaluation, life-cycle assessment.

**UNIT 5: Life Cycle Assessment and Clean Technology options**

Environmental audits-waste audits, life cycle assessment industrial symbiosis. Clean technology options, clean technology and clean up technology and clean synthesis. Materials re-use, waste reduction at source, economics of pollution.

**REFERENCES:**


1. W.J. Thieman, M. A. Palladino, Introduction to Biotechnology, 4th Edn., Pearson Education Ltd., 2021. 3. S.C. Bhatia, Textbook of Biotechnology, Atlantic Publishers, 2005.
2. R. Mureddy, Environmental Impact Assessment: Theory and Practice, Butterworth-Heinemann 2017.
3. J. Glasson, R. Therivel, Introduction to Environmental Impact Assessment, Taylor & Francis, Routledge 2019.



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## CHEMICAL BIOTECHNOLOGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC25D | FOOD INDUSTRY ROLES AND RESPONSIBILITIES | 4 | 1 | 0 | 3 |

| | |
|---|---|
| Module 1 | Introduction to Food Industry Roles and Responsibilities |
| Module 2 | Food Safety and Quality Control |
| Module 3 | Food Production and Manufacturing Processes |
| Module 4 | Regulatory Compliance in the Food Industry |
| Module 5 | Food Industry Marketing and Sales |
| Module 6 | Career Opportunities in the Food Industry |

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## ARTIFICIAL INTELLIGENCE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC25E | ARTIFICIAL INTELLIGENCE | 4 | 1 | 0 | 3 |

Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

MODULE-I

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

MODULE-II

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms

MODULE-III

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems.

MODULE- IV

First order logic. Inference in first order logic, propositional vs. first order Inference, unification & lifts forward chaining, Backward chaining, Resolution

MODULE- V

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web

Reference Books:-


1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", SecondEdition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.



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## MATHEMATICS FOR LIFE SCIENCES

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC25F | MATHEMATICS FOR LIFE SCIENCES | 4 | 1 | 0 | 3 |

**UNIT 1**

Introduction: Mathematics as a language, Need of learning mathematics, Applications of mathematics in Biology

**UNIT 2**

Graphs and functions – I: Linear function, Quadratic function, Exponential function

**UNIT 3**

Graphs and functions – II: Periodic functions, Combination of simple functions, Examples from Biology

**UNIT 4**

Differentiation and its application in Biology – I: Product rule in differentiation, Derivatives of Sine and Cosine functions, Plotting derivatives, Differential calculus to understand actin polymerization

**UNIT 5**

Differentiation and its application in Biology – IV: Force and energy, DNA unzipping, Plotting mathematical function

References:


- Mathematics for Biological Scientists, M. Aitken, B. Broadhursts, S. Haldky, Garland Science (2009)
- Introduction to Mathematics for Life Scientists, E. Batschelet, Springer Verlag, 3rd edition (2003)
- Calculus for Life Sciences, R. De Sapio, W. H. Freeman and Co. (1976)
- Physical Biology of the Cell, R Phillips, J Kondev, J. Theriot, Garland Science (2009)
- Random Walks in Biology, H. C. Berg, Princeton university press (1993)



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# ECOLOGY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC34C | ECOLOGY | 4 | 1 | 0 | 3 |

**COURSE OBJECTIVE:**
To introduce the basics of Ecology and Environmental Sciences tonstudents coming from different background.

UNIT-I Introduction to Ecology & environmental sciences; Principles and Scope of Ecology Structure and Functions of Ecosystems- Abiotic and Biotic components, Flow of energy and cycling of materials; water, carbon, nitrogen and phosphorus, Trophic pyramids and food webs; Ecosystems Types and Diversity. Alterations of ecosystem function: acid rain, nuclear winter, global warming and ozone hole, an overview of IPCC.

UNIT-II Aquatic and terrestrial communities; rare communities; deep earth, deep sea floor, volcanoes. Primary productivity; basic concepts, Ecological succession inland, water; concepts, Invasive species and control

UNIT-III Biodiversity: Definition, importance, Magnitude and global accumulation of biodiversity, diversification through geological time scale; Levels of biodiversity. Species diversity

UNIT-IV Population estimation methods- Life tables, fecundity and survivorship schedules pre and post breeding census, field exercise in plant demography, density estimations: field and computer simulation.

Unit-V Biogeography - Distribution of communities and island biogeography; examples,

**Text books:**
1. Smith, TM and Smith RL 2015. Elements of Ecology, Pearson Education, India.
2. Cain, ML, Bowman, WD and Hacker SD 2011. Ecology, 2nd Edition, Sinauer Associates Inc.
3. Odum, E. P. (2004). Fundamentals of Ecology, Oxford and IBH Publishing Co. Pvt. Ltd.

**Reference books:**
1. Singh, J.S., S.P & Gupta, S.R. 2006. Ecology, Environment and Resource conservation. Anamaya Publ., New Delhi, 688 pp.
2. Miller, G.T. 2004. Environmental Science. Thomson, California. 538 pgs.
3. Jase Fitzgerald 2017. Biodiversity: An Introduction. Larsen and Keller Education. ISBN: 978-16354904284.

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## BIOCHEMICAL PATHWAY

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC34D | BIOCHEMICAL PATHWAY | 4 | 1 | 0 | 3 |

**UNIT 1**

Pathways of carbohydrate biosynthesis - gluconeogenesis, pentose phosphate pathway, glyoxylate pathway.

**UNIT 2**

Biosynthesis of amino acids, amino acids as biosynthetic precursors.

**UNIT 3**

Fatty acids and lipid biosynthesis, regulation and their metabolic disorders.

**UNIT 4**

Biosynthesis of purine and pyrimidine ribonucleotides, formation of deoxyribonucleotides and their regulation.

**UNIT 5**

Metabolic pathway engineering, vitamin A engineering in cereals, microarray analysis, role of bioinformatics in functional genomics.

REFERENCES:


- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN: 13: 978-1-4641-0962-1 / ISBN: 10:1-4292-3414-8.
- Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New York), ISBN: 978-0-470-28173-4.
- Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4
- Fundamental of Biochemistry, Voet and Voet- provide necessary details on latest edition Edited by Prof. Hiren K Das (JNU).



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## ANIMAL HEALTH

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC34E | ANIMAL HEALTH | 4 | 1 | 0 | 3 |

**COURSE OBJECTIVES:**

To provide the candidate with knowledge, understanding and application of animal health, welfare, food hygiene and feed hygiene legislation.

**UNIT 1**

Introduction: Signs of health & diseases, General causes of diseases, Disease transmission, diagnosis & treatment, Biosecurity: disease prevention

**UNIT 2**

Immune response (Immune system: Immune organs & cells), Immune response (mechanisms of innate & acquired Immunity), Immune response (Vaccines & Immunity)

**UNIT 3**

Diseases of digestive system (mouth, choke, lactic acidosis, colic), Diseases of digestive sys. (Bloat, ruminal drinkers, hardware dis.), Diseases of digestive sys. (scours, colibacillosis, obstruction), Diseases of respiratory system

**UNIT 4**

Nutritional & metabolic diseases, Neonatal diseases & field therapy, Urinary tract disorders (general signs, infections, calculi), Reproductive disorders (abortion, dystocia, mastitis)

**UNIT 5**

Infectious diseases (FMD, erysipelas, PRRS), Infectious diseases (TB, Johne's disease, strangles), Infectious diseases (tetanus, botulism, lyme disease)

**REFRENCES**


- Introduction to Veterinary Science. Lawhead & Baker, 2004.
- Animal Health, 3rd ed, Jackson, Greer, Baker. 2000.
- Principles of Veterinary Medicine, by Hoopes and Thwaits.
- The Merck Veterinary Manuel 9 th edition, 2005.



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## TRANSLATIONAL BIOLOGY AND MOLECULAR MEDICINE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC34F | TRANSLATIONAL BIOLOGY AND MOLECULAR MEDICINE | 4 | 1 | 0 | 3 |

UNIT 1
Medical Team Selection, Introduction to Molecular Medicine, Scientific Collaboration in Molecular, Medicine- the key players Goal: Personalized Medicine

UNIT 2
Breast Cancer- from Genes to Personalized Medicine

UNIT 3
The CRISPR Revolution- Genes, inheritance, and Genome Editing

UNIT 4
Aging-Related Chronic Diseases from Bench to Bedside

UNIT 5
Immunotherapeutics for Autoimmunity and Cancer, Molecular Medicine and Forensic Science

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## MOLECULAR MEDICINE AND FORENSIC SCIENCE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC44C | MOLECULAR MEDICINE AND FORENSIC SCIENCE | 4 | 1 | 0 | 3 |

UNIT 1

Molecular docking with deep learning, convolution neural network and its potential in virtual screening and binding affinity prediction, machine learning algorithms as scoring functions and rank binding poses. Application of deep learning to predicting protein structure

**UNIT 2**

Machine learning techniques in drug discovery and development. Machine learning applications in cancer prognosis and prediction, Emphasis on papers illustrating techniques for data-driven machine learning analysis of big data in Digital medicine.

**UNIT 3: BASICS OF FORENSIC SCIENCE**

Introduction Global History and Scope, Need and Development Principles, emphasizing on Specific contribution of Scientists in the field of Forensic Science

**UNIT 4 FORENSIC PSYCHOLOGY**

Forensic Psychology – Introduction, Scope and Significance, Role of forensic Psychologist, Psychology and law- Laws related to psychology, fitness to stand trial, legal perspective of insanity, Psychology of evidence – eyewitness testimony, confession evidence. Criminal profiling, Ethical issues in Psychology.

**UNIT 5: BIOMETRICS**

Biometric evidences such as finger impressions, retina, ear patterns, voice, face recognition, 3D face recognition, automatic forensic dental identification, hand vascular pattern, Multibiometric system, Recent technologies and developments, biometric databases.

**REFRENCES:**


1. Introduction to Machine Learning, By Ethem Alpayd in, 4th Edition, MIT press, 2020
2. Artificial Intelligence in Drug Discovery, Editor: Nathan Brown, Copyright year m2021; Print ISBN 978-1-78801-547-9
3. Deep Learning for the Life Sciences, by Bharath Ramsundar, Peter Eastman
4. Patrick Walters, Vijay Pande, Released April 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492039839
5. Morgan C. T. King R. A. Weisz J. R. & Schopler J., Introduction to psychology (7th ed.), McGraw-Hill.
6. Veeraraghavan, V. Handbook of ForensicPsychology 2nd ed. Selective &
7. Scientific Books: India
8. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).


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## LIVE STOCK PRODUCTION & MANAGEMENT

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC44D | LIVE STOCK PRODUCTION & MANAGEMENT | 4 | 1 | 0 | 3 |

**UNIT 1**

Introduction-Development of Daily Industry in India and World-Present status and future prospects of livestock development in India.

**UNIT 2**

Integrated fish farming: principles, Poultry-cum-fish culture, Duck-cum-fish culture, Pig-cum-fish culture, Paddy-cum-fish culture, Mushroom-cum-fish culture, Vermicomposting-cum-fish culture, Fish-cum-horticulture, Sewage-fed fish culture: Fish-cum-sericulture, Aquatic Plant-cum-fish culture, livestock management in relation to fish culture.

**UNIT 3**

Introduction and scope of swine farming in the country. Demography of swine population. Breeds and their role in economy. Management of different categories of swine for optimal production: breeding and pregnant sows; sows at farrowing and after farrowing; pig-Ms, growing stock, lactating sows, feed lot stock.

**UNIT 4**

Biodiversity management: Concept of biological diversity, Conservation in India and abroad, Wildlife conservation programmes, The wildlife (protection) Act-1972, Biological diversity Act- 2002, Basic concept of Zoo Management

**UNIT 5**

Demography of cattle and buffalo population, Breeds and breed descripters of important breeds, Important traits of cattle and buffaloes, General management and feeding practices of calves, heifers, pregnant, lactating and dry animals in bulls and working animals, Draught ability of cattle and buffaloes, Raising of buffalo mates for meat production.

**REFRENCES:**


1. Akano IE. 1992. DNA Technology. IAP Academic Press.
2. Micklos DA, Fryer GA & Crotty DA. 2003. DNA Science. Cold Spring Harbour.
3. Setlow JK. 2006. Genetic Engineering – Principles and Methods. Springer.
4. Lasley JF. 1987. Genetics of Livestock Improvement. 3rd Ed. IBH.
5. Nicholas FW. 1987. Veterinary Genetics. Claredon Press.



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## VETERINARY MEDICINE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22217DSC44E | VETERINARY MEDICINE | 4 | 1 | 0 | 3 |

UNIT 1:
Elementary Anatomy and Physiology of Animals, Introduction to anatomy and physiology of musculoskeletal, digestive, cardiovascular, respiratory, nervous excretory, male and female reproductive and endocrine systems and mammary glands of domestic animals; Body cavities

UNIT 2 Elementary Pharmacology
Introduction of Pharmacology, Nature and sources of drugs; Routes of drug administration; Dosage forms; Pharmaceutical processes; Handling of Hazardous substances; Chemical sterilization of equipments and premises; Antiseptics and disinfectants; Weights and measures; Pharmacy calculations; Classification of important drugs; Important Indigenous drugs.

UNIT 3 Elementary Parasitology
Economic importance of parasitic diseases of livestock, Introduction to endo-and ecto- parasites; Prevention control and treatment of diseases caused by protozoa, trematodes, cestodes, nematodes and arthropods in livestock; Parasites of zoonotic importance.

UNIT 4 Basic Preventive Veterinary Medicine
Definition, incidence, etiology, epidemiology, pathogenesis, transmission, clinical findings, diagnosis, prevention and control of Hemorrhagic Septicaemia, Brucellosis, Tuberculosis, Listeriosis, Actinobacillosis, Foot and Mouth disease, Rabies, Johne's disease, Strangles, Glanders, Classical swine fever, Abortions, Enterotoxaemia etc. Toxicities e.g. nitrate, BHC, DDT.

UNIT 5 Wounds Management and Veterinary Care
Wound: causes, classification, drainage; Wound dressings and wound protection; Cyst; Haematoma; Hernia Abscess; Clinical use of antiseptics, fly repellents, anti-maggot etc.; First aid in sick animals including fracture cases.

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## DEPARTMENT OF BIOTECHNOLOGY

Certificate course on

# MEDICAL LABORATORY TECHNICIAN

## SYLLABUS

**SUBJECT CODE: 22517MT** **Total: 45 hours**

**Course objectives:**

- To provide students with comprehensive knowledge of various laboratory techniques, including microbiology, biochemistry, clinical pathology, serology, and hematology.
- Students learn how to conduct diagnostic tests, interpret test results, and maintain laboratory equipment and supplies.

**Course Outcomes:**

- Perform routine clinical laboratory procedures within acceptable quality control parameters in Hematology, Chemistry, Immunohematology, and Microbiology under the general supervision of a Clinical Laboratory Scientist or Pathologist.
- Demonstrate technical skills, social behavior, and professional awareness incumbent upon a laboratory technician.
- Operate and maintain laboratory equipment, utilizing appropriate quality control and safety procedures.

**UNIT 1** **(9 hours)**

Anatomical terms & Anatomical Positions, Different parts of the human body, Tissue with Function & Classification, Genito- Urinary System - Male & Female Reproductive Organic System, Urinary bladder, Kidney and Ureter, Uterus & Urethra.

**UNIT 2** **(9 hours)**

Morphology and Staining of Bacteria, Bacteriological Examination of Pus, Abscess and wounds, Isolation and Inoculation according Techniques, Biochemical Test.

**UNIT 3** **(9 hours)**

Introduction of Haematology, Collection of Blood, Estimation of Haemoglobin, Anticoagulation, MCV,MCH & MCHC & its Importance, Total Platelet Count, Urine Analysis, Serum Analysis.

**UNIT 4** **(9 hours)**

ABO & Rh Blood Group System, Blood Transfusion and its Reactions, Administration of Blood Bank.

**UNIT 5** **(9 hours)**

Microscope-Principal, Operation, care and use, Sterilization: General Principal and Classification, First Aid and Safety Measures, Collection preservation and Storage of different body fluids.

**REFERENCE**


1. Godkar P.B. Textbook of M.L.T. 3rd edition, Bhalani Publications.
2. Mukherjee .L. K , Medical Laboratory Technology,Vol.1-3, 3rd edition, Tata McGraw Hill
3. Wintrobe's Clinical Haematology, 14th edition, Lippincott Williams & Wilkins
4. De Gruthy's Clinical Haematology in Medical Practice, Sixth edition, Wiley Publications
5. Dacie J.A & Lewis S.M. Practical Haematology. The English Language Book Society. 8th ed., ELBS
6. Mark K Fung, Brenda J. Grossman, Christopher D. Hillyer, Connie M Westhoff. Technical Manual. 18th ed. AABB


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## DEPARTMENT OF BIOTECHNOLOGY

Certificate course on

# SPIRULINA CULTIVATION

## SYLLABUS

**SUBJECT CODE: 22517SC** **Total: 45 hrs**

**Course objectives:**

- To introduce fundamental concepts and methods of spirulina cultivation
- To train the students in comprehensive spirulina production and post-production
- To make the students become an entrepreneur

**Course Outcomes:**

- Will prepare students to understand the spirulina cultivating techniques
- It will also help students to learn the application of spirulina
- Will prepare students to understand the problems of farmers and them to tackle them with recent Biotechnological advances.

**UNIT 1** **(9 hours)**

Introduction to SCP production – historical use and rediscovery of Spirulina, importance, morphology, taxonomy and habitat of Spirulina

**UNIT 2** **(9 hours)**

Biochemical composition – amino acids, unsaturated fatty acids and lipids, mineralsvitamins, pigments, carotenoids and phycobiliproteins. Chelating of toxic minerals.

**UNIT 3** **(9 hours)**

Cultivation and production of spirulina -Natural production –Nutritional media ,small scale commercial production – commercial and mass cultivation (tank construction, culture medium, strain selection, scaling up of the process)

**UNIT 4** **(9 hours)**

Importance of light and pH in Spirulina cultivation –Harvesting and processing drying and packing

**UNIT 5** **(9 hours)**

Products, uses and benefits -Spirulina and its use by humans-Immune system enhancement,nutritional supplements, Food source, Food safety aspects related to human consumption of spirulina. Spirulina and agriculture - nutritional supplement, a colourant

**REFERENCES:**


1. AvigadVonshak. Spirulina platensis (Arthrospira) Physiology, cell-biology and biotechnology. Taylor & Francis Ltd. 2. Selvendran D. 2015.
2. Large Scale Algal Biomass (Spirulina) Production in India. In: D. Das (Ed.) Algal Biorefinery: An Integrated Approach. Springer.
3. Habib M.A.B., Parvin M., Huntington T.C. and Hasan M.R. 2008. A review on culture, production and use of Spirulina as food for humans and feeds for domestic animals and fish. FAO Fishers and Aquaculture Circular No. 1034, FAO, Rome, Italy


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## DEPARTMENT OF BIOTECHNOLOGY

Diploma course on

# FERMENTATION TECHNOLOGY

## SYLLABUS

**SUBJECT CODE: 22517FT** **Total: 90 hours**

**Course objectives:**

- To study the design and construction of fermenter and parameters to be monitored and controlled in fermentation process
- To study the principle of sterilization necessary for fermentation
- To study the cell growth and product formation
- To evaluate the kinetics and mechanism of microbial growth

**Course outcomes:**

- This subject puts emphasis on the basic engineering principles of Fermentation Technology
- It also highlights the application of fermentation in biotechnological industry.

**UNIT I: Introduction to fermentation** **(18 hours)**

Introduction to fermentation; History and development of fermentation industry; General requirements of fermentation processes; Isolation, preservation and improvement of industrially important micro-organisms

**UNIT II: Preparation of microorganisms (microbial cells) for fermentation.** **(18 hours)**

Development of inoculum for industrial fermentations; Kinetics of microbial growth and death; Air and media sterilization

**UNIT III: Basic design of fermentor** **(18 hours)**

Fermentor; Basic design and construction of fermentor and ancillaries; Different types of fermentations

**UNIT IV: Types of fermentation process** **(18 hours)**

An overview of aerobic and anaerobic fermentation processes and their application in the biotechnology industry solid-substrate fermentation and its applications.

**UNIT V: Measurement of Parameters** **(18 hours)**

Measurement and control of bioprocess parameters Analysis of batch, fed-batch and continuous bioreactions; Bioreactor configuration – batch, continuous stirred-tank, tubular, plug flow, packed bed, air lift, fluidized bed

**REFERENCES:**

1. Murray Moo -Young, Comprehensive Biotechnology, Vol. 1 & III-latest ed.
2. Microbes & Fermentation, A. Lel and Ketlers Richard J. Mickey, Griffin Publication
3. Industrial Fermentations- Leland, N. Y. Chemical Publishers.
4. Prescott and Dunn's- Industrial Microbiology, 4 th, ed.

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## DEPARTMENT OF BIOTECHNOLOGY

Certificate course on

# AQUACULTURE TECHNOLOGY

## SYLLABUS

**SUBJECT CODE: 22517AT** **Total: 45 hours**

**Course objectives:**

- To meet the academic to provide knowledge for sustainable aquaculture
- To expose learners to frontier and thrust areas of Aquaculture
- To provide the learners an experience in research for Aquaculture production

**Course outcomes:**

- Identify and understand different types of fishes and fin fish anatomy
- Understand the Aquatic environment and Aquatic ecosystem
- Understand the Classification of Fishes and Distribution
- Understand the Food and Feeding Habits.

**UNIT 1** **(9 hours)**

Definition of ecology, organism and environment; features of organism - environment relations; living and non - living environments; the ecosystem or habitat

**UNIT 2** **(9 hours)**

Basic structure of the skin in fishes; epidermal derivatives – microridges and integumentary glands; dermal derivatives – cosmoid scales, ganoid scales, placoid scales, elasmoid, cycloid and ctenoid scales; Fish age and scales; integumentary pigments; mouth and jaws; gill slits; fins – median fins and paired fins, origin of paired fins; coloration

**UNIT 3** **(9 hours)**

Types of food – basic food, secondary food, incidental food, obligatory food; feeding habits – detritivores, scavengers, herbivores, omnivores, carnivores, surface feeders, column feeders, bottom feeders, stenophagic, stenophagic and euryphagic fishes; seasonal changes in food availability and food preferences

**UNIT 4** **(9 hours)**

Reproduction – ovary and testes, structure, development of primary and secondary sexual & Sexual dimorphism in fishes. Endocrine organs in fishes – Pituitary gland, thyroid gland, adrenal gland, Urohypophysis, pancreatic islets and pineal organs.

**UNIT 5** **(9 hours)**

Microbial infections of Bacteria, Viruses, fungi and algae- pathogenicity and virulence-source of infection-morphological, physiological and sociological diagnosis-microbiological water quality management- application of drugs, chemicals and antibiotics.

**REFERENCES:**


1. Jingaran, V.G.1991. Fish and Fisheries of India. Hindustan Publ.Corporation (India).
2. Lagler K. F., J. E. Bardach and R. R. Miller. 1977. Ichthyology. John Wiley.
3. Moyl, P. B. 1995. Fishes: An Introduction to Ichthyology, 3/Ed. Narendra Publishing House, New Delhi.
4. Talwar, P. K. and V. G. Jhingran. 1991. Inland Fishes of India and Adjacent Countries. Vol. I & II. Oxford and IBM Publishing Co.,
5. Halver, J. E. 1972. Fish Nutrition. Academic Press, New York. 2. Sena, S. De Silva and Trevor A. Anderson. Fish Nutrition in Aquaculture. Chapman & Hall London.1998. p. 319. New Delhi.


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## DEPARTMENT OF BIOTECHNOLOGY

Certificate course on

# 3D BIOPRINTING

## SYLLABUS

**SUBJECT CODE: 225173BP** **Total: 45 hours**

**Course objectives:**

This course is of interest for students with a bio/medical, material chemistry or engineering background interested in the application of 3D printing and other 3D fabrication techniques in the field of medicine.

- It will provide insight in the opportunities of additive manufacturing technologies, micro/nano devices and 3D printing in biomedical applications.
- It will provide the basics of 3D printing and additive manufacturing and devices used for biofabrication, and the introduction to 3D design.
- It will also provide insight in the specific challenges encountered when translating 3D printing to biofabrication, such as the development of specific bioinks and the required control over processing conditions

**Course outcomes:**

On completion of the course the student will be able to:

1. Use software tools for 3D printing
2. Prepare 3D printed modules
3. Construct products using LOM and FDM technologies

**UNIT 1** (9 hours)

Opportunities & Challenges of 3D bioprinting & biofabrication in medical applications, Core Principles and Physical Foundations underlying 3D Bioprinting, Basic process of 3D bioprinting (problem, design, material selection, and object fabrication)

**UNIT 2** (9 hours)

Biofabrication and 3D-Bioprinting Technologies and Tools, Medical imaging and imaging processing, Biomodeling, Blueprints (Digital models of tissues and organs), Technology platform and emerging trends in bioprinting, Validating assays applied to printed products

**UNIT 3** **(9 hours)**

Introduction to Bioinks, Important material requirement for Bioink development, Crosslinking of Hydrogels for Bioprinting, Single-Material and Multimaterial Bioink Systems

**UNIT 4** **(9 hours)**

Design approaches in Bioprinting, Design of Cornea Tissue-Specific Bioink and 3D Bioprinting of Cornea, Bioprinting of Heart, Bioprinting of Kidney

**UNIT 5** **(9 hours)**

Medical Modeling for Organ Printing, Ethical Issues related to Organ Printing

**REFERENCES**


1. Chua C.K., Leong K.F. and LIM C.S *Rapid prototyping: Principles an Applications*, World Scientific publications, 3rdEd., 2010
2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001.
3. Terry Wohlers. " Wholers Report 2000", Wohlers Associates, 2000.
4. Paul F. Jacobs. " Rapid Prototyping and Manufacturing"–. ASME Press, 1996 5. Ian Gibson, Davi'n Rosen, Brent Stucker "Additive Manufacturing Technologies" Springer, 2nd Ed, 2014.


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## DEPARTMENT OF BIOTECHNOLOGY

### CERTIFICATE COURSE SYLLABUS

### ACADEMIC YEAR 2022-2023

## RENEWABLE ENERGY

**Subject code: 22517REY**

**Course Outcome**

1. To Understand the Need, importance and scope of non-conventional and alternate energy resources.
2. To understand role significance of solar energy, Wind Energy.
3. To get the utilization of Biogas plants and geothermal energy
4. To understand the concept of energy Conservation and applications

**Unit I: ENERGY SYSTEM**

Solar Radiation Flat Plate and Concentrating Collectors, Solar Direct Thermal Applications, Solar Thermal Power Generation, Fundamentals of Solar Photo Voltaic Conversion, Solar Cells, Solar PV Power Generation, Solar PV Applications. Wind Energy Estimation, Types of Wind Energy Systems, Performance, Site Selection, Details of Wind Turbine Generator. Ocean Thermal Energy Conversion (OTEC), Principle of operation, development of OTEC plants, Tidal and wave energy, Potential and conversion techniques, mini-hydel power plants. Geothermal Energy: Resources, types of wells, methods of harnessing the energy, scope in India.

**Unit II: Fuel Technology**

Principles of combustion, Solid, Liquid and Gaseous fuels, Coal as source of energy and chemicals, Coal preparation, Carbonization, Gasification and Liquefaction of coal and lignite, Petroleum and its derived products. Inter conversion of fuels, Natural gases and derivatives, Sources and Potential, combustion equipment for solid, Liquid and gaseous fuels, Nuclear fuel and technology.

**Unit III: Thermo-chemical conversions**: Direct Combustion, Technology of Biomass gasification, Pyrolysis and Liquefaction, Bio- Chemical Conversion: anaerobic digestion, alcohol production from biomass, Chemical conversion process: hydrolysis and hydrogenation,

**Unit IV: Biomass Gasifiers:** History, Principle, Design of Biomass Gasifiers, updraft gasifier, down draft gasifier, zero carbon biomass gasification plants, Gasification of plastic-rich waste, applications for cooking, electricity generation, Gasifier Engines, Operation of spark ignition and compression ignition engine withwood gas, methanol, ethanol and biogas, Biomass integrated gasification/combined cycles systems.

**Unit V: Bio-Energy Systems with Efficient Applications**: Traditional Stoves, Energy Efficient Cooking and Space heating Stoves, Metal Stoves Improved Gasifier Stoves, Pollution due to smoke emissions, Biogas Systems: Technology of Bio-gas production,

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Biogas Plants , Digester types, Digester design, Dung, Vegetable Waste, Night Soil and Municipal Waste based Bio-gas plants. Application of Bio gas slurry in agriculture.

**Text Books:**

1. Reneweble energy resources: Tiwari and ghosal, Narosa publication.
2. Non conventional Energy Sources,Khanna Publication

**Reference Books:**

1. Renewable Energy Sources:Twidell& Weir, CRC Press.
2. Solar Energy/ S.P. Sukhatme, Tata McGraw-Hill.
3.Non Conventional Energy Systems: K M. Mittal, A H WheelerPublishing Co Ltd.
4. Renewable Energy Technologies: Ramesh & Kumar, Narosa publication.
5. Biomass Energy, Oxford &IBH Publication Co.

HOD

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## SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF MATHEMATICS

### BOARD OF STUDIES COMMITTEE MEETING CIRCULAR

**Date: 29.04.2022**

There will be a Board of Studies Meeting on 05.05.2022at 2.30 p.m in Dean Office, PRIST University, Thanjavur. All the staff members are requested to attend the meeting.

**Agenda:**

Curriculum

Feedback

Others

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Ponnaiyah Ramajayam Institute of Science and Technology
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School of Arts and Science
Department of Mathematics

Minutes of the meeting of the Board of Studies (BoS)*

Date : 5th May 2022
Venue : Dean Office, PRIST Block
Time : 2:30 PM

Members present:

Chair: Dr.S.Subramanian M.Sc., M.Phil., Ph.D.,
Professor in Mathematics,
School of Arts and Science
PRIST Deemed to be University , Thanjavur.

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr.S.Ramasubramanian M.Sc., M.Phil., Ph.D. Assistant Professor | UCE, BIT Campus, Anna University, Trichy-24. | Physical | |
| 2 | Dr.A.Mohan M.Sc., M.Phil., Ph.D. Assistant Professor | Urumu Dhanalakshmi College of Arts and Science, Kattur, Trichy. | Physical | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. S.Subramanian M.Sc., M.Phil., Ph.D HOD/Professor | Mathematics | Physical | |
| 2 | Dr. R. Balakumar M.Sc., M.Phil., Ph.D. Associate Professor | Mathematics | Physical | |
| 3 | Dr.D.R.Kirubaharan | Mathematics | Physical | |

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| | | | | |
|---|---|---|---|---|
| | M.Sc., M.Phil., Ph.D<br><br>Assistant Professor | | | |
| 4 | Dr. K.Selvaraj<br>M.Sc., M.Phil., Ph.D.<br>Assistant Professor | Mathematics | Physical | |
| 5. | Dr.A.Usha<br>M.Sc., M.Phil., Ph.D.<br>Assistant Professor | Mathematics | Physical | |

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class Institute/Organization/Address | Online/ Physical | Signature (scan, If online) |
|---|---|---|---|---|
| 1 | Dr.L.Chinnappa,<br>MSc MTech PhD<br>Dean School of Arts and Science | Department of Physics,<br>PRIST Deemed to be University, Vallam, Thanjavur | Physical | |

Students Representative

1. Ms. A.Agastia, I M.Sc., Mathematics (2021 Batch)

Alumina Representative

1. Ms. R.Radhiga Devi , Alumini, B.Sc Mathematics (2018 Batch)

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# 2022-2023
# B.Sc & M.Sc
# MATHEMATICS

## MINUTES OF THE 15th BOARD OF STUDIES MEETING

**Faculty: BoS** **Board: Mathematics**

| | |
|---|---|
| Name of the Body | Board of Studies |
| Department | Mathematics |
| Meeting No. | 15 |
| Date and Time | 05.05.2022 & 2.30p.m |
| Venue | Dean Office, PRIST Block |
| Members Attended | The details are given in the Annexure-1 |

| Item No. | AGENDA |
|---|---|
| 1 | Confirmation of the previous meeting minutes |
| 2 | Action taken on the previous meeting minutes |
| 3 | To scrutinize the stakeholder feedback on UG, PG and M.Phil curriculum |
| 4 | To recommend the panel of examiners for UG, PG Mathematics |
| 5 | Discussion on UG syllabi for Part III-Core Courses in all semester for 2022-23 Batch and onwards |
| 6 | Discussion on PG syllabi for core courses in all semester for 2022-23 Batch and onwards |

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### MINUTES OF THE 15th BOARD OF STUDIES MEETING

**Faculty: BoS** **Board: Mathematics**

The Chairman of BoS welcomed all the Panel members for the meeting. The items listed in the agenda were taken for discussion.

The following are the minutes of the meeting.

| ITEM | AGENDA |
|---|---|
| Item-01 | Confirmation of the previous meeting minutes |
| Discussion | Minutes of the previous meeting were confirmed and accepted |
| Resolution | The Coordinator read the minutes of the early meeting and the minutes were reviewed and passed by the members |
| | |
| Item-02 | Action taken on the previous meeting minutes |
| Discussion | The details of the action taken were presented by the members |
| Resolution | The members expressed satisfaction over the action taken report. |
| | |
| Item-03 | To scrutinize the stakeholder feedback on UG, PG and M.Phil curriculum |
| Discussion | More courses should be offered entrepreneurship should be covered |
| Resolution | The Board unanimously solved to make necessary change as requests by the stake holders. |
| | |
| Item-04 | To recommend the panel of examiners for UG, PG Mathematics |
| Discussion | |
| Resolution | The members of the board resolved to approve the continuous of the audit course |

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in the curriculum

**Item-05** Discussion on UG syllabi for Part III-Core Courses in all semester for 2022-23 Batch and onwards

**Discussion** In UG Syllabus, the panel members Dr.A.Mohan & Dr S.Ramasubramanian are suggested to revise the contents of some unit of some the papers and include new papers

**The following list of papers CHANGE in contents**

| Sem. No | Sub. Code | Title of the Paper | Revised Units | Revision in % |
|---|---|---|---|---|
| I | 22112AEC14 | TRIGONOMETRY,ANALYTICAL GEOMETRY 3D AND CALCULUS | U-5 | 100% |
| II | 22112SEC24 | SEQUENCE AND SERIES | U-4 | 100% |
| III | 22112AEC33 | NUMBER THEORY | U-4 & 5 | 100% |
| IV | 22112SEC43 | OPERATIONS RESEARCH | U-4 | 100% |
| V | 22112AEC51 | MODERN ALGEBRA | U-5 | 100% |
| VI | 22112AEC63 | DISCRETE MATHEMATICS | U-3 | 100% |

**List of REPLACED PAPERS**

| S. No | Old Sub. Code | Old Title of the Paper | New Sub. Code | New Title of the Paper |
|---|---|---|---|---|
| IV | 20112AEC44 | ASTRONOMY | 22112AEC44 | IMAGE PROCESSING |
| VI | 20112DSC64B | MATHEMATICAL MODELLING | 22112DSC64B | QUANTITATIVE APTITUDE |

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## List of NEW Discipline Specific Electives Courses

| Sl. No | Program Code | Program Name | Sub. Code | Sub. Name | Sem |
|---|---|---|---|---|---|
| 1 | 22UGMATGE | B.Sc | 22112DSC55A | Abstract Harmonic Analysis | V |
| 2 | 22UGMATGE | B.Sc | 22112DSC55B | Regression Analysis | V |
| 3 | 22UGMATGE | B.Sc | 22112DSC55C | Linear Algebra and Series | V |
| 4 | 22UGMATGE | B.Sc | 22112DSC55D | Mathematical Logic | V |
| 5 | 22UGMATGE | B.Sc | 22112DSC55E | Space Science | V |
| 6 | 22UGMATGE | B.Sc | 22112DSC64A | Multivariable Calculus | VI |
| 7 | 22UGMATGE | B.Sc | 22112DSC64B | Astronomy & Space Sience | VI |
| 8 | 22UGMATGE | B.Sc | 22112DSC64C | Operator Theory | VI |
| 9 | 22UGMATGE | B.Sc | 22112DSC64D | Ergodic Theory | VI |
| 10 | 22UGMATGE | B.Sc | 22112DSC64E | Algebraic Geometry | VI |

## List of Value Added CERTIFICATE Courses

| Sl No | Program Code | Program Name | Subj Code | Sub. Name | Sem |
|---|---|---|---|---|---|
| 1 | 22UGMATGE | B.Sc | 22512VARP | R- Programming | |
| 2 | 22UGMATGE | B.Sc | 22512VAS | Statistica | |
| 3 | 22UGMATGE | B.Sc | 22512VAM | Mathematica | |

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## List of Value Added DIPLOMA Courses

| Sl. No | Program Code | Program Name | Subj Code | Sub. Name | Sem |
|---|---|---|---|---|---|
| 1 | 22UGMATGE | B.Sc | 22512MRE | Mathematics for recruitment exam | |
| 2 | 22UGMATGE | B.Sc | 22512MRE | Quantitative Aptitude | |

**Resolution** The Board approved the syllabi.

**Item-06** Discussion on PG syllabi for core courses in all semester for 2022-23 Batch and onwards.

**Discussion** The following list of papers CHANGE in contents

| Sem. No | Sub. Code | Title of the Paper | Revised Units | Revision in % |
|---|---|---|---|---|
| I | 22212DSC15A | CLASICAL DYNAMICS | ALL UNITS | 50% |
| I | 22212DSC15B | FLUID DYNAMICS | ALL UNITS | 50% |
| II | 22212DSC25A | MATHEMATICAL PROBABILITY | ALL UNITS | 50% |
| II | 22212DSC25B | MATHEMATICAL MODELING | ALL UNITS | 50% |
| III | 22212DSC34A | CRYPTOGRAPHY | ALL UNITS | 50% |
| III | 22212DSC34B | ALGEBRIC CODING THOERY | ALL UNITS | 50% |
| IV | 22212DSC44A | COMBINATORIAL MATHEMATICS | ALL UNITS | 50% |
| IV | 22212DSC44B | DESIGN AND ANALYSIS OF ALGORITHM | ALL UNITS | 50% |

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## List of NEW Discipline Specific Electives Courses

| Sl No | Program Code | Programme Name | Sub Code | Sub Name | Sem |
|---|---|---|---|---|---|
| 1 | 22PGMATGE | MSc | 22212DSC15A | Probability & Statistics | I |
| 2 | 22PGMATGE | MSc | 22212DSC15B | Bio-Mathematics | I |
| 3 | 22PGMATGE | MSc | 22212DSC15C | Portfolio Optimization | I |
| 4 | 22PGMATGE | MSc | 22212DSC15D | Object Oriented Programming Problem Solving | I |
| 5 | 22PGMATGE | MSc | 22212DSC15E | Finite Elements Method | I |
| 6 | 22PGMATGE | MSc | 22212DSC15F | Mathematical Finance | I |
| 7 | 22PGMATGE | MSc | 22212DSC25A | Econometrics | II |
| 8 | 22PGMATGE | MSc | 22212DSC25B | Cryptography and Network Security | II |
| 9 | 22PGMATGE | MSc | 22212DSC25C | Information Security | II |
| 10 | 22PGMATGE | MSc | 22212DSC25D | Application of Algebra | II |
| 11 | 22PGMATGE | MSc | 22212DSC25E | Computer Graphics | II |
| 12 | 22PGMATGE | MSc | 22212DSC25F | Operating System | II |
| 13 | 22PGMATGE | MSc | 22242DSC24A | Actuarial Mathematics | III |
| 14 | 22PGMATGE | MSc | 22242DSC24B | Applied Statistical Methods | III |
| 15 | 22PGMATGE | MSc | 22242DSC24C | Actuarial Models | III |
| 16 | 22PGMATGE | MSc | 22242DSC24D | Financial Economics | III |
| 17 | 22PGMATGE | MSc | 22262DSC26E | Mathematical Cryptography | III |
| 18 | 22PGMATGE | MSc | 22212DSC26F | Time Series | III |
| 19 | 22PGMATGE | MSc | 22212DSC44A | Mathematical Modelling | IV |
| 20 | 22PGMATGE | MSc | 22212DSC44B | Mathematical Ecology | IV |
| 21 | 22PGMATGE | MSc | 22212DSC44C | Artificial Intelligence | IV |

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| | | | | | |
|---|---|---|---|---|---|
| 24 | PRMSMATGE | M.Sc | 22212DSC446 | Artificial Intelligence | V |
| 25 | PRMSMATGE | M.Sc | 22212DSC447 | Design of Algorithms | V |
| 26 | PRMSMATGE | M.Sc | 22212DSC448 | General Insurance | V |
| 27 | PRMSMATGE | M.Sc | 22212DSC449 | Game Theory | V |

**Resolution** The Board approved the syllabi.

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## SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF MATHEMATICS

**B.Sc., MATHEMATICS - REGULATION 2022**

**COURSE STRUCTURE**

**SEMESTER – I**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC11/ 22111AEC11/ 22132AEC11/ 22135AEC11 | Tamil – I/Advanced English-I/Hindi-I/ French - I | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22112AEC13 | Differential Calculus and Vector Calculus | 5 | 0 | 0 | 3 |
| | | | | | |
| 22112AEC14 | Trigonometry, Analytical Geometry 3D and Calculus | 5 | 0 | 0 | 3 |
| 22120AEC15 | Programming in C | 6 | 0 | 0 | 5 |
| | **PRACTICAL** | | | | |
| 22120AEC16L | Programming in C Lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | **Total** | 24 | 0 | 3 | 17 |
| | **AUDIT COURSE** | | | | |
| 221ACLSICN | Indian Constitution | - | - | - | 2 |
| 221ACLSUHV | Universal Human Values | - | - | - | 2 |

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SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC21/ 22111AEC21/ 22132AEC21/ 22135AEC21 | Tamil – II/ Advanced English-II/Hindi-II/ French – II | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22112AEC23 | Integrals & Differential Equations | 5 | 0 | 0 | 3 |
| | | | | | |
| 22112SEC24 | Sequence and series | 5 | 0 | 0 | 3 |
| 22120AEC25 | Web Programming | 5 | 1 | 0 | 5 |
| | | | | | |
| | **PRACTICAL** | | | | |
| 22120AEC26L | Web Programming Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| | | | | | |
| 22112RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **23** | **1** | **3** | **18** |
| | **AUDIT COURSES** | | | | |
| **221ACLSCOS** | Communication Skills | - | - | - | 2 |
| **221ACSSBBE** | Basic Behavioral Etiquette | - | - | - | 2 |

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## SEMESTER – III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC31/ 22132AEC31/ 22111AEC31/ 22135AEC31 | Tamil – III/Hindi-III/Advanced English-III/ French – III | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22112AEC33 | Number Theory | 4 | 0 | 0 | 3 |
| | | | | | |
| 22112AEC34 | Numerical Analysis | 4 | 0 | 0 | 3 |
| 22118AEC35 | Mathematical Statistics-I | 5 | 1 | 0 | 5 |
| | **PRACTICAL** | | | | |
| 22118AEC36L | Mathematical Statistics-I Lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22112RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | **Total** | **23** | **1** | **3** | **19** |
| | **AUDIT COURSE** | | | | |
| **201ACLSOAN** | Office Automation | - | - | - | **2** |

## SEMESTER – IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC41/ 22111AEC41/ 22132AEC41/ 22135AEC41 | Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV | 4 | 0 | 0 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 221125EC43 | Operations Research | 4 | 0 | 0 | 3 |
| 22112AEC44 | Image Processing | 4 | 0 | 0 | 3 |
| 221ENSTU45 | Environmental Studies | 2 | 0 | 0 | 2 |
| 22118AEC46 | Mathematical Statistics-II | 5 | 1 | 0 | 5 |
| | PRACTICAL | | | | |
| 22118AEC47L | Mathematical Statistics- II Lab | 0 | 0 | 3 | 2 |
| | Total | 23 | 1 | 3 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 221ACSSAQA | General Aptitude and Quantitative Ability | | | | 2 |

SEMESTER – V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| | | | | | |
| 22112AEC51 | Modern Algebra | 5 | 0 | 0 | 4 |
| 22112AEC52 | Real Analysis | 5 | 1 | 0 | 4 |
| 22112SEC53 | Statics | 5 | 1 | 0 | 4 |
| 22112SEC54 | Programming in C++ | 5 | 0 | 0 | 3 |
| 22112DSC55_ | Discipline Specific Elective -I | 5 | 0 | 0 | 3 |
| | RESEARCH SKILL BASED COURSE | | | | |
| 22112BRC56 | Participation in Bounded Research | - | - | - | 1 |
| | Total | 25 | 2 | 0 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSPSL | Professional Skills | - | - | - | 2 |

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## SEMESTER – VI

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22112AEC61 | Complex Analysis | 5 | 0 | 0 | 4 |
| 22112SEC62 | Dynamics | 5 | 1 | 0 | 4 |
| 22112AEC63 | Discrete Mathematics | 5 | 0 | 0 | 4 |
| 22112DSC64_ | Discipline Specific Elective –II | 5 | 0 | 0 | 4 |
| 221__OEC(2 Digit Course Name ) | Open Elective | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 22112PRW65 | Project Work | - | - | - | 4 |
| 22112PROEE | Program Exit Examination | - | - | - | 1 |
| | **Total** | **24** | **1** | **0** | **23** |
| | **AUDIT COURSE** | | | | |
| 221ACSSIST | Interview Skills Training and Mock Test | - | - | - | 2 |
| 221ACLSCET | Community Engagement | - | - | - | 1 |
| | | | | | |
| **Total Credits -Programme** | | | | | **115** |
| **Total Credits - Audit Courses** | | | | | **19** |

### Discipline Specific Electives

| Sl. No | Program Code | Program Name | Sub. Code | Sub. Name | Sem |
|---|---|---|---|---|---|
| 1 | 22UGMATGE | B.Sc | 22112DSC55A | Abstract Harmonic Analysis | V |
| 2 | 22UGMATGE | B.Sc | 22112DSC55B | Regression Analysis | V |
| 3 | 22UGMATGE | B.Sc | 22112DSC55C | Linear Algebra and Series | V |
| 4 | 22UGMATGE | B.Sc | 22112DSC55D | Mathematical Logic | V |

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| | | | | | |
|---|---|---|---|---|---|
| 5 | 22UGMATGE | B.Sc | 22112DSC55E | Space Science | V |
| 6 | 22UGMATGE | B.Sc | 22112DSC64A | Multivariable Calculus | VI |
| 7 | 22UGMATGE | B.Sc | 22112DSC64B | Astronomy & Space Sience | VI |
| 8 | 22UGMATGE | B.Sc | 22112DSC64C | Operator Theory | VI |
| 9 | 22UGMATGE | B.Sc | 22112DSC64D | Ergodic Theory | VI |
| 10 | 22UGMATGE | B.Sc | 22112DSC64E | Algebraic Geometry | VI |

## Value Added Courses

| Certificate Course | Title of the Value Added Courses |
|---|---|
| 1 | Mathematica |
| 2 | Quantitative Aptitude |
| 3 | Machine Learning |
| 4 | Lie groups and Lie Algebra |
| 5 | Machine learning and Artificial Intelligence |

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## VALUE ADDED COURSES

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512VAM | Mathematics | 4 | 0 | 0 | 2 |

Duration: 45 Hours

**Course Objectives:**
Learn the applications of mathematics in real life problems. Understand the suitable methods to adopt the problem using several mathematical concepts.

**Unit I:**

Solving higher degree equations. Solving system of equations by matrix method and find the eigen values and eigen vectors of a matrix of order 4 by 4 or higher order

**Unit II:**

Solving system of non-linear equations. Finding the differentiation of different functions of second and third derivatives.

**Unit III:**

Finding the Integration of different functions with limits. Evaluation of double integrals and triple integrals#.

**Unit IV:**

Solving ordinary differential equations with initial condition. Solving system of ordinary differential equations.

**Unit V:**

Creating and plotting 2-D and 3-D graphs.Solving Linear programming problems. Self-study portion.

**Text Books:**
T.B-1 : Eugene Don. Mathematica, Schum's Outline Series, Mc Graw Hill Publisher, New York. (20##)
T.B-2 : Pragathi Gautam and Swapnil Verma, Practical Mathematica, Ane Books Publisher (2019).

**Books for Reference:**
1. Ananta Kumar Bora. Mathematica:A Research Book of Mathematics, Scholarlak Publishers (2017)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512QA | Quantitative Aptitude | 4 | 0 | 0 | 2 |

**Objectives:**

Learn the applications of mathematics in real life problems. Understand the suitable methods to adopt the problem using several mathematical concepts.

Unit 1: Problems on Arithmetic Aptitude, Average, Clock

Unit-2: Problems on Calander, Compound Interest

Unit-3: Problems on HCF & LCM, Number System

Unit 4: Problems on Percentage, Permutation and Combinations

Unit 5: Problems on Ages, Boats, Train

Reference: Quantitative Aptitude by R.S. Aggarwal

**Course Outcomes:**

1. To learn a new programming language, beginner in the field of data science.
2. To kindle the problem solving ability of the students in statistics.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512QA | Quantitative Aptitude | 4 | 0 | 0 | 2 |

**Objectives:**

Learn the applications of mathematics in real life problems. Understand the suitable methods to adopt the problem using several mathematical concepts.

Unit 1: Problems on Arithmetic Aptitude, Average, Clock

Unit-2: Problems on Calander, Compound Interest

Unit-3: Problems on HCF & LCM, Number System

Unit 4: Problems on Percentage, Permutation and Combinations

Unit 5: Problems on Ages, Boats, Train

Reference: Quantitative Aptitude by R.S. Aggarwall

**Course Outcomes:**

1. To learn a new programming language, beginner in the field of data science.

2. To kindle the problem solving ability of the students in statistics.

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| Course Code | 20512ML | TITLE OF THE COURSE | L | T | P | C |
|---|---|---|---|---|---|---|
| Value Added | | MACHINE LEARNING | 4 | 1 | - | 4 |
| Pre-requisite | | Knowledge in basic algebra | Syllabus Version | | 2021-22 | |

**Course Objectives**

The main objectives of this course are to:

- To Learn about Machine Intelligence and Machine Learning applications To implement and apply machine learning algorithms to real-world applications.
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- To understand how to perform evaluation of learning algorithms and model selection.
- To understand about the basic theory of problem solving paradigms and search strategies in artificial intelligence
- To make the students familiar with knowledge representation, planning, learning, natural language processing and robotics

**Expected Course Outcomes**

On completion of the course students will be expected to:

| | | |
|---|---|---|
| 1 | Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc | K2 |
| 2 | Have an understanding of the strengths and weaknesses of many popular machine learning approaches | K4 |
| 3 | Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning | K3 |
| 4 | Be able to design and implement various machine learning algorithms in a range of real-world applications | K3 |
| 5 | Understand the computation intelligence | K6 |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

| | |
|---|---|
| **Unit:1** | |
| | Introduction to ML |
| **Unit:2** | |
| | Fundamentals of ML |
| **Unit:3** | |
| | Selected Algorithms |
| **Unit:4** | I |
| | Neural Network Learning |
| **Unit:5** | |
| | Key Concepts from ML |

**Books for Study**

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| | |
|---|---|
| 1 | Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press (23 April 2020 |
| 2 | Tom M. Mitchell- Machine Learning - McGraw Hill Education, International Edition |

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| Course Code | 22512LGLA | TITLE OF THE COURSE | L | T | P | C |
|---|---|---|---|---|---|---|
| Value Added | | LIE GROUPS & LIE ALGEBRAS | 4 | 1 | - | 4 |
| Pre-requisite | | Knowledge in basic algebra | Syllabus Version | | 2021-22 | |

**Course Objectives**

The main objectives of this course are to:

1. In physics, Lie groups appear as symmetry groups of physical systems, and their Lie algebras (tangent vectors near the identity) may be thought of as infinitesimal symmetry motions.
2. Lie algebras and their representations are used extensively in physics, notably in quantum mechanics and particle physics.

**Expected Course Outcomes**

On the successful completion of the course, student will be able to:

| | | |
|---|---|---|
| 1 | Understand the basics of R Language | K2 |
| 2 | Apply the logical skills for performing statistical analysis | K4 |
| 3 | Use appropriate plots, charts and diagrams for all kinds of data | K3 |
| 4 | Perform parametric methods | K3 |
| 5 | Write and execute the code for multivariate analysis | K6 |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

| | |
|---|---|
| **Unit:1** | |
| | Matrix-Lie Groups |
| **Unit:2** | |
| | The Matrix Exponential |
| **Unit:3** | |
| | Lie Algebras |
| **Unit:4** | |
| | Basic Representation Theory |
| **Unit:5** | |
| | Semi-simple Lie Algebras |

**Books for Study**

| | |
|---|---|
| 1 | Brain Hall, Lie Groups, Lie Algebras and Representations: An Elementary Introduction (Second Edition), Springer, USA, 2015. |

**Reference Books**

| | |
|---|---|
| 1 | V. S. Varadarajan, Lie groups, Lie algebras and their representations, Sringer 1984. |
| 2 | A. W. Knapp, Representation theory of semi-simple Lie groups. An overview based on examples, Princeton university press 2002. |
| 3 | S. Kumaresan S, A course in differential geometry and Lie groups, Texts and Readings in Mathematics, 22. Hindustan Book Agency, New Delhi, 2002. |

**Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]**

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| Course Code | 22512MLAI | TITLE OF THE COURSE | L | T | P | C |
|---|---|---|---|---|---|---|
| Value Added | | MACHINE LEARNING AND ARTIFICAL INTELLIGENCE | 4 | 1 | - | 4 |
| Pre-requisite | | Knowledge in basic algebra | Syllabus Version | | 2022-23 | |

**Course Objectives**

The main objectives of this course are to:

- To Learn about Machine Intelligence and Machine Learning applications To implement and apply machine learning algorithms to real-world applications.
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- To understand how to perform evaluation of learning algorithms and model selection.
- To understand about the basic theory of problem solving paradigms and search strategies in artificial intelligence
- To make the students familiar with knowledge representation, planning, learning, natural language processing and robotics

**Expected Course Outcomes**

On completion of the course students will be expected to:

| | | |
|---|---|---|
| 1 | Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc | K2 |
| 2 | Have an understanding of the strengths and weaknesses of many popular machine learning approaches | K4 |
| 3 | Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning | K3 |
| 4 | Be able to design and implement various machine learning algorithms in a range of real-world applications | K3 |
| 5 | Understand the computation intelligence | K6 |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

| | |
|---|---|
| Unit:1 | INTRODUCTION |
| | Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning |
| Unit:2 | NEURAL NETWORKS AND GENETIC ALGORITHMS |
| | Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms– Hypothesis Space Search – |
| Unit:3 | BAYESIAN AND COMPUTATIONAL LEARNING |
| | Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier |

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| Unit:4 | INTRODUCTION |
|---|---|
| | Introduction - Intelligent Agents- Problem Solving - by Searching - Informed Search Strategies- Optimization Problems - Adversarial Search-Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation |
| Unit:5 | PLANNING |
| | Planning – Planning and Acting in the Real World - Uncertain knowledge and reasoning - Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning over Time - Making Simple Decisions - Making Complex Decisions |
| Books for Study | |
| 1 | Tom M. Mitchell,—Machine Learning, McGraw-Hill Education (India) Private Limited, 2013. |
| 2 | Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach," Third Edition, Prentice Hall of India, New Delhi, 2010. |
| Reference Books | |
| 1 | EthemAlpaydin,—Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004. |
| 2 | Stephen Marsland,—Machine Learning: An Algorithmic Perspective, CRC Press,2009. |
| 3 | Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, —Genetic Algorithms and Genetic Programming ‖ ,CRC Press Taylor and Francis Group |
| Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] | |
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## Value Added Courses

| Diploma Course | Title of the Value Added Courses |
|---|---|
| 1 | Mathematics for recruitment exam |
| 2 | R-programming |
| 3 | Statistica |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512VAMRE | Mathematics for recruitment Exam | 4 | 0 | 0 | 2 |

**Objectives:**

Learn the applications of mathematics in real life problems. Understand the suitable methods to adopt the problem using several mathematical concepts.

Unit 1: Problems on Divisiblity, remainders, Number Properties

Unit-2: Problems on Polynomials equations, Percentage, Permutation and Combinations
Unit-3: Problems on HCF & LCM, Number System

Unit 4: Problems on Percentage, Permutation and Combinations

Unit 5: Problems on Times, speed, distance

Reference: Quantitative Aptitude by R.S. Aggarwall

**Course Outcomes:**

1. To learn a new programming language, beginner in the field of data science.

2. To kindle the problem solving ability of the students in statistics.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512VARP | R Programming | 4 | 0 | 0 | 2 |

**Objectives:**

Learn the applications of mathematics in real life problems. Understand the suitable methods to adopt the problem using several mathematical concepts.

**Unit I:** Simple Programs using Mathematical constant ,Programs using complex functions

**Unit II:**Numerical solutions of nonlinear equations and systems , Solving system of linear equations using Jacobi method

**Unit III:** Program using Trigonometric and Hyperbolic Expressions 6. Finding Eigen values and Eigen vectors

**Unit IV:**Plotting Points in the Plane and Space ,Analyze data using Central Tendency and Measures of dispersion and distributions

**Unit V:**. Find the Laplace integral transforms for different functions. Obtain the solution of the initial value problem Books for

**Reference:**

1. Programming with R by S.R. Mani Sekhar, T.V. Suresh Kumar, Madhavi Kasa, Sunil Kumar S. Manvi, Cengage Learning India Pvt. Ltd, 2017

2. R for Statistics by Pierre-Andre Cornillon, Arnaud Guyader, Francois Husson, Nicolas Jegou, Julie Josse, Maela Kloareg, Eric Matzner-Lober, Laurent Rouvière, Chapman and Hall, 2012

3. Statistics with R Programming by Dr. Sandip Rakshit, McGraw Hill Education (India) Pvt. Ltd, 2018

**Course Outcomes:**

1. To learn a new programming language, beginner in the field of data science.

2. To kindle the problem solving ability of the students in statistics.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22512VA5 | STATISTICA | 4 | 0 | 0 | 2 |
| | | | | | |
| Unit-1 | Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. | | | | |
| Unit-2 | Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, | | | | |
| Unit-3 | correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves | | | | |
| Unit-4 | Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth- Marshall and Fisher's ideal Index numbers. Errors in Index numbers. | | | | |
| Unit-5 | Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa. Consumer price index numbers. Uses and limitations of index numbers. | | | | |
| Reference | Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata. 2. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals Of Mathematical Statistics, 4 thEdition (Reprint), Sultan Chand &Sons | | | | |

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## Open Electives

| Semester | Open Elective Courses |
|---|---|
| VI | a) 221TNOEC-Tamil IlakkiyaVaralaru<br>b) 221ENOEC-Journalism<br>c) 221PHOEC-Instrumentation<br>d) 221CEOEC-Food and Adulteration<br>e) 221MBOEC- Wildlife Conservation<br>f) 221CSOEC – E-Learning<br>g) 221CAOEC-Web Technology<br>h) 221CMOEC-Banking service |

## Credit Distribution

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 17 | - | - | - | - | - | 17 |
| II | 13 | 4 | - | - | 1 | - | 18 |
| III | 17 | - | - | - | 2 | - | 19 |
| IV | 14 | 3 | - | - | - | 2 | 19 |
| V | 8 | 7 | 3 | - | 1 | - | 19 |
| VI | 8 | 4 | 4 | 2 | 4 | 1 | 23 |
| **Total** | **77** | **18** | **7** | **2** | **8** | **3** | **115** |

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# PRIST
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NEW Course

Faculty: BAS | Board: Mathematics | Semester: VI

| | |
|---|---|
| Course Code | 22212DSC55A Abstract Harmonic Analysis |
| I | Groups and Homogenous spaces, linear Lie groups, Convolution of Haar measures on some known examples, Convolution Various function spaces. |
| II | Harmonic Analysis over Torus and Euclidean spaces. Generalities about locally compact abelian groups, which includes Fourier Inversion Formula, Bochner's theorem. |
| III | Basic Representation Theory, Induced representations, Positive Definite functions, Schur's lemma, Naimark Theorem |
| IV | Peter-Weyl Theory of compact groups- Examples: Unitary groups, Orthogonal groups. |
| V | Abstract Theory of Gelfand Pairs, Spherical Fourier Transforms, Plancherel-Godement Theorem, Inverse Spercal Fourier Transforms, Compact Gelfand Pair. |
| Text Books: | 1. G. B. Folland, "A Course in Abstract Harmonic Analysis", CRC Press, 2000 |
| Reference: | 1. H. Helson, "Harmonic Analysis", Texts and Readings in Mathematics, Hindustan Book Agency, 2010.<br>2. Y. Katznelson, "An Introduction to Harmonic Analysis", Cambridge University Press, 2004. |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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NEW Course

Faculty:BAS | Board: Mathematics | Semester: VI

| | |
|---|---|
| Course Code | 22112DSC55B Regression Analysis |
| I | Introduction to simple linear regression, least square estimation and hypothesis testing of model parameters, prediction, interval estimation in simple linear regression |
| II | Coefficient of determination, estimation by maximum likelihood, multiple linear regression, matrix representation of the regression model |
| III | estimation and testing of model parameters and prediction, model adequacy checking-residual analysis, PRESS statistics, outlier detection, lack of fit test |
| IV | serial correlation and Durbin-Watson test, transformation and weighting to correct model inadequacies-variance-stabilizing transformation, generalized and weighted least squares, diagnostics for influential observations |
| V | Cook's D test, multicollinearity-sources and effects, diagnosis and treatment for multicollinearity, ridge regression and LASSO, bootstrap estimation, dummy variable model, variable selection and model building |
| Text Books: | 1.Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, "Introduction to Linear Regression Analysis", 5th Edition, Wiley, 2012 |
| Reference: | 1. N. R. Draper and H. Smith (1998), Applied Regression Analysis, 3rd Edition, New York: Wiley.<br>2. Michael H. Kutner, Chris J. Nachtsheim, and John Neter, "Applied Linear Statistical Models", McGraw-Hill/Irwin; 5th edition, 2004. |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | ✓ | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty:BAS** **Board: Mathematics** **Semester: V**

| | |
|---|---|
| Course Code | 22112DSC55C |
| Title | LINEAR ALGEBRA AND SERIES |
| UNIT | Contents |
| I | Rational and Jordan canonical forms, Inner product spaces, |
| II | Unitary and Normal operators, Forms on inner product spaces |
| III | Spectral theorems, Bilinear forms, Matrix decomposition theorems. |
| IV | Courant- Fischer minimax and related theorems, Nonnegative matrices |
| V | Perron-Frobenius theory, Generalized inverse, Matrix Norm, Perturbation of eigenvalues. |
| Text Books: | Reference Books<br>1. K. Hoffman, R. Kunze, "Linear Algebra", Prentice-Hall of India, 2012. |
| Reference: | 1. S. Roman, "Advanced Linear Algebra", Graduate Texts in Mathematics 135, Springer, 2008.<br>2. R. A. Horn, C. R. Johnson, "Matrix Analysis", Cambridge University Press, 2010 |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty: BAS** **Board: Mathematics** **Semester: V**

| Course Code | 22112DSC55D |
|---|---|
| Title | Mathematical Logic |
| UNIT | Contents |
| I | Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. |
| II | General Notions : Formal language, object and meta language, general definition of a Formal Theory/Formal Logic |
| III | Propositional Logic : Formal theory for propositional calculus, derivation, proof, theorem, deduction theorem, conjunctive and disjunctive normal forms, semantics, truth tables, tautology, adequate set of connectives, applications to switching circuits, logical consequence, consistency, maximal consistency, Leindenbaum lemma, soundness and completeness theorems, algebraic semantics |
| IV | Predicate Logic : First order language, symbolizing ordinary sentences into first order formulae, free and bound variables, interpretation and satisfiability, models, logical validity, formal theory for predicate calculus, |
| V | theorems and derivations, deduction theorem, equivalence theorem, replacement theorem, choice rule, Prenex normal form, soundness theorem, completeness theorem, compactness theorem, First Order Theory with equality, examples of First Order Theories (groups, rings, fields etc.). |
| Text Books: | Mendelson; Introduction to mathematical logic; Chapman & Hall; London(1997)<br>Angelo Margaris; First order mathematical logic; Dover publications, Inc, New York (1990). |
| Reference: | S.C.Kleene; Introduction to Metamathematics; Amsterdam; Elsevier (1952).<br>J.H.Galller; Logic for Computer Science; John.Wiley & Sons (1987).<br>H.B.Enderton; A mathematical introduction to logic; Academic Press; New York (1972) |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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NEW Course

**Faculty:BAS** **Board: Mathematics** **Semester: VI**

| Course Code | 22112DSC55E SPACE SCIENCE |
|---|---|
| I | History of Astronomy and Apparent Luminosity of Stars: Ptolemy's astronomical work, Copernican heliocentrism and Tychonian system, Luminosity (Apparent and Absolute) of stars, Magnitude scale, Luminosity measurement: 1)Visual Method 2) Photographic method and 3) Photoelectric method.. |
| II | Stellar Evolution (HR diagram): Life cycle; Stellar Processes (Nuclear) and spectral classification of Stars O, B, A, F, G, K, M. |
| III | The Sun and Planets Origin of the solar system, Internal structure and surface features of sun, Sun spots and Magnetic field on the sun and Solar activity. |
| IV | Moon Phases, Tidal forces and Tidal locking |
| V | Asteroids, Meteors, Comets and Galaxies: Asteroids: Discovery and designation, Origin, Nature and Orbits of Asteroids. Meteors : Meteor showers and sporadic meteors. Comets : Periodic comets, Brightness variation in Comets. Gas production rates, dust and ion tails. |
| Text Books: | 1. Astronomy structure of the Universe. A.E. Roy and D. Clarke, Adam Hilger Pub.<br>2. Source Book of Space Sciences, Samuel Galsstone; D.VanNostrand Co. Inc<br>3. Textbook of Astronomy and Astrophysics with elements of cosmology, V.B. Bhatia, NarosaPub. |
| Reference: | Introduction to Astrophysics - Baidyanath Basu 6. Astrophysics: Stars and Galaxies- K.D.Abhyankar: Tata McGraw Hill Publication(Chap.<br>"Astrophysics: A modern Perspective" - K. S. Krishnaswami New Age International.<br>K. S. Krishnaswami, "Understanding cosmic Panorama" New Age International.<br>9. Frontiers in Astronomy by Jastrow |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty:BAS** **Board: Mathematics** **Semester: VI**

| | |
|---|---|
| Course Code | 22112DSC64A Multivariable Calculus |
| I | Introduction to multivariable calculus, Vectors and matrices, Visualizing scalar valued functions, vector-valued functions, Transformations, multi variable functions |
| II | Partial derivatives, Gradient and directional derivatives, partial derivative and gradient, Differentiating parametric curves, chain rule, curvature. |
| III | Tangient planes and local linearization, Quadratic approximations, optimizing multivariable functions, optimiziang multivariable functions. Applications of multivariable . |
| IV | Line intergrals for scalar functions, vector fields, double integrals, Triple integrals, change of variables, polar , sphereical and cylindrical coordinates. Applications of multivariable. |
| V | Green's theorem, stokes and divergence theorem ., Application of multivariable. |
| Text Books: | S.C.Kleene; Introduction to Metamathematics; Amsterdam; Elsevier (1952). |
| Reference: | J.H.Gallier; Logic for Computer Science; John.Wiley & Sons (1987).<br>H.B.Enderton; A mathematical introduction to logic; Academic Press; New York (1972) |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| | Skill Development | ✓ | Entrepreneurial Development |
| | Employability | | Innovations |
| ✓ | Intellectual Property Rights | | Gender Sensitization |
| ✓ | Social Awareness/ Environment | ✓ | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty :BAS** **Board: Mathematics** **Semester: VI**

| Course Code | 22112DSC64B Astronomy & Space Science |
|---|---|
| I | Celestial Sphere, various Coordinate Systems, transformation formulae among various coordinate systems, formulae of spherical triangle : cosine formula, sine formula, four parts formula , analogous cosine formula, hour angle, sidereal day, sidereal time, equation of time. Exercises. |
| II | Light and its properties, Optical , absorption, emission and continuous spectra, radio and Hubble Space Telescopes (HST), Photometry, Spectrometry, Spectrophotometry (definitions only), magnification, resolution, f/a ratio , refractors and reflectors. Exercises. |
| III | Various magnitudes of stars: apparent, absolute, photovisual, photographic, bolometric etc. Distance measurements of stars: Parallax method, Statistical Palallax Method, Moving Cluster Method. Radial and proper motion. Exercises. • Morphological structure of Sun, solar cycles, sunspots, solar corona, solar wind, solar neutrino puzzle (Merely descriptive models). Solar system. |
| IV | Interstellar matter, elastic collisions and kinetic equilibrium, Jeans Mass for gravitational collapse, radiative process (statement only). |
| V | Morphological classification of galaxies, rotation curves and mass modelling, missing mass and dark matter, distance determination by various methods. Our Galaxy. Exercises |
| Text Books: | Padmanabhan, Theoretical Astrophysics, vols. 1-3, Cambridge University Press, 2002. S. Weinberg, Gravitation and Cosmology, Wiley, 2001.<br>J.V. Narlikar, Introduction to Cosmology, Cambridge University Press, 2002. |
| Reference: | J.V. Narlikar, An Introduction to Relativity, Cambridge University Press, 2010.<br>B.Basu, T.Chattopadhyay and S.N.Biswas, An Introduction to Astrophysics, Prentice Hall of India, 2010.<br>Physical Processes in the Interstellar Medium, Lyman Spitzer, Jr. Wiley, 1998.<br>Astrophysics for Physicists, Arnab Rai Choudhuri, Cambridge University Press, 2010. |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| | Skill Development | ✓ | Entrepreneurial Development |
| | Employability | | Innovations |

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|---|---|---|---|
| ✓ | Intellectual Property Rights | | Gender Sensitization |
| ✓ | Social Awareness/ Environment | ✓ | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty:BAS** **Board: Mathematics** **Semester: VI**

| Course Code | 22212DSC25C Operator Theory |
|---|---|
| I | Review of Hilbert space Theory , Bounded operators on Hilbert spaces, examples |
| II | Adjoint an operator, examples, Self-adjoint, normal, positive. |
| III | Unitary, isometries, partial isometries. |
| IV | Orthogonal projections with examples, invariant subspaces. |
| V | Numerical range and characterization of operators. |
| Text Books: | 1.W. Arveson, "An invitation to C*-algebras", Graduate Texts in Mathematics, No. 39. Springer-Verlag, 1976 |
| Reference: | 1.N. Dunford and J. T. Schwartz, "Linear operators. Part II: Spectral theory. Self adjoint operators in Hilbert space", Interscience Publishers John Wiley i& Sons 1963.<br>2.R. V. Kadison and J. R. Ringrose, "Fundamentals of the theory of operator algebras. Vol. I. Elementary theory", Pure and Applied Mathematics, 100, Academic Press, Inc., 1983. |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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**NEW Course**

**Faculty:BAS** **Board: Mathematics** **Semester: VI**

| Course Code | 22112D5C15D Ergodic Theory |
|---|---|
| I | Measure preserving systems; examples: Hamiltonian dynamics and Liouvilles theorem, Bernoulli shifts, Markov shifts, Rotations of the circle, Rotations of the torus, Automorphisms of the Torus, Gauss transformations |
| II | Skew-product, Poincare Recurrence lemma: Induced transformation: Kakutani towers: Rokhlins lemma. Recurrence in Topological Dynamics |
| III | Birkhoffs Recurrence theorem, Ergodicity, Weak-mixing and strong-mixing and their characterizations, Ergodic Theorems of Birkhoff and Von Neumann. Consequences of the Ergodic theorem. |
| IV | Invariant measures on compact systems, Unique ergodicity and equidistribution. Weyls theorem, The Isomorphism problem; conjugacy, spectral equivalence, Transformations with discrete spectrum |
| V | Halmosvon Neumann theorem, Entropy. The Kolmogorov-Sinai theorem. Calculation of Entropy. The Shannon Mc-MillanBreiman Theorem, Flows. Birkhoffs ergodic Theorem and Wieners ergodic theorem for flows. Flows built under a function. |
| Text Books: | 1.Peter Walters, "An introduction to ergodic theory", Graduate Texts in Mathematics, 79. Springer-Verlag. 1982.Patrick Billingsley, |
| Reference: | "Ergodic theory and information", Robert E. Krieger Publishing Co., 1978.M. G. Nadkarni, "Basic ergodic theory", Texts and Readings in Mathematics |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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15th BOS

**NEW Course**

**Faculty:BAS** **Board: Mathematics** **Semester: VI**

| Course Code | 22112DSC55E ALGEBRAIC GEOMETRY |
|---|---|
| I | Classical linear algebra revisited with a geometric perspective: fundamental theorem, determinants, Jordan normal form |
| II | Basic definitions and first examples from algebraic geometry: e.g., varieties, Zariski topology, regular and rational maps, incidence correspondences, Grassmannians, determinantal varieties, secant varieties. |
| III | Examples of elementary questions in linear algebra that lead to deep and open questions in algebraic geometry |
| IV | rational maps and function fields, nonsingularity, smooth varieties. The course will try to stress the nexus between Commutative Algebra and Algebraic Geometry |
| V | Affine Varieties, Hilbert's Basis Theorem and the Hilbert Nullstellensatz, projective and quasi-projective varieties, morphisms, |
| Text Books: | Landsberg, J. M. "Tensors: geometry and applications". Graduate Studies in Mathematics, 128. American Mathematical Society, Providence, RI, 2012. xx+439 pp. ISBN: 978-0-8218-6907-9 |
| Reference: | Shafarevich, Igor R. "Basic algebraic geometry. 1. Varieties in projective space". Third edition. Translated from the 2007 third Russian edition. Springer, Heidelberg, 2013. xviii+310 pp. ISBN: 978-3-642-37955-0; 978-3-642-37956-7 |

Percentage of Syllabus Revised: 100%

Course Focuses on:

| | | | |
|---|---|---|---|
| ✓ | Skill Development | ✓ | Entrepreneurial Development |
| ✓ | Employability | | Innovations |
| | Intellectual Property Rights | | Gender Sensitization |
| | Social Awareness/ Environment | | Constitutional Rights/Human Values/Ethics |

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# PRIST
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M.Sc., MATHEMATICS -CURRICULUM – REGULATION 2022

COURSE STRUCTURE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 22212AEC11 | Algebra | 5 | 1 | 0 | 4 |
| 22212AEC12 | Real Analysis | 5 | 1 | 0 | 4 |
| 22212AEC13 | Ordinary Differential Equations | 5 | 1 | 0 | 4 |
| 22220SEC14 | C++ Programming | 5 | 1 | 0 | 4 |
| 22212DSC15_ | Discipline Specific Elective – I | 5 | 0 | 0 | 4 |
| 22212RLC16 | Research Led seminar | - | - | - | 1 |
| | **Total** | **25** | **4** | **0** | **21** |
| | **SEMESTER II** | | | | |
| 22212AEC21 | Complex Analysis | 5 | 1 | 0 | 4 |
| 22212AEC22 | Measure Theory and Integration | 5 | 0 | 0 | 4 |
| 22212SEC23 | Mathematical Methods | 5 | 1 | 0 | 4 |
| 22212AEC24 | Graph Theory | 5 | 0 | 0 | 4 |
| 22212DSC25_ | Discipline Specific Elective – II | 5 | 0 | 0 | 4 |
| 22212RMC26 | Research Methodology | 3 | 0 | 0 | 2 |
| 22212BRC27 | Participation in Bounded Research | - | - | - | 2 |
| | **Total** | **28** | **2** | **0** | **24** |
| | **SEMESTER III** | | | | |
| 22212AEC31 | Topology | 5 | 1 | 0 | 5 |
| 22212SEC32 | Stochastic Process | 5 | 2 | 0 | 5 |
| 22212AEC33 | Advanced Numerical Analysis | 5 | 2 | 0 | 5 |
| 22212DSC34_ | Discipline Specific Elective – III | 5 | 0 | 0 | 4 |
| 222__OEC | Open Elective | 4 | 0 | 0 | 3 |
| 22212SRC36 | Participation in Scaffold Research (Societal Project) | - | - | - | 2 |
| | **Total** | **24** | **5** | **0** | **24** |
| | **SEMESTER IV** | | | | |
| 22212AEC41 | Functional Analysis | 5 | 1 | 0 | 5 |
| 22212SEC42 | Visual Programming | 5 | 2 | 0 | 5 |
| 22212AEC43 | Number Theory | 5 | 1 | 0 | 5 |
| 22212DSC44_ | Discipline Specific Elective – IV | 5 | 0 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 22212PRW45 | Project Work | 0 | 0 | 0 | 6 |
| 22212PEE | Programme for Exit Examination | 0 | 0 | 0 | 2 |
| | **Total** | **20** | **4** | **0** | **27** |
| | **Total Credits for the Programme** | | | | **96** |

## Discipline Specific Electives

| Sl. No | Program Code | Program Name | Sub. Code | Sub. Name | Sem |
|---|---|---|---|---|---|
| 1 | 22PGMATGE | M.Sc | 22212DSC15A | Probability & Statistics | I |
| 2 | 22PGMATGE | M.Sc | 22212DSC15B | Bio-Mathematics | I |
| 3 | 22PGMATGE | M.Sc | 22212DSC15C | Porfolio Optimization | I |
| 4 | 22PGMATGE | M.Sc | 22212DSC15D | Object Oriented Programming Problem in C ++ | I |
| 5 | 22PGMATGE | M.Sc | 22212DSC15E | Finite Elements Method | I |
| 6 | 22PGMATGE | M.Sc | 22212DSC15F | Mathematical Finance | I |
| 7 | 22PGMATGE | M.Sc | 22212DSC25A | Econometrics | II |
| 8 | 22PGMATGE | M.Sc | 22212DSC25B | Cryptograph and Network Security | II |
| 9 | 22PGMATGE | M.Sc | 22212DSC25C | Information Security | II |
| 10 | 22PGMATGE | M.Sc | 22212DSC25D | Application of Algebra | II |
| 11 | 22PGMATGE | M.Sc | 22212DSC25E | Computer Graphics | II |
| 12 | 22PGMATGE | M.Sc | 22212DSC25F | Operating System | II |
| 13 | 22PGMATGE | M.Sc | 22212DSC34A | Actuarial Mathematcs | III |
| 14 | 22PGMATGE | M.Sc | 22212DSC34B | Applied Statistical Methods | III |
| 15 | 22PGMATGE | M.Sc | 22212DSC34C | Actuarial Models | III |
| 16 | 22PGMATGE | M.Sc | 22212DSC34D | Financial Economics | III |
| 17 | 22PGMATGE | M.Sc | 22212DSC34E | Mathematical Cryptography | III |
| 18 | 22PGMATGE | M.Sc | 22212DSC34F | Time Scale | III |
| 19 | 22PGMATGE | M.Sc | 22212DSC44A | Mathematical Modelling | IV |

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| | | | | | |
|---|---|---|---|---|---|
| 20 | 22PGMATGE | M.Sc | 22212DSC44B | Mathematical Ecology | IV |
| 21 | 22PGMATGE | M.Sc | 22212DSC44C | Artificial Intelligence | IV |
| 22 | 22UPMATGE | M.Sc | 22212DSC44D | Design of Algorithms | IV |
| 23 | 22PGMATGE | M.Sc | 22212DSC44E | General Insurance | IV |
| 24 | 22PGMATGE | M.Sc | 22212DSC44F | Game Theory | IV |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| III | a) 22211OEC-Writing For the Media<br>b) 22213OEC-Bio-medical Instrumentation<br>c) 22214OEC-Green Chemistry<br>d) 22215OEC-Herbal Medicines<br>e) 22220OEC-M-Marketing<br>f) 22261OEC- Financial Service |

**Credit Distribution:**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 12 | 04 | 04 | - | 01 | - | 21 |
| II | 12 | 04 | 04 | - | 04 | - | 24 |
| III | 10 | 05 | 04 | 03 | 02 | - | 24 |
| IV | 10 | 05 | 04 | - | 06 | 02 | 27 |
| **Total** | **44** | **18** | **16** | **03** | **13** | **02** | **96** |

**Date:**

**Dr. S. Subramanian**

**BOS Chairman**

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## NEW DISCIPLINE SPECIFIC ELECTIVE COURSES

**NEW Course Syllabus**

**Faculty: BoS** **Board: Mathematics** **Semester: IV**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15A | Probability and Statistics | | | | |
| | | | | | |
| AIM | This course aims to provide an understanding of the basic concepts in probability, conditional probability and independent events. It will also focus on the random variable, mathematical expectation, and different types of distributions, sampling theory and estimation theory. | | | | |
| Course Objectives | to design a statistical hypothesis about the real world problem and 2 conduct appropriate test for drawing valid inference about the population characteristics | | | | |
| | It is inevitable to have the knowledge of hypothesis testing for any research work. | | | | |
| | The course will provide an opportunity to learn R programming to substantial extent. | | | | |
| | Apply the basic rules and theorems in probability including Bayes's theorem and the Central Limit Theorem | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, | | | | |
| II | Discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential. | | | | |
| III | Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution,. | | | | |
| IV | correlation coefficient, rank correlation coefficient, covariance, linear regression for two variables | | | | |

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| | |
|---|---|
| V | Chebyshev's inequality, statement and interpretation of (weak) law of large numbers, Central Limit theorem for independent and identically distributed random variables with finite variance. |
| Text Book | 1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, Introduction to Mathematical Statistics, Pearson Education, Asia, 2007 |
| | 2. Irwin Miller and Marylees Miller, John E. Freund, Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia, 2006. |
| Reference Book | 1.Sheldon Ross, Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint, 2007. |
| | 2 Alexander M. Mood, Franklin A. Graybill and Duane C. Boes, Introduction to the Theory of Statistics, 3rd Ed., Tata McGraw- Hill, Reprint 2007. |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15B | Bio-Mathematics | | | | |
| | | | | | |

| | |
|---|---|
| AIM | Mathematical biology aims at the mathematical representation and modeling of biological processes, using techniques and tools of applied mathematics |
| Course Objectives | To prepares students with a rigorous education in applied mathematics |
| | To educates students in the fundamental principles of biology, |
| | To trains students to work in a computational arena |
| | To better understand how the parts interact and how perturbations in these complex systems may contribute to disease. |
| | |

| Unit No. | Contents |
|---|---|
| I | Mathematical Biology and the modeling process: an overview. Continuous models: Malthus model, logistic growth, Allee effect, Gompertz growth, Michaelis-Menten Kinetics, Holling type growth, Bacterial growth in a Chemostat, |
| II | Harvesting a single natural population, Prey predator systems and Lotka Volterra equations, Populations in competitions, Epidemic Models (SI, SIR, SIRS, SIC). |
| III | II Activator-Inhibitor system, Insect Outbreak Model: Spruce Budworm, Numerical solution of the models and its graphical representation. Qualitative analysis of continuous models: Steady state solutions, stability and linearization, multiple species communities and Routh-Hurwitz Criteria, |
| IV | Phase plane methods and qualitative solutions, bifurcations and limit cycles with examples in the context of biological scenario. (2 questions) Spatial Models: One species model with diffusion, Two species model with diffusion, Conditions for diffusive instability, Spreading colonies of microorganisms, Blood flow in circulatory system, Travelling wave solutions, Spread of genes in a population. |
| V | Discrete Models: Overview of difference equations, steady state solution and linear stability analysis, Introduction to Discrete Models, Linear Models, Growth models, Decay models, Drug Delivery Problem, Discrete Prey-Predator models, Density dependent growth models with harvesting, Host-Parasitoid systems (Nicholson-Bailey model),Numerical solution of the models 34 and its graphical representation. Case Studies: Optimal Exploitation models, Models in |

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| | |
|---|---|
| | Genetics, Stage Structure Models, Age Structure Models |
| Text Book | 1. L.E. Keshet, Mathematical Models in Biology, SIAM, 1988. |
| | 2. J. D. Murray, Mathematical Biology, Springer, 1993. |
| Reference Book | 3.Y.C. Fung, Biomechanics, Springer-Verlag, 1990. |
| | 4. F. Brauer, P.V.D. Driessche and J. Wu, Mathematical Epidemiology, Springer, 2008. 5. M. Kot, Elements of Mathematical Ecology, Cambridge University Press, 2001. |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15C | Portfolio optimization | | | | |
| | | | | | |
| AIM | to maximize portfolio returns and minimize portfolio risk | | | | |
| Course Objectives | The objective typically maximizes factors such as expected return, and minimizes costs like financial risk, resulting in a multi-objective optimization problem. | | | | |
| | Factors being considered may range from tangible (such assets, liabilities, earnings or other fundamentals) | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Hydrostatics, Mass, Density, Specific gravity (relative density) Fluid-Pressure under Gravity : Solid, Fluid, Liquid, Gases, Perfect fluids, Viscous fluid, Experimental observation about fluid pressure under gravity, Liquid exerts pressure normally on a plane in contact (An Analytical treatment), | | | | |
| II | Equality of pressure in all directions, Transmissibility of fluid pressure, In a fluid at rest under gravity the pressure is same at all points in the same horizontal plane, Find the pressure at a point of a liquid or establish pressure equation for a fluid at rest under gravity, Free surface and effective surface of a liquid, Common surface of two heavy homogenous liquids that don't mix is a horizontal plane. | | | | |
| III | Thrust on Curved Surfaces: Thrust on curved surfaces, vertical surfaces, Horizontal thrust.Equilibrium of fluids under given field of forces and Pressure of Elastic rotating fluids. | | | | |
| IV | Equilibrium of floating bodies. Archimedes' Principle, Force of Buoyancy, Centre of Buoyancy and Plane floatation, Body floats freely in one or more liquids, Body floating in a liquid under constraints. | | | | |
| V | Condition of equilibrium of a body immersed in a liquid and supported by a string, Weighing a body in air, Weighing a body immersed in a liquid, The positions of equilibrium of a body floating in a homogenous liquid. | | | | |
| Text Book | 1. B. D. Sharma and M. R. Hassan, "Hydrostatics", Kedar Nath Ram Nath, Meerut, 2018. | | | | |
| Reference Book | 1. S.L.Loni, "An Introduction to Hydrostatics | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15D | Oriented Programming in C++ | | | | |
| | | | | | |
| AIM | aims to implement real-world entities like inheritance, hiding, polymorphism, etc. in programming | | | | |
| Course Objectives | To bind together the data and the functions that operate on them so that no other part of the code can access this data except that function. | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | OOP Paradigm: Comparison of Programming paradigms, Characteristics of Object-Oriented Programming Languages, Object-based programming languages C++: Brief History of C++,Structure of a C++ program, Difference between C and C++ - cin, cout, new, delete operators, ANSI/ISO Standard C++, Comments, Working with Variables and const Qualifiers. Enumeration, Arrays and Pointer. (2 questions) | | | | |
| II | Implementing oops concepts in C++ Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Default Parameter Value,Using Reference variables with Functions. (2 questions) | | | | |
| III | Abstract data types, Class Component, Object & Class, Constructors Default and Copy Constructor, Assignment operator deep and shallow coping, Access modifiers – private, publicand protected. Implementing Class Functions within Class declaration or outside the Class declaration. Instantiation of objects, | | | | |
| IV | Scope resolution operator, Working with Friend Functions, Using Static Class members. Understanding Compile Time Polymorphism function overloading Rules of Operator Overloading (Unary and Binary) as member function/friend function, | | | | |
| V | Implementation of operator overloading of Arithmetic Operators, Overloading Output/Input,Prefix/ Postfix Increment and decrement Operators, Overloading comparison operators, Assignment, subscript and function call Operator , concepts of namespaces. | | | | |
| Text Book | 1. A. R. Venugopal, Rajkumar, and T. Ravishanker, Mastering C++, TMH, 1997.<br>2. S. B. Lippman and J. Lajoie, C++ Primer, 3rd Ed., Addison Wesley, 2000. | | | | |
| Reference Book | 1. Bruce Eckel, Thinking in C++, 2nd Ed., President, Mindview Inc., Prentice Hall. | | | | |

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| | |
|---|---|
| | 2. D. Parasons, Object Oriented Programming with C++, BPB Publication.<br>3. Bjarne Stroustrup , The C++ Programming Language, 3rd Ed., Addison Welsley |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15E | Finite Element Methods | | | | |
| | | | | | |
| AIM | for numerically solving differential equations arising in engineering and mathematical modelling. | | | | |
| Course Objectives | Typical problem areas of interest include the traditional fields of structural analysis, heat transfer, fluid flow, mass transport, and electromagnetic potential. | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Introduction to finite element methods, comparison with finite difference methods, Methods of weighted residuals, collocations, least squares | | | | |
| II | Applications to solving simple problems of ordinary differential equations. Linear, quadratic and higher order elements in one dimensional and assembly, solution of assembled system. | | | | |
| III | Simplex elements in two and three dimensions, quadratic triangular elements, rectangular elements, serendipity elements and isoperimetric elements and their assembly | | | | |
| IV | Discretization with curved boundaries. Interpolation functions, numerical integration | | | | |
| V | Solution of one dimensional heat and wave equation and solution of two dimensional Laplace equation under different Geometric conditions. | | | | |
| Text Book | 1. J.N. Reddy, Introduction to the Finite Element Methods, Tata McGraw-Hill, 2003.<br>2. K.J. Bathe, Finite Element Procedures, Prentice-Hall, 2001 | | | | |
| Reference Book | 1. R.D. Cook, D.S. Malkus and M.E. Plesha, Concepts and Applications of Finite Element Analysis, John Wiley and Sons, 2002.<br>2.. Thomas J.R. Hughes, The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Dover Publication, 2000. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC15F | Mathematical Finance | | | | |
| | | | | | |
| AIM | It helps researchers to analyze, quantify, and optimize financial decisions | | | | |
| Course Objectives | By employing mathematical models, statistical analysis, and computational techniques, financial professionals can gain valuable insights into market behavior, risk management, asset pricing, and portfolio optimization | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Basic principles: Comparison, arbitrage and risk aversion, Interest (simple and compound, discrete and continuous), time value of money, | | | | |
| II | inflation, net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR. Bonds, bond prices and yields, | | | | |
| III | Macaulay and modified duration, term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds, immunization, convexity, putable and callable bonds. | | | | |
| IV | Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation), random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints), | | | | |
| V | Two fund theorem, risk free assets, One fund theorem, capital market line, Sharpe index. Capital Asset Pricing Model (CAPM), betas of stocks and portfolios, security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index. | | | | |
| Text Book | 1. David G. Luenberger, Investment Science, Oxford University Press, Delhi, 1998 | | | | |
| Reference Book | 1.John C. Hull, Options, Futures and Other Derivatives, 6th Ed., Prentice-Hall India, Indian reprint, 2006.<br>2. Sheldon Ross, An Elementary Introduction to Mathematical Finance, 2nd Ed., Cambridge University Press, USA, 2003. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC25A | Econometrics | | | | |
| | | | | | |
| AIM | To convert qualitative statements (such as "the relationship between two or more variables is positive") into quantitative statements | | | | |
| Course Objectives | "consumption expenditure increases by 95 cents for every one dollar increase in disposable income" | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Statistical Concepts Normal distribution; chi-square, t and F-distributions; estimation of parameters; properties of estimators; testing of hypotheses: defining statistical hypotheses; | | | | |
| II | distributions of test statistics; testing hypotheses related to population parameters; Type I and Type II errors; power of a test; tests for comparing parameters from two samples. | | | | |
| III | Simple Linear Regression Model: Two Variable Case Estimation of model by method of ordinary least squares | | | | |
| IV | Properties of estimators; goodness of fit; tests of hypotheses; scaling and units of measurement; confidence intervals; Gauss-Markov theorem; forecasting. | | | | |
| V | Assumptions: Consequences, Detection and Remedies Multicollinearity; heteroscedasticity; serial correlation. (1 question) Specification Analysis Omission of a relevant variable; inclusion of irrelevant variable; tests of specification errors. | | | | |
| Text Book | 1. Jay L. Devore, Probability and Statistics for Engineers, Cengage Learning, 2010.<br>2. John E. Freund, Mathematical Statistics, Prentice Hall, 1992. | | | | |
| Reference Book | 1.Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.<br>2. D. N. Gujarati and D.C. Porter, Essentials of Econometrics, McGraw Hill, 4th Ed., International Edition, 2009. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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THANJAVUR - 613 403

Dean
School of Arts & Science
Ponnaiyah Ramajayam Institute of
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U/s 3 of the UGC Act 1956
THANJAVUR - 613 403, Tamil Nadu

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC25B | Cryptography and Network Security | | | | |
| | | | | | |
| AIM | To understand basics of Cryptography and Network Security | | | | |
| Objectives | To be able to secure a message over insecure channel by various means. | | | | |
| | To learn about how to maintain the Confidentiality, Integrity and Availability of a data. | | | | |
| | To understand various protocols for network security to protect against the threats in the networks | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Public Key Cryptography Principles & Applications, Algorithms: RSA, Message Authentication. | | | | |
| II | : One way Hash Functions: Message Digest, MD5, SHA1. Public Key Infrastructure: Digital Signatures, Digital Certificates, Certificate Authorities | | | | |
| III | Network Attacks: Buffer Overflow, IP Spoofing, TCP Session Hijacking, Sequence Guessing, Network Scanning: ICMP, TCP sweeps, Basic Port Scans; Denial of Service Attacks: SYN Flood, Teardrop attacks, land, Smurf Attacks.IP security Architecture: Overview, | | | | |
| IV | Authentication header, Encapsulating Security Pay Load, combining Security Associations, Key Management. Virtual Private Network Technology: Tunneling using IPSEC | | | | |
| V | Requirements, Secure Socket Layer, and Secure Electronic Transactions, Network Management Security: Overview of SNMP Architecture- SNMPV1, SNMPV3.Firewall Characteristics & Design Principles, Types of Firewalls: Packet Filtering Router, Application Level Gateway or Proxy, Content Filters, Bastion Host. | | | | |
| Text Book | 1. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.. | | | | |
| Reference Book | 1. TCP/IP Protocol Suite , Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw Hill.<br>2.W. Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000 | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC25C | Information Security | | | | |
| | | | | | |
| AIM | The main aim of Information Security are typically related to ensuring confidentiality, integrity, and availability of company information. | | | | |
| Course Objectives | To study of protection of confidentiality, integrity, availability, authenticity, and non-repudiation of user data. | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Overview of Security: Protection versus security; aspects of security–data integrity, data availability, privacy; security problems, user authentication, Orange Book. | | | | |
| II | Security Threats: Program threats, worms, viruses, Trojan horse, trap door, stack and buffer over flow; system threats- intruders; communication threats-tapping and piracy. | | | | |
| III | Cryptography: Substitution, transposition ciphers, symmetric-key algorithms-Data Encryption Standard, advanced encryption standards, public key encryption - RSA; | | | | |
| IV | Diffie- Hellman key exchange, ECC cryptography, Message Authentication-MAC, hash functions. | | | | |
| V | Digital signatures: Symmetric key signatures, public key signatures, message digests, public key infrastructures. (1 questions) Security Mechanisms: Intrusion detection, auditing and logging, tripwire, system-call monitoring. | | | | |
| Text Book | 1. W. Stallings, Cryptography and Network Security Principles and Practices, 4th Ed., PrenticeHall of India, 2006. 2. C. Pfleeger and S.L. Pfleeger, Security in Computing , 3rd Ed., Prentice-Hall of India, 2007. 3. D. Gollmann, Computer Security, John Wiley and Sons, NY, 2002. | | | | |
| Reference Book | 1. J. Piwprzyk, T. Hardjono and J. Seberry, Fundamentals of Computer Security, SpringerVerlag Berlin, 2003.<br>2. J.M. Kizza, Computer Network Security, Springer, 2007.<br>3. M. Merkow and J. Breithaupt, Information Security: Principles and Practices, Pearson Education, 2006. | | | | |
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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC25D | Applications of Algebra | | | | |
| | | | | | |
| AIM | to simplify the process of articulating a mathematical relationship by efficiently utilising symbols to represent entities as a form of abbreviation | | | | |
| Course Objectives | Translate data to algebraic expressions the prime factorization of expressions | | | | |
| | Translate date to equations | | | | |
| | Use commutative, associative and distributive laws to rewrite expression | | | | |
| | Determine the prime factorization of expressions | | | | |
| | | | | | |

| Unit No. | Contents |
|---|---|
| I | Balanced incomplete block designs (BIBD): definitions and results, incidence matrix of a BIBD, construction of BIBD from difference sets, construction of BIBD using quadratic residues, difference set families, construction of BIBD from finite fields |
| II | Coding Theory: introduction to error correcting codes, linear cods, generator and parity check matrices, minimum distance. (1 questions) Symmetry groups and color patterns: review of permutation groups, groups of symmetry and action of a group on a set; colouring and colouring patterns |
| III | Special types of matrices: idempotent, nilpotent, involution, and projection tri diagonal matrices, circulant matrices, Vandermonde matrices, Hadamard matrices, permutation and doubly stochastic matrices, Frobenius- König theorem, Birkhoff theorem. Positive |
| IV | Semi-definite matrices: positive semi-definite matrices, square root of apositive semi-definite matrix, a pair of positive semi-definite matrices, and their simultaneous diagonalization. Symmetric matrices and quadratic forms: diagonalization of symmetric matrices, quadratic forms, constrained optimization, singular value decomposition, and applications to image processing and statistics. (2 questions) |
| V | Applications of linear transformations: Fibonacci numbers, incidence models, and differential equations. Least squares methods: Approximate solutions of system of linear equations, approximate inverse of an m×n matrix, solving a matrix equation using its normal equation, finding functions that approximate data. Linear algorithms: LDU factorization, the row reduction algorithm and its inverse, backward and forward substitution, approximate inverse and |

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| | projection algorithms. |
| Text Book | 1. I. N. Herstein and D. J. Winter, Primer on Linear Algebra, Macmillan Publishing Company, New York, 1990.<br>2. S. R. Nagpaul and S. K. Jain, Topics in Applied Abstract Algebra, Thomson Brooks and Cole, Belmont, 2005. |
| Reference Book | 1. Richard E. Klima, Neil Sigmon, Ernest Stitzinger, Applications of Abstract Algebra with Maple, CRC Press LLC, Boca Raton, 2000.<br>2. David C. Lay, Linear Algebra and its Applications. 3rd Ed., Pearson Education Asia, Indian Reprint, 2007. |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC25E | Computer Graphics | | | | |
| | | | | | |
| AIM | for displaying art and image data effectively and meaningfully to the consumer | | | | |
| Course Objectives | The main objective of the course is to introduce students with fundamental concepts and theory of computer graphics. | | | | |
| | It presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curves and an introduction to 3D transformation | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Development of computer Graphics: Raster Scan and Random Scan graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices. | | | | |
| II | Points, lines and curves: Scan conversion, line-drawing algorithms, circle and ellipse generation, | | | | |
| III | Conic-section generation, polygon filling anti aliasing | | | | |
| IV | Two-dimensional viewing: Coordinate systems | | | | |
| V | Linear transformations, line and polygon clipping algorithms | | | | |
| Text Book | 1. D. Hearn and M.P. Baker, Computer Graphics, 2nd Ed., Prentice–Hall of India, 2004. 2. J.D. Foley, A van Dam, S.K. Feiner and J.F. Hughes, Computer Graphics: Principals and Practices, 2nd Ed., Addison-Wesley, MA, 1990. | | | | |
| Reference Book | 1. D.F. Rogers, Procedural Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 2001.<br>2. D.F. Rogers and A.J. Admas, Mathematical Elements in Computer Graphics, 2nd Ed., McGraw Hill Book Company, 1990. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212D5C25F | Operating System: Linux | | | | |
| | | | | | |
| AIM | It maintains the privacy of the user. The performance of the Linux system is much higher than other operating systems. | | | | |
| Course Objectives | To study Efficiency,Hardware, abstraction,Convenience<br>System resource management. | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Linux – The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, | | | | |
| II | Overview of Linux architecture, Installation, Start up scripts, system processes (an overview), Linux Security. | | | | |
| III | The Ext2 and Ext3 File systems: General Characteristics of, The Ext3 File system, file permissions. User Management: | | | | |
| IV | Types of users, the powers of Root, managing users (adding and deleting): using the command line and GUI tools. | | | | |
| V | Resource Management in Linux: file and directory management, system calls for files Process Management, Signals, IPC: Pipes, FIFOs, System V IPC, Message Queues, system calls for processes, Memory Management, library and system calls for memory. | | | | |
| Text Book | 1. Arnold Robbins, Linux Programming by Examples The Fundamentals, 2nd Ed., Pearson Education, 2008.<br>2. Cox K, Red Hat Linux Administrator's Guide, PHI, 2009.<br>3. R. Stevens, UNIX Network Programming, 3rd Ed., PHI, 2008. | | | | |
| Reference Book | 1. Sumitabha Das, Unix Concepts and Applications, 4th Ed., TMH, 2009.<br>2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, Linux in a Nutshell, 6th Ed., O'Reilly Media, 2009.<br>3. Neil Matthew, Richard Stones, Alan Cox, Beginning Linux Programming, 3rd Ed., 2004. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212D5C34A | Acturial Mathematics | | | | |
| | | | | | |
| AIM | The aim of the Actuarial Mathematics subject is to provide a grounding in financial mathematics and its simple applications | | | | |
| Course Objectives | (i) Describe how to use a generalised cashflow model to describe financial transactions. | | | | |
| | (ii) Describe how to take into account the time value of money using the concepts of compound interest and discounting. | | | | |
| | (iii) Show how interest rates or discount rates may be expressed in terms of different time periods. | | | | |
| | (iv) Demonstrate a knowledge and understanding of real and money interest rates. | | | | |
| | (v) Calculate the present value and the accumulated value of a stream of equal or unequal payments using specified rates of interest and the net present value at a real rate of interest, assuming a constant rate of inflation | | | | |
| | | | | | |
| Unit No. | Contents | | | | |
| I | Cashflow models, The time value of money, Interest rates, Real and money interest rates, Discounting and accumulating, Level annuities. | | | | |
| II | Equations of value, Loan schedules, Project appraisal | | | | |
| III | Investments, Elementary compound interest problems, | | | | |
| IV | Term structure of interest rates, Stochastic interest rate models | | | | |
| V | Arbitrage and forward contracts, Deferred and increasing annuities. | | | | |
| Text Book | An introduction to the mathematics of finance. McCutcheon, J. J.; Scott, W. F.Heinemann, 1986. 463 pages. ISBN: 9780434912285. (Chapters 1 to 7 and Chapter 10) | | | | |
| Reference Book | 1. Bowers, N. L.; Gerber, H. U.; Hickman, J, C. et al., In Actuarial mathematics, 2nd ed. Society of Actuaries, 1997. 753 pages. ISBN: 9780938959465.<br>2. Butcher, M. V., Mathematics of compound interest, Nesbitt, C. J. Ulrich's Books, 1971. 324 pages. ISBN: 9780960300013.<br>3. Ingersoll, J. E. Rowman & Littlefield, 1987. Theory of financial decision making. 474 pages. ISBN: 9780847673599. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC34B | Applied Statistical Methods | | | | |
| | | | | | |
| AIM | The aim of the Statistical Methods subject is to provide a further grounding in mathematical and statistical techniques of particular relevance to financial work. | | | | |
| Course Objectives | (i) Explain the concepts of decision theory and apply them. | | | | |
| | (ii) Calculate probabilities and moments of loss distributions both with and without limits and risk-sharing arrangements. | | | | |
| | (iii) Construct risk models involving frequency and severity distributions and calculate the moment generating function and the moments for the risk models both with and without simple reinsurance arrangements. | | | | |
| | (iv) Explain the concept of ruin for a risk model. Calculate the adjustment coefficient and state Lundberg's inequality. Describe the effect on the probability of ruin of changing parameter values and of simple reinsurance arrangements. | | | | |
| | (v) Explain the fundamental concepts of Bayesian statistics and use these concepts to calculate Bayesian estimators | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Decision theory, Bayesian statistics, Loss distributions, Reinsurance | | | | |
| II | Credibility theory, Empirical Bayes credibility theory, Risk models - Collective Risk Model, Risk models - Individual Risk Model | | | | |
| III | Ruin theory, Generalised linear models, Run-off triangles. | | | | |
| IV | Time series - Auto Regressive models, Time series - | | | | |
| V | ARCH, GARCH models, Monte Carlo simulation. | | | | |
| Text Book | Loss models: from data to decisions. - Klugman, Stuart A; Panjer, Harry H; Willmot, Gordon E; Venter, Gary G. - John Wiley & Sons, 1998. 644 pages. ISBN: 0 471 23884 8. (Chapters 5 and 6, Chapters 9 to 11, Chapters 15, Chapters 20 and 21) | | | | |
| Reference Book | 1. Dobson, Annette J., An introduction to statistical modelling, - Chapman & Hall, 1983. 125 pages. ISBN: 0 412 24860 3.<br>2. Hossack, Ian B, Pollard, John H, Zehnwirth, Benjamin, Introductory statistics with applications in general insurance, - 2nd ed. - Cambridge University Press, 1999 - 282 pages. ISBN: 0 521 65534 X.<br>3. Daykin, Chris D; Pentikainen, Teivo; Pesonen, Martti, Practical risk theory for actuaries, Chapman & Hall, 1994. 545 pages. - ISBN: 0 412 42850 . | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC34C | Acturial Models | | | | |
| | | | | | |
| AIM | The aim of the Models subject is to provide a grounding in stochastic processes and survival models and their application. | | | | |
| Course Objectives | (i) Describe the principles of actuarial modelling. | | | | |
| | (ii) Describe the general principles of stochastic processes, and their classification into different types. | | | | |
| | (iii) Define and apply a Markov chain | | | | |
| | (iv)Explain the concept of survival models. | | | | |
| | (v) Describe estimation procedures for lifetime distributions | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Principles of actuarial modeling, stochastic processes, Markov chains, The two-state Markov model. | | | | |
| II | Time-homogeneous Markov jump processes, Time-inhomogeneous Markov jump processes | | | | |
| III | Survival models, Estimating the lifetime distribution function, The Cox regression model | | | | |
| IV | The Binomial and Poisson models, Exposed to risk. | | | | |
| V | Graduation and statistical tests, Methods of graduation. | | | | |
| Text Book | 1)Kulkarni, Vidyadhar G, Modeling, analysis, design, and control of stochastic systems, Springer, 1999. 374 pages. – ISBN: 0 387 98725 8. (Chapters 1, 2, 4 and 5)<br><br>2)Elandt-Johnson, Regina C; Johnson, Norman L, Survival models and data analysis, John Wiley & Sons, 1999, 457 pages. – ISBN: 0 47134992 5. (Chapters 2 Sec 2.10, 3, 4 and 6) | | | | |
| Reference Book | 1. Macdonald A S, *An Actuarial Survey of Statistical Models for Decrement and Transition Data*, British Actuarial Journal 2 (1996).<br>2. Brzezniak, Zdzislaw; Zastawniak, Tomasz, Basic stochastic processes; A course through exercises – Springer, 1998. - 225 pages. – ISBN: 3 540 76175 6. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC34D | Financial Economics | | | | |
| | | | | | |
| AIM | The aim of the Financial Economics subject is to develop the necessary skills to construct asset liability models and to value financial derivatives. These skills are also required to communicate with other financial professionals and to critically evaluate modern financial theories | | | | |
| Course Objectives | (i) Describe and discuss the application of utility theory to economic and financial problems. | | | | |
| | (ii) Discuss the advantages and disadvantages of different measures of investment risk. | | | | |
| | (iii) Describe and discuss the assumptions of mean-variance portfolio theory and its principal results. | | | | |
| | (iv) Describe and discuss the properties of single and multifactor models of asset returns. | | | | |
| | (v) Describe asset pricing models, discussing the principal results and assumptions and limitations of such models. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | **Introduction – Efficient Market Hypothesis, Risk Assessment**<br>Introduction to financial economics, Efficient Market Hypothesis (EMH), Evidence for and against EMH, Utility theory, stochastic dominance and behavioral finance, Measures of investment risk, Portfolio theory, Models of asset returns | | | | |
| II | **Determination of Efficient Frontier using Statistical and Economic Pricing Models**<br>Asset pricing models, Brownian motion and martingales, stochastic calculus and Ito processes, stochastic models of security prices | | | | |
| III | **Introduction to Stochastic Models**<br>Introduction to the valuation of derivative securities, The Greeks, The binomial model, The Black-Scholes option pricing formula | | | | |
| IV | **Properties and Valuation of Derivatives**<br>The 5-Step method in discrete time, The 5-step method in continuous time, Term Structure of interest Rates, | | | | |
| V | Credit Risk Models: JLT Model, Two State Model. | | | | |
| Text Book | 1.Elton, Edwin J, Martin J Gruber, Stephen J Brown, & William N Goetzmann, Modern portfolio theory and investment analysis (6th edition), John Wiley, 2003 (Chapters: 1, 4, 5,6, 13, 17, 20) | | | | |

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|---|---|
| | 2.Hull, John C. Options, Futures and other derivatives (5th edition), Prentice Hall, 2002. (Chapters: 1, 12, 13, 14, 18, 20, 23, 30) |
| Reference Book | 1. Baxter, Martin & Andrew Rennie, Financial calculus; An introduction to derivative pricing, Cambridge University Press, 1996.<br>2. Panjer, Harry H (ed), Financial economics: with applications to investments, insurance and pensions, The Actuarial Foundation, 1998. |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC34E | Mathematical Cryptography | | | | |
| | | | | | |
| AIM | To offer number theoretic preliminaries for widely used public-key cryptosystems.<br>2. To teach public-key cryptographic primitives and their role in communication. | | | | |
| Course Objectives | 1. Appreciate the role of mathematics in cryptography. | | | | |
| | 2. Understand how secure communications happen over insecure channels. | | | | |
| | 3. Appreciate how computational complexities form the basis of public-key cryptography. | | | | |
| | 4. Understand the importance of data secrecy, data integrity, and data authentication and the ways to achieve them | | | | |
| | 5. Understand key-agreement, public-key encryption and digital signatures | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Simple substitution ciphers-Divisibility and GCD(without proofs) – Modular arithmetic- Prime numbers, unique factorization and finite fields-Powers and primitive roots in finite fields | | | | |
| II | The birth of public key cryptography- Discrete Logarithm Problem-Diffie-Hellman key exchange- ElGamal public key cryptosystem-The Chinese remainder theorem. | | | | |
| III | Euler's formula and roots modulo $pq$ – RSA public key cryptosystem-Implementations and security issues-Primality testing-Pollard's p-1 factorization algorithm- Quadratic residues and Quadratic reciprocity-Probabilistic encryption | | | | |
| IV | Elliptic Curves(Theorems without proofs)- Elliptic Curves over finite fields-Elliptic Curve Discrete Logarithm Problem-Elliptic Curve Cryptography and Lenstra's ECFM. | | | | |
| V | Digital Signatures – An Over View and Definitions-RSA Digital Signatures | | | | |
| Text Book | **KEY TEXT BOOK: An Introduction to Mathematical Cryptography,** Authors : Jeffrey Hoffstein, Jill Pipher and Joseph H. Silverman, ISBN : 978-1-4419-2674-6, Springer, 2010.<br>**Chapters**: 1.1-1.5, 2.1-2.4, 2.8, 3.1-3.5 (excluding 3.4.1 & 3.4.2), 3.9-3.10, 5.1-5.4,5.6, 7.1-7.2. | | | | |
| Reference Book | Neal Koblitz, A Course in Number Theory and Cryptography, Springer, 1994.<br>Jonathan Katz and Yehuda Lindell, Introduction to Modern Cryptography, Second edition, CRC Press, 2015.<br>Douglas R.Stinson, Cryptography Theory and Practice, CRC Press, Third edition, 2005 | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC34F | Time Scale | | | | |
| | | | | | |
| AIM | The objectives of the course are to know what Time Scales are, to study basic analysis on Time scales, and solve dynamic equations of various types including Self Adjoint equations and Riccati equations on time scales | | | | |
| Course Objectives | After going through the course, a student should be able to perform calculus-based study on Time Scales and Solve Dynamic Equations based on Green's function. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Time scale calculus – First order linear equations on time scale | | | | |
| II | Hilger's complex plane – Initial value problems | | | | |
| III | Second order linear equations on time scale – hyperbolic and trigonometric functions – Euler –Cauchy equations- Laplace transforms | | | | |
| IV | Self-Adjoint equations | | | | |
| V | Riccati equation, Boundary value problems and Green's function–Eigenvalue problems | | | | |
| Text Book | 1.Martin Bohner and Allan Peterson, Dynamic Equations on Time Scales an introduction with applications, BIRKHAUSER BOSTON. BASEL. BERLIN, 2001, [Chapters: 1 to 4]. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

H.O.D.
DEPARTMENT OF MATHEMATICS
PRIST DEEMED TO BE UNIVERSITY
THANJAVUR - 613 403

Dean
School of Arts & Science
Ponnaiyah Ramajayam Institute of
Science & Technology ( PRIST)
Deemed to be University
Vallam, Thanjavur - 613 403.

REGISTRAR
Ponnaiyah Ramajayam Institute of
Science & Technology (PRIST)
(Institution Deemed to be University
u/s 3 of the UGC Act 1956
THANJAVUR - 613 403, TAMIL NADU

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44A | Game Theory | | | | |
| | | | | | |
| AIM | Provide a foundation in the basic concepts of Game Theory<br>Understand Nash's equilibrium<br>Understand Cooperative v/s Non-Cooperative games | | | | |
| Course Objectives | Clear of how to strategize in day to day situations | | | | |
| | Take decisions which benefit as many as possible | | | | |
| | Model all practical situations as a game and find its solution | | | | |
| | When to form coalitions and not. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Games and Solutions, Game theory and the Theory of Competitive Equilibrium, Rational Behaviour, The Steady State and Deductive Interpretations, Bounded Rationality, Terminology and Notation | | | | |
| II | Strategic Games, Nash Equilibrium, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information. | | | | |
| III | **Mixed, Correlated, and Evolutionary Equilibrium**<br>Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium | | | | |
| IV | **Rationalizability, Iterated Elimination of Dominated Actions**<br>Rationalizability, Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions | | | | |
| V | **Knowledge and Equilibrium**<br>A Model of Knowledge, Common Knowledge, Can People Agree to Disagree, Knowledge and Solution Concepts, The Electronic Mail Game | | | | |
| Text Book | Martin J Osborne and Ariel Rubinstein, A Course in Game Theory, The MIT Press, Cambridge Massachusetts, London. | | | | |
| Reference Book | N.N. Vorobev, Game Theory, Springer Verlag Publications, 1977 | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

H.O.D.
DEPARTMENT OF MATHEMATICS
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Dean
School of Arts & Science
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Science & Technology ( PRIST)

REGISTRAR
Pennalyah Ramalayam Institute of
Science & Technology (PRIST)
(Institution Deemed to B
u/s 3 of the UGC A
THANJAVUR

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44B | Mathematical Ecology | | | | |
| | | | | | |
| AIM | To Introduce Mathematical Modelling of population dynamics under various conditions. To analyse mathematical models using the theory of Linear and Non-Linear Dynamical Systems | | | | |
| Course Objectives | Apply theory of Non-Linear Dynamical Systems and theory of Bifurcations to analyse the dynamics of the model and determine the futuristic population of species in an ecosystem. | | | | |
| | Comprehensively understand Predator-Prey models, their analysis and dynamics for a 2-dimensional system. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Single-species models<br>Exponential, Logistic and Gompertz Growth, arvest Models: Bifurcation and Break Points | | | | |
| II | Interacting populations<br>A Classical Prey-Predator model, To cycle or not to cycle, | | | | |
| III | Global Bifurcations in Prey-Predator Models, | | | | |
| IV | Competition Models,. | | | | |
| V | Mutualism Models. | | | | |
| Text Book | Mark Kot, Elements of Mathematical Ecology, Cambridge University press, 2001. [Chapters: I. A: Sec 1, 2, I.B: 7, 8, 9, 12, 13] | | | | |
| Reference Book | J. D. Murray, Mathematical Biology: An Introduction, 3rdedition, Springer, 2001. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

H.O.D.
DEPARTMENT OF MATHEMATICS
PRIST DEEMED TO BE UNIVERSITY
THANJAVUR - 613 403

Dean
School of Arts & Science
Ponnaiyah Ramajayam Institute of
Science & Technology (PRIST)
Deemed to be University
Vallam - 613 403.

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Science & Technology (PRIST)
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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44C | Artificial Intelligence | | | | |
| | | | | | |
| AIM | The course introduces to students the concepts and principles behind mapping Human Intelligence onto Artificial Systems. It is Primarily the study of agents different types of Intelligent agents, Search Techniques, Heuristics based, State Space Search for Problem Solving. It is followed by Inferencing, Logical Reasoning Approaches and Knowledge representation applicable to real world problems and situations | | | | |
| Course Objectives | Understand the concepts of Artificial Intelligence State Space Search and Problem Solving | | | | |
| | Work on Uninformed and Informed Search Techniques | | | | |
| | Solve various types of real world problems and use theory in simulations. | | | | |
| | Construct Logical Statements from Natural Language Sentences and create a Facts base and deduce new facts by the application of reasoning procedures | | | | |
| | Apply techniques of Knowledge representation to solve real world problems | | | | |
| Unit No. | | | | | |
| I | Introduction – what is AI? – Intelligent agents, environments – Solving problems by searching: problem solving agents –Example problems – Uninformed search strategies – Informed search and exploration: Informed search strategies –Heuristic functions– Local search algorithms – Optimization problems | | | | |
| II | Logical Agents: Knowledge Based Agents – Logic – Propositional logic – Reasoning patterns – Propositional Inference – Agents based on propositional logic – First Order Logic :Representation–Using FOL–Knowledge Engineering–Inference in FOL : Unification And Lifting – Forward Chaining – Backward Chaining – Resolution – Examples | | | | |
| III | Knowledge Representation: Ontological Engineering – Categories and objects – Actions situations and events – Mental events and mental objects – Reasoning Systems – Truth maintenance systems | | | | |
| IV | Learning from Observations: Forms of learning – Inductive learning – Learning Decision trees - Knowledge in Learning | | | | |
| V | – Knowledge in Learning – Explanation based learning – Learning using relevance information | | | | |
| Text Book | 1. Stuart J. Russel and Peter Norvig, Artificial Intelligence – A Modern Approach, Prentice Hall, Pearson Education, 2003.<br>[ Chapters & Sections : 1: 1.1 ; 2: 2.1 to 2.4 ; 3:3.1 to 3.6; 4: 4.1 to 4.3 ; 7: 7.1 to 7.7; 8 : 8.1 to 8.4; 9: 9.1 to 9.5 ; 10: 10.1 to 10.8; 18: 18.1 to 18.3 ; 19: 19.1 to 19.4] | | | | |
| Reference Book | 1. George F. Luger and William A. Stubblefield, Artificial Intelligence, Structures and Strategies for Complex Problem Solving, The Benjamin / Cummings Publishing Co, 1993.<br>2. Amit Konar, Artificial Intelligence and Soft Computing, CRC Press, 2000. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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Science & Technology (PRIST)

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44D | Design of Algorithms | | | | |
| | | | | | |
| AIM | The course takes a mathematical problem solving approach to writing algorithms. The course deals with designing algorithms through the process of induction and simultaneously prove its correctness. A variety of domains such as sequences, sets, graphs and geometric are discussed. | | | | |
| Course Objectives | 1. Student will be able to design and develop an algorithm using the induction processes. | | | | |
| | 2. Student can prove the correctness of an algorithm. | | | | |
| | 3. Student becomes a better problem solver. | | | | |
| Unit No. | | | | | |
| I | Design of Algorithms by Induction | | | | |
| II | Algorithms involving Sequences and Sets | | | | |
| III | Graph Algorithms . | | | | |
| IV | Geometric Algorithms | | | | |
| V | Algebraic and Numeric Algorithms | | | | |
| Text Book | Udi Manber, Introduction to Algorithms: A Creative Approach, Addison-Wesley, 1988, Chapters: 5 to 9. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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THANJAVUR - 613 403, TN

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44E | General Insurance, Life and Health Contingencies | | | | |
| | | | | | |
| AIM | The aim of the Contingencies subject is to provide a grounding in the mathematical techniques that can be used to model and value cash-flows dependent on death, survival, or other uncertain risks. | | | | |
| Course Objectives | (i) Define simple assurance and annuity contracts, and develop formulae for the means and variances of the present values of the payments under these contracts, assuming constant deterministic interest. | | | | |
| | (ii) Describe and use practical methods of evaluating expected values and variances of the simple contracts defined in objective | | | | |
| | Describe and calculate, using ultimate or select mortality, net premiums and net premium reserves of simple insurance contracts | | | | |
| | (iv) Describe and calculate, using ultimate or select mortality, net premiums and net premium reserves for increasing and decreasing benefits and annuities. | | | | |
| | (v) Describe and calculate gross premiums and reserves of assurance and annuity contracts | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Life assurance contracts, Life annuity contracts, The life table, Evaluation of assurances and annuities. | | | | |
| II | Net premiums and reserves, Variable benefits and with-profit policies, Gross premiums and reserves for fixed and variable benefit contracts | | | | |
| III | Simple annuities and assurances involving two lives, Contingent and reversionary benefits, Profit testing, Determining reserves using profit testing | | | | |
| IV | Competing risks, Multiple decrement tables, | | | | |
| V | Pension funds, Mortality, selection and standardisation | | | | |
| Text Book | Actuarial mathematics. Bowers, Newton L et al. – 2nd ed. – Society of Actuaries, 1997. 753 pages. ISBN: 0 938959 46 8. (Chapters: 3 to 8, Ch9-Sec 9.1 to 9.7, Ch 10 and Ch 20) | | | | |
| Reference Book | 1. Benjamin, Bernard; Pollard, The analysis of mortality and other actuarial statistics, John H. – 3rd ed. – Faculty and Institute of Actuaries, 1993. 519 pages. ISBN 0 90106626 5.<br>2. Neill, Alistair, Life contingencies – Heinemann, 1977. 452 pages. ISBN 0 434 91440 1 | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212DSC44F | Game Theory | | | | |
| | | | | | |
| AIM | Provide a foundation in the basic concepts of Game Theory<br>Understand Nash's equilibrium<br>Understand Cooperative v/s Non-Cooperative games | | | | |
| Course Objectives | Clear of how to strategize in day to day situations | | | | |
| | Take decisions which benefit as many as possible. | | | | |
| | Model all practical situations as a game and find its solution. | | | | |
| | When to form coalitions and not. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Games and Solutions, Game theory and the Theory of Competitive Equilibrium, Rational Behaviour, The Steady State and Deductive Interpretations, Bounded Rationality, Terminology and Notation. | | | | |
| II | **Nash Equilibrium (5 periods)**<br>Strategic Games, Nash Equilibrium, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayseian Games: Strategic Games with Imperfect Information. | | | | |
| III | **: Mixed, Correlated, and Evolutionary Equilibrium (4 periods)**<br>Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium. | | | | |
| IV | **Rationalizability, Iterated Elimination of Dominated Actions (3 periods)**<br>Rationalizability, Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions. | | | | |
| V | A Model of Knowledge, Common Knowledge, Can People Agree to Disagree, Knowledge and Solution Concepts, The Electronic Mail Game. | | | | |
| Text Book | Martin J Osborne and Ariel Rubinstein, A Course in Game Theory, The MIT Press, Cambridge Massachusetts, London. | | | | |
| Reference Book | N.N. Vorobev, Game Theory, Springer Verlag Publications, 1977. | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

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# REPLACED COURSES

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212AEC44 | IMAGE PROCESSING | | | | |
| | | | | | |
| AIM | Students are expected to have knowledge in linear signals and systems, 1-D Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable and working knowledge of Matlab. | | | | |
| Course Objectives | Develop a theoretical foundation of fundamental Digital Image Processing concepts. | | | | |
| | Provide mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression. | | | | |
| | Gain experience and practical techniques to write programs using MATLAB language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression. | | | | |
| | | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | Introduction And Digital Image Fundamentals: The origins of Digital Image Processing Examples of Fields that Use Digital Image Processing Fundamentals Steps in Image Processing Elements of Digital Image Processing Systems | | | | |
| II | Introduction And Digital Image Fundamentals (cont.): Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels Translation, Scaling, Rotation and Perspective Projection of image | | | | |
| III | Introduction And Digital Image Fundamentals (cont.): Linear and Non Linear Operations • Digital image Representation Reading, Displaying, Writing Images using MATLAB Data Classes, Image Types using MATLAB | | | | |
| IV | Digital image Representation (cont.) Converting Between data classes and Image Types Introduction to M Function Programming using MATLAB • Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations Histogram Processing Quiz 1 | | | | |
| V | Image Enhancement in the Spatial Domain (cont.): Enhancement Using Arithmetic and Logic operations Combining Spatial Enhancement Methods Basics of Spatial Filters | | | | |
| Text Book | Al Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000.<br>A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison- | | | | |

H.O.D.
DEPARTMENT OF MATHEMATICS
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Ponnaiyah Ramajayam Institute of
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Deemed to be University
THANJAVUR - 613 403, TN.

Dean
School of Arts & Science
Ponnaiyah Ramajayam Institute of
Science

| | |
|---|---|
| | Wesley, 1989. |
| Reference Book | W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001.<br><br>Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000 |
| Percentage of Syllabus Revised: 100% | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22212AEC44 | Quantitative Aptitude | | | | |
| | | | | | |
| AIM | Students to engage in multiple mathematical ways of thinking that will enhance their ability to make informed decisions as citizens and as potential leaders. | | | | |
| Course Objectives | It represents a person's level of competency to perform a certain type of task.<br>The entire objective of the 60 hours aptitude building program is to develop the basics of the students towards three segments of aptitude<br>The main goal of courses that satisfy the quantitative reasoning requirement is for students to engage in multiple mathematical ways. | | | | |
| | | | | | |
| Unit No. | | | | | |
| I | **Number Systems:** Computation of Whole Number, Decimal and Fraction , Relationship between numbers | | | | |
| II | **Fundamental Arithmetical Operations**<br>Percentages-Ratio and Proportion-Square roots-Averages-Interest (Simple and Compound)-Profit and Loss, Discount-Partnership Business-Mixture and Alligation-Time and distance-Time and work | | | | |
| III | **Algebra**<br>Basic algebraic identities of School Algebra and Elementary surds<br>Graphs of Linear Equations | | | | |
| IV | **Geometry**<br>Triangle and its various kinds of centres-Congruence and similarity of triangles-Circle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles | | | | |
| V | **Statistics and Probability**<br>Use of Tables and Graphs-Histogram-Frequency polygon-Bar-diagram-Pie-chart-Measures of central tendency: mean, median, mode, standard deviation-calculation of simple probabilities | | | | |
| Text Book | Quantitative Aptitude By Dr. R.S Aggarwal | | | | |
| Reference Book | Advance Maths Rakesh Yadav<br>Magical Book on Quicker Maths M Tyra | | | | |
| Percentage of Syllabus Revised: 100% | | | | | |

H.O.D.
DEPARTMENT OF MATHEMATICS
PRIST DEEMED TO BE UNIVERSITY
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Dean

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THANJAVUR - 613 403, Tamil Nadu, India

PRIST
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UNIVERSITY
NAAC ACCREDITED
THANJAVUR- 613 403 - TAMIL NADU

## MINUTES OF BOARD OF STUDIES MEETING OF COMPUTER SCIENCE

The Minutes of the Board of Studies meeting in Computer Science was held on 29-04-22 by 10.30 a.m. in Department of Computer Science, PRIST University, Thanjavur under the chairmanship of Dr.K.T.Senthil Kumar, Head of the Department of Computer Science.

**The following Members were present for the meeting:**

| | | |
|---|---|---|
| 1. | Dr.L.Chinnappa | Dean of Arts and Science, PRIST Deemed University |
| 2. | Dr.K.T.Senthil Kumar | HOD/Asst.prof/Chairman PRIST Deemed University |
| 3. | Dr.K.Mohan Kumar | Academic Expert Department of Computer Science, Rajah serfoji government college, Thanjavur, |
| 4. | Mr.S.Karthikeyan Head, | Industrial Expert Quantumsys Technologies, Thanjavur |
| 5. | Dr.K.Saravanan | Prof. PRIST Deemed University, Member Internal |
| 6. | Dr.R.Maruthi | Prof. PRIST Deemed University, Member Internal |
| 7. | Dr.G.Preethi | Asso.prof, PRIST Deemed University, Member Internal |
| 8. | Mrs.M.Aarthi | Asst.prof, PRIST Deemed University, Member Internal |
| 9. | Mrs.R.Suganya | Asst.prof, PRIST Deemed University, Member Internal |
| 10. | Mr.D.S.ChozhaBharathi | Asst.prof, PRIST Deemed University, Member Internal |
| 11. | C.Balaji -B.Sc.(CS) | Alumni |
| 12. | S.Swetha-B.C.A | Student |

The Chairman of Board of Studies (BOS) in Computer Science welcomed the members and briefed about the programmes offered by the department.

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PRIST
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THANJAVUR- 613 403 - TAMIL NADU

## MINUTES OF BOARD OF STUDIES MEETING OF COMPUTER SCIENCE

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**The following Members were present for the meeting:**

| | | |
|---|---|---|
| 1. | Dr.L.Chinnappa | Dean of Arts and Science, PRIST Deemed University |
| 2. | Dr.K.T.Senthil Kumar | HOD/Asst.prof/Chairman<br>PRIST Deemed University |
| 3. | Dr.K.Mohan Kumar | Academic Expert<br>Department of Computer Science,<br>Rajah serfoji government college, Thanjavur. |
| 4. | Mr.S.Karthikeynn<br>Head, | Industrial Expert<br>Quantumsys Technologies,<br>Thanjavur |
| 5. | Dr.K.Saravanan | Prof, PRIST Deemed University, Member Internal |
| 6. | Dr.R.Maruthi | Prof, PRIST Deemed University, Member Internal |
| 7. | Dr.G.Preethi | Asso.prof, PRIST Deemed University, Member Internal |
| 8. | Mrs.M.Aarthi | Asst.prof, PRIST Deemed University, Member Internal |
| 9. | Mrs.K.Suganya | Asst.prof, PRIST Deemed University, Member Internal |
| 10. | Mr.D.S.ChozhaBharathi | Asst.prof, PRIST Deemed University, Member Internal |
| 11. | C.Balaji -B.Sc.(CS) | Alumni |
| 12. | S.Swetha-B.C.A | Student |

The Chairman of Board of Studies (BOS) in Computer Science welcomed the members and briefed about the programmes offered by the department.

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SCHOOL OF ARTS AND SCIENCE
MINUTES OF BOARD OF STUDIES MEETING OF COMPUTER SCIENCE

| AGENDA |
|---|
| **Agendum 1:** To Confirmation of the Previous Meeting Minutes |
| **Discussion:** The Minutes of the Board of Studies meeting held on 29 April 2022 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the Academic Council. |
| Resolution: The coordinator read the minutes of earlier meeting and the minutes were reviewed and passed by the members |
| **Agendum 2**: Action taken on the Previous Meeting Minutes. |
| Discussion: The details of the action taken were presented to the members |
| Resolution: The members expressed satisfaction over the action taken enclosed in Annexure |
| **Agendum 3**: To scrutinize the stakeholder feedback on UG PG Curriculum |
| Discussion: To Produce the continuity of courses from BCA, B.Sc, MCA & M.Sc Curriculum the introduction of new courses and value added courses was discussed in the curriculum. |
| Resolution: The board unanimously resolved to make necessary changes as requested by the stake holders. |
| Agendum 4: To introduced in the curriculum from 2022-2023 Academic year. |
| Discussion: The Syllabus of new courses in the curriculum for the Academic year 2022-2023 |
| Resolution: The new courses are introduced in the Academic year 2022-2023 |
| **Agendum 5**:To Discuss and finalize the Revision, introduction of new courses in syllabus of subjects in the Department of Computer Science |
| Discussion: Approval for Revision in syllabus requirements in Department of Computer Science for the Academic Year 2022-2023. |
| Resolution: After reviewing of the revised syllabus, the Board of Studies members discussed and finalized the revisions of new course introduction made in the syllabus with effect from Academic Year 2022-2023. |

| Course title | Category(Core: Theory/Practical) | Programme | Year of introduction |
|---|---|---|---|
| 22122SEC13 | Problem Solving using Python | B.C.A | 2022 |
| 22122SEC16L | Problem Solving using Python Lab | B.C.A | 2022 |
| 22122SEC33 | Java and Data structures | B.C.A | 2022 |
| 22122SEC36L | Data structures using Java Lab | B.C.A | 2022 |
| 22122DSC54D | Block Chain Technology | B.C.A | 2022 |
| 22122SEC61 | Introduction to Data Science | B.C.A | 2022 |
| 22122SEC64L | Data Science Lab | B.C.A | 2022 |
| | | | |
| 22120SEC13 | Visual Programming | B.Sc | 2022 |

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| | | | |
|---|---|---|---|
| 22120SEC16L | Visual Programming Lab | B.Sc. | 2022 |
| 22120SEC33 | Problem Solving using Python | B.Sc. | 2022 |
| 22120SEC35L | Problem Solving using Python Lab | B.Sc. | 2022 |
| 22120SEC43 | Java and Data structures | B.Sc. | 2022 |
| 22120SEC45L | Java and Data structures Lab | B.Sc. | 2022 |
| 22120DSC54D | Semantic Web | B.Sc. | 2022 |
| 22120SEC61 | Advanced Web Technology | B.Sc. | 2022 |
| 22222DSC17C | Augmented Reality | MCA | 2022 |
| | | | |

| | | | |
|---|---|---|---|
| 22222DSC17D | Ruby On Rails | MCA | 2022 |
| 22222DSC17E | Soft computing Techniques | MCA | 2022 |
| 22222DSC17F | Quantum information and Computation | MCA | 2022 |
| 22222DSC27D | Haskell programming | MCA | 2022 |
| 22222DSC27E | Natural Language Processing | MCA | 2022 |
| 22222DSC27F | Artificial Neural Networks | MCA | 2022 |
| 22222DSC36D | Software Forensics | MCA | 2022 |
| 22222DSC36E | Information System Management | MCA | 2022 |
| 22222DSC36F | Social Media Mining | MCA | 2022 |
| 22222DSC44A | Design and Analysis of Algorithm | MCA | 2022 |
| 22222DSC44B | Computer Ethics | MCA | 2022 |
| 22222DSC44C | Web Mining | MCA | 2022 |
| 22222DSC44D | Sensor Networks | MCA | 2022 |
| 22222DSC44E | Graphics and Computer Vision | MCA | 2022 |
| 22222DSC44F | Agile Frameworks | MCA | 2022 |
| 22220DSC16C | Internet and HTML Programming | MSC CS | 2022 |
| 22220DSC16D | Parallel Processing | MSC CS | 2022 |
| 22220DSC16E | IT Infrastructure and cloud security | MSC CS | 2022 |
| 22220DSC16F | Service Oriented Architecture and Web Services | MSC CS | 2022 |
| 22220DSC26C | Rapid Application Development Using Python | MSC CS | 2022 |
| 22220DSC26D | Client-Server Computing | MSC CS | 2022 |
| 22220DSC26E | Computer Vision | MSC CS | 2022 |
| 22220DSC26F | Graphical Programming and Virtual Instrumentation | MSC CS | 2022 |
| 22220DSC35C | Data Analysis and Business Intelligence | MSC CS | 2022 |
| 22220DSC35D | Fundamentals of PHP | MSC CS | 2022 |
| 22220DSC35E | Open Source Technologies | MSC CS | 2022 |
| 22220DSC35F | Machine Learning | MSC CS | 2022 |
| 22220DSC43C | Telecommunication Networks and optimization | MSC CS | 2022 |
| 22220DSC43D | Image Processing | MSC CS | 2022 |
| 22220DSC43E | Mobile Communication | MSC CS | 2022 |
| 22220DSC43F | Resource Management Techniques | MSC CS | 2022 |

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**Agendum 6**: To introduce in the curriculum from 2022-2023 Academic year.

Discussion: The Syllabus of Value Added courses in the curriculum for the Academic year 2022-2023 was reviewed

Resolution: The Value Added courses are introduced in the Academic year 2022-2023.

| Name of the course/programme | Course/programme Code | Year of offering |
|---|---|---|
| Certificate course on Designing [Photoshop, Premium, Illustrator] | 22CC01 | 2021 |
| Certificate course onWeb Application Development and Hosting. | 22CC02 | 2021 |
| Certificate course on Google IT Support | 22CC05 | 2021 |
| Certificate course on Introduction to Cyber Security and Cyber Attacks | 22CC06 | 2022 |
| Certificate course on Network Simulator | 22CC07 | 2022 |
| Diploma course on Graphical Programming[Flash, Swish] | 22DIP03 | 2022 |

**Agendum 7**:Organizing industrial visit for students.

Discussion: External experts suggested that Final year BCA, B.Sc, MCA & M.Sc have to be allowed to go for industrial visit so that the students can get industrial experts.

Resolution: After the discussion, the members insisted that final year B.Sc, BCA, M.sc and MCA students have to be taken to industries so as to get industrial exposure and for getting internships.

**Agendum 8**: Allotment of the panel of examiners for BCA, B.Sc, MCA & M.Sc Programme

Discussion: Members suggested the names of the experts who would serve as panel of examiners for different programme.

Resolution: The BOS approved a tentative list of subject experts for paper setting, moderation and examiners. If required few may be included with the permission of the concerned authorities.

The Chairman of Board of Studies thanked all the members for their kind cooperation and the meeting came to an end.

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# SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF COMPUTER SCIENCE
## BCA (BACHELOR OF COMPUTER APPLICATION)
## REGULATION 2022 – 2023
## COURSE STRUCTURE
## SEMESTER – I

| Course Code | Course Title - BCA | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC11/ 22111AEC11/ 22132AEC11/ 22135AEC11 | Tami – I/Advanced English-I/Hindi-I/ French - I | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22122SEC13 | PROBLEM SOLVING USING PYTHON | 5 | 1 | 0 | 4 |
| 22112AEC14B | Classical algebra | 4 | 1 | 0 | 3 |
| 22112AEC15B | Numerical and statistical Methods | 4 | 1 | 0 | 4 |
| | **PRACTICAL** | | | | |
| 22122SEC16L | PROBLEM SOLVING USING PYTHON LAB | 0 | 0 | 3 | 2 |
| | **Total** | 21 | 3 | 3 | 17 |
| | **AUDIT COURSE** | | | | |
| **221LSCIC** | Indian Constitution | - | - | - | **2** |
| **221LSCUV** | Universal Human Values | - | - | - | **2** |

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SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC21/ 22111AEC21/ 22132AEC21/ 22135AEC21 | Tamil – II/ Advanced English-II/Hindi-II/ French – II | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22122SEC23 | Data Structure and Algorithms | 5 | 1 | 0 | 4 |
| | | | | | |
| 22112AEC24B | Discrete Mathematics | 4 | 1 | 0 | 4 |
| 22112AEC25B | Operations Research | 4 | 1 | 0 | 3 |
| | | | | | |
| | **PRACTICAL** | | | | |
| 22122SEC26L | Data Structure and Algorithms Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| | | | | | |
| 22122RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | 21 | 3 | 3 | 18 |
| | **AUDIT COURSES** | | | | |
| **221LSCCS** | Communication Skills | - | - | - | 2 |
| **221SSCBE** | Basic Behavioral Etiquette | - | - | - | 2 |

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SEMESTER – III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC31/ 22132AEC31/ 22111AEC31/ 22135AEC31 | Tamil – III/Hindi-III/Advanced English-III/ French – III | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| | | | | | |
| 22122SEC33 | Java and Data Structures | 4 | 1 | 0 | 4 |
| 22161SEC34 | Financial Accounting | 4 | 1 | 0 | 4 |
| 22113AEC35A | Allied Physics –I | 3 | 1 | 0 | 3 |
| | PRACTICAL | | | | |
| 22122SEC36L | Data Structure using Java Lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | RESEARCH SKILL BASED COURSE | | | | |
| 22122RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 21 | 3 | 3 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |

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SEMESTER – IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 22110AEC41/ 22111AEC41/ 22132AEC41/ 19135AEC41 | Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22122SEC43 | Visual Programming | 4 | 1 | 0 | 4 |
| 22113AEC44A | Allied Physics –II | 5 | 1 | 0 | 5 |
| **221EVNSTU** | Environmental Studies | 2 | 0 | 0 | 2 |
| | PRACTICAL | | | | |
| 22122SEC45L | Visual Programming Lab | 0 | 0 | 3 | 2 |
| 22113AEC46AL | Allied Physics Lab –I | 0 | 0 | 3 | 2 |
| | Total | 19 | 2 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 221LSCLS | Leadership and Management Skills | - | - | - | 2 |
| 221SSCAQ | General Aptitude and Quantitative Ability | | | | 2 |

REGISTRAR
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SEMESTER – V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| | | | | | |
| 22122SEC51 | Relational Database Management Systems | 4 | 1 | 0 | 4 |
| 22122SEC52 | .NET Programming | 4 | 1 | 0 | 3 |
| 22122SEC53 | Designing and supporting Computer Networks | 4 | 1 | 0 | 4 |
| 22122DSC54 | Discipline Specific Elective -I | 4 | 1 | 0 | 3 |
| | **PRACTICAL** | | | | |
| 22122SEC55L | Oracle Lab | 0 | 0 | 3 | 2 |
| 22122SEC56L | .NET Programming Lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22122BRC57 | Participation in Bounded Research | - | - | - | 1 |
| | Total | 16 | 4 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSPSL | Professional Skills | - | - | - | 2 |

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SEMESTER – VI

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22122SEC61 | Introduction to Data Science | 4 | 1 | 0 | 4 |
| 22122SEC62 | Operating System | 4 | 1 | 0 | 5 |
| 22122DSC63_ | Discipline Specific Elective –II | 4 | 1 | 0 | 3 |
| 221_ _OEC(2 Digit Course Name ) | Open Elective | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 22122SEC64L | Data Science Lab | 0 | 0 | 3 | 2 |
| 22122SEC65L | Operating System Lab | 0 | 0 | 3 | 2 |
| 22122PRW66 | Project Work | - | - | - | 4 |
| 22122PROEE | Program Exit Examination | - | - | - | 1 |
| | Total | 16 | 3 | 6 | 23 |
| | AUDIT COURSE | | | | |
| 221SSCIM | Interview Skills Training and Mock Test | - | - | - | 2 |
| 221LSCCE | Community Engagement | - | - | - | 2 |
| | **Total Credits –Programme** | | | | **115** |
| | **Total Credits - Audit Courses** | | | | **22** |

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**Discipline Specific Electives**

| Semester | Discipline Specific Elective Courses |
|---|---|
| V | a) 22122DSC54A - Computer Organization and Architecture<br>b) 22122DSC54B - E-learning<br>c)22121DSC54C- Enterprise Resource Planning<br>d) 22122DSC54D - Block Chain Technology |
| VI | a) 22122DSC63A - Software Project Management<br>b) 22122DSC63B - Object Oriented Analysis and Design<br>c) 22122DSC63C -Ethical Hacking<br>d) 22122DSC63D - WAP and WML |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| VI | a) 221TNOEC-Tamil IlakkiyaVaralaru<br>b) 221ENOEC-Journalism<br>c) 221MAOEC-Development of Mathematical Skills<br>d) 221PHOEC-Instrumentation<br>e) 221CEOEC-Food and Adulteration<br>f) 221MBOEC-Wildlife Conservation<br>g) 221BTOEC-Mushroom Technology<br>h) 221CSOEC-E-Learning<br>i) 221CMOEC-Banking Service |

**Skill based Electives**

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THANJAVUR - 613 403, (Distt.)

**Credit Distribution**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 11 | 6 | - | - | - | - | 17 |
| II | 11 | 6 | - | - | 1 | - | 18 |
| III | 7 | 10 | - | - | 2 | - | 19 |
| IV | 11 | 6 | - | - | - | 2 | 19 |
| V | | 15 | 3 | - | 1 | - | 19 |
| VI | | 13 | 3 | 2 | 4 | 1 | 23 |
| TOTAL | 44 | 52 | 6 | 2 | 8 | 3 | 115 |

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## SCHOOL OF ARTS & SCIENCE

## DEPARTMENT OF COMPUTER SCIENCE

### M.C.A.,
### REGULATION 2022-2023 - COURSE STRUCTURE

(For the candidates admitted in the academic year 2022-2023 onwards)

**Semester I**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222SEC11 | Advanced Data Science | 4 | 0 | 0 | 4 |
| 22222SEC12 | Advance Database Management System | 4 | 0 | 0 | 4 |
| 22222SEC13 | Routing and Switching in LAN | 4 | 0 | 0 | 4 |
| 22212SEC14 | Discrete Mathematics | 4 | 0 | 0 | 4 |
| 22222SEC15L | Advanced Data Science Lab | 0 | 0 | 3 | 2 |
| 22222SEC16L | Advance Database Management System Lab | 0 | 0 | 3 | 2 |
| 22222DSC17_ | Discipline Specific Elective – I | 4 | 0 | 0 | 4 |
| 22222RLC18 | Research Led Seminar | - | - | - | 1 |
| | Total | 22 | 0 | 6 | 25 |

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## Semester II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222SEC21 | Python Programming | 4 | 0 | 0 | 4 |
| 22222SEC22 | Cryptography Network security | 4 | 1 | 0 | 3 |
| 22222SEC23 | Open Source programming | 4 | 0 | 0 | 3 |
| 22222SEC24 | Web Service | 4 | 0 | 0 | 3 |
| 22222SEC25L | Python Programming Lab | 0 | 0 | 3 | 2 |
| 22222SEC26L | Open Source programming Lab | 0 | 0 | 3 | 2 |
| 22222DSC27_ | Discipline Specific Elective – II | 5 | 0 | 0 | 4 |
| 22222RMC28 | Research Methodology | 3 | 0 | 0 | 2 |
| 22222BRC29 | Participation in Bounded Research | 0 | 0 | 0 | 2 |
| | **Total** | **24** | **1** | **6** | **25** |

## Semester III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222SEC31 | Data mining and warehousing | 6 | 1 | 0 | 5 |
| 22222SEC32 | Grid and Cloud Computing. | 6 | 1 | 0 | 4 |
| 22222SEC33 | .NET Programming | 5 | 0 | 0 | 4 |
| 22222SEC34 | Object Oriented System Design | 5 | 0 | 0 | 4 |
| 22222SEC35L | .NET Programming Lab. | 0 | 0 | 3 | 2 |
| 22222DSC36_ | Discipline Specific Elective – III | 5 | 0 | 0 | 4 |
| 22222SRC37 | Societal project (Mini Project) | 0 | 0 | 0 | 2 |
| | **Total** | **27** | **2** | **3** | **25** |

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Semester IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222SEC41 | Human Computer Interaction. | 6 | 0 | 0 | 4 |
| 22222SEC42 | Software Project Management | 6 | 0 | 0 | 4 |
| 22222SEC43 | Big Data | 6 | 0 | 0 | 5 |
| 22222PRW44 | Project work | 0 | 0 | 15 | 10 |
| 22222PEE | Program Exit Examination | - | - | - | 2 |
| | Total | 18 | 0 | 15 | 25 |
| | Total Credits of the Programme | | | | 100 |



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**DISCIPLINE SPECIFIC ELECTIVE COURSES:**

| Semester | Discipline Specific Elective Courses |
|---|---|
| I | a) 22222DSC17A - Mobile Computing<br>b)22222DSC17B - Knowledge based decision support system<br>c) 22222DSC17C - Augmented Reality<br>d) 22222DSC17D - Ruby On Rails<br>e) 22222DSC17E - Soft computing Techniques\<br>f) 22222DSC17F - Quantum information and Computation |
| II | a) 22222DSC27D - Haskell programming<br>b) 22222DSC27E - Natural Language Processinge)<br>22222DSC27F - Artificial Neural Networks |
| III | a) 22222DSC36D - Software.Forensics<br>b) 22222DSC36E - Information System Managemente)<br>22222DSC36F - Social Media Mining<br>d)22222DSC36G - Business Intelligence and Analytics |
| IV | a) 22222DSC44A - Design and Analysis of Algorithmb)<br>22222DSC44B - Computer Ethics<br>c) 22222DSC44C - Web Mining<br>d) 22222DSC44D - Sensor Networks<br>e) 22222DSC44E - Graphics and Computer Visionf)<br>22222DSC44F - Agile Frameworks |

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Credit Distribution:

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 4 | 16 | 4 | | 1 | | 25 |
| II | | 17 | 4 | | 4 | | 25 |
| III | | 19 | 4 | | 2 | | 25 |
| IV | | 13 | | | 10 | 2 | 25 |
| TOTAL | 4 | 65 | 12 | | 17 | 2 | 100 |

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## SCHOOL OF ARTS AND SCIENCE

### DEPARTMENT OF COMPUTER SCIENCE
### B.Sc. COMPUTER SCIENCE
### REGULATION 2022 – 2023
### COURSE STRUCTURE SEMESTER – I

| Course Code | Course Title - B.Sc(CS) | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 22110AEC11/ 22111AEC11/ 22132AEC11/ 22135AEC11 | Tami – I/Advanced English-I/Hindi-I/ French – I | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22120SEC13 | Visual Programming | 5 | 1 | 0 | 4 |
| 22112AEC14B | Classical algebra | 4 | 1 | 0 | 3 |
| 22112AEC15B | Numerical and statistical Methods | 4 | 1 | 0 | 4 |
| | PRACTICAL | | | | |
| 22120SEC16L | Visual Programming Lab | 0 | 0 | 3 | 2 |
| | Total | 21 | 3 | 3 | 17 |
| | AUDIT COURSE | | | | |
| 221LSCIC | Indian Constitution | - | - | - | 2 |
| 221LSCUV | Universal Human Values | - | - | - | 2 |

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## SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC21/ 22111AEC21/ 22132AEC21/ 22135AEC21 | Tamil – II/ Advanced English-II/Hindi-II/ French – II | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22120SEC23 | Internet and Java Programming | 5 | 1 | 0 | 4 |
| | | | | | |
| 22112AEC24B | Discrete Mathematics | 4 | 1 | 0 | 4 |
| 22112AEC25B | Operations Research | 4 | 1 | 0 | 3 |
| | | | | | |
| | **PRACTICAL** | | | | |
| 22120SEC26L | Internet and Java Programming Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| | | | | | |
| 22122RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | 21 | 3 | 3 | 18 |
| | **AUDIT COURSES** | | | | |
| 201LSCCS | Communication Skills | - | - | - | 2 |
| 201SSCBE | Basic Behavioral Etiquette | - | - | - | 2 |

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SEMESTER – III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| THEORY | | | | | |
| 22110AEC31/ 22132AEC31/ 22111AEC31/ 22135AEC31 | Tamil – III/Hindi-III/Advanced English-III/ French – III | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22120SEC33 | Problem Solving using Python | 4 | 1 | 0 | 4 |
| | | | | | |
| 22113AEC34A | Applied Physics –I | 4 | 1 | 0 | 5 |
| PRACTICAL | | | | | |
| 22120SEC35L | Problem Solving using Python Lab | 0 | 0 | 3 | 2 |
| 22113AEC36AL | Applied physics Lab – I | 0 | 0 | 3 | 2 |
| | | | | | |
| RESEARCH SKILL BASED COURSE | | | | | |
| 22120RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 18 | 2 | 6 | 19 |
| AUDIT COURSE | | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |

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## SEMESTER – IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| THEORY | | | | | |
| 22110AEC41/ 22111AEC41/ 22132AEC41/ 19135AEC41 | Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22120SEC43 | Java and Data structures | 4 | 1 | 0 | 4 |
| 22113AEC44A | Applied Physics –II | 5 | 1 | 0 | 5 |
| 221ENSTU45 | Environmental Studies | 2 | 0 | 0 | 2 |
| PRACTICAL | | | | | |
| 221205EC45L | Java and Data structures Lab | 0 | 0 | 3 | 2 |
| 22113AEC47AL | Applied Physics Lab –II | 0 | 0 | 3 | 2 |
| | Total | 19 | 2 | 6 | 19 |
| AUDIT COURSE | | | | | |
| 221LSCL8 | Leadership and Management Skills | - | - | - | 2 |
| 221SSCAQ | General Aptitude and Quantitative Ability | | | | 2 |

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## SEMESTER – V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| | | | | | |
| 22120SEC51 | Data Communication and Networking | 4 | 1 | 0 | 4 |
| 22120SEC52 | Operating System | 4 | 1 | 0 | 3 |
| 22120SEC53 | Microprocessor and its Applications | 4 | 1 | 0 | 4 |
| 22120DSC54 | Discipline Specific Elective -I | 4 | 1 | 0 | 3 |
| | PRACTICAL | | | | |
| 22120SEC55L | Microprocessor Lab | 0 | 0 | 3 | 2 |
| 22120SEC56L | Operating System Lab | 0 | 0 | 3 | 2 |
| | | | | | |
| | RESEARCH SKILL BASED COURSE | | | | |
| 22120RSC57 | Participation in Bounded Research | - | - | - | 1 |
| | Total | 16 | 4 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSPSL | Professional Skills | - | - | - | 2 |

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SEMESTER – VI

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22120SEC61 | . Advanced Web Technology | 4 | 1 | 0 | 4 |
| 22120SEC62 | Relational Data Base Management System | 4 | 1 | 0 | 5 |
| 22120DSC63_ | Discipline Specific Elective –II | 4 | 1 | 0 | 3 |
| 221_ _OEC(2 Digit Course Name ) | Open Elective | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 22120SEC64L | .NET Programming Lab | 0 | 0 | 3 | 2 |
| 22120SEC65L | Oracle Lab | 0 | 0 | 3 | 2 |
| 22120PRW66 | Project Work | - | - | - | 4 |
| 22120PROEE | Program Exit Examination | - | - | - | 1 |
| | **Total** | 16 | 3 | 6 | 23 |
| | **AUDIT COURSE** | | | | |
| 221SSCIM | Interview Skills Training and Mock Test | - | - | - | 2 |
| 221LSCCE | Community Engagement | - | - | - | 2 |
| | | | | | |
| **Total Credits –Programme** | | | | | **115** |
| **Total Credits - Audit Courses** | | | | | **19** |

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**Discipline Specific Electives**

| Semester | Discipline Specific Elective Courses |
|---|---|
| V | a)22120DSC56A- Cloud Computing<br>b)22120DSC56B- Middleware Technology<br>c)22120DSC56C- Enterprise Resource Planning |
| VI | a) 22120DSC65A- Data Mining<br>b) 22120DSC65B-Artificial Intelligence and Expert System<br>c)22120DSC65C-Ethical Hacking |
| V | 22120DSC54D – Semantic Web |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| VI | a) 221TAOEC-Tamil IlakkiyaVaralaru<br>b) 221MAOEC-Development of Mathematical Skills<br>c) 221PHOEC-Instrumentation<br>d) 221CHOEC-Food and Adulteration<br>e) 221MBOEC-Wildlife Conservation<br>f) 221CSOEC-Web Technology<br>g) 221CMOEC-Banking Service |

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**Credit Distribution:**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 4 | 16 | 4 | | 1 | | 25 |
| II | | 17 | 4 | | 4 | | 25 |
| III | | 19 | 4 | | 2 | | 25 |
| IV | | 13 | | | 10 | 2 | 25 |
| TOTAL | 4 | 65 | 12 | | 17 | 2 | 100 |

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## SCHOOL OF ARTS AND SCIENCE

### DEPARTMENT OF COMPUTER SCIENCE
### M.Sc. COMPUTER SCIENCE
### REGULATION 2022 – 2023
### COURSE STRUCTURE SEMESTER – I

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **Semester I** | | | | |
| 22220SEC11 | J2EE Programming | 6 | 0 | 0 | 4 |
| 2220SEC12 | RDBMS | 6 | 0 | 0 | 4 |
| 22212SEC13 | Discrete Mathematics | 6 | 0 | 0 | 4 |
| 22220SEC14L | J2EE programming Lab | 0 | 0 | 3 | 2 |
| 22220SEC15L | RDBMS Lab | 0 | 0 | 3 | 2 |
| 22220DSC16 | Discipline Specific Elective - I | 6 | 0 | 0 | 4 |
| 22220RLC17 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **24** | **0** | **6** | **21** |

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Semester II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22220SEC21 | Python Programming | 5 | 0 | 0 | 4 |
| 22220SEC22 | Cryptography & Network Security | 5 | 0 | 0 | 4 |
| 22220SEC23 | Software Engineering | 5 | 0 | 0 | 4 |
| 22220SEC24L | Python Programming Lab | 0 | 0 | 3 | 2 |
| 22220SEC25L | UNIX Lab | 0 | 0 | 3 | 2 |
| 22220DSC26_ | Discipline Specific Elective – II | 5 | 0 | 0 | 4 |
| 22220RMC27 | Research Methodology | 4 | 0 | 0 | 2 |
| 22220BRC28 | Participation in Bounded Research | - | - | - | 2 |
| | Total | 24 | 0 | 6 | 24 |

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Semester III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22220SEC31 | Open Source programming | 6 | 0 | 0 | 6 |
| 22220SEC32 | .Net Programming | 6 | 0 | 0 | 5 |
| 22220SEC33L | Open Source programming Lab | 0 | 0 | 3 | 2 |
| 22220SEC34L | .Net Programming Lab | 0 | 0 | 3 | 2 |
| 22220DSC35_ | Discipline Specific Elective – III | 5 | 0 | 0 | 4 |
| 222___OEC | Open Elective Course | 4 | 0 | 0 | 3 |
| 22220SRC37 | Societal project (Mini Project) | 0 | 0 | 0 | 2 |
| | **Total** | **21** | **0** | **6** | **24** |

Semester IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22220SEC41 | Software Testing | 6 | 0 | 0 | 6 |
| 22220SEC42 | Human Computer Interaction | 6 | 0 | 0 | 5 |
| 22220DSC43_ | Discipline Specific Elective - IV | 4 | 0 | 0 | 4 |
| 22220PRW44 | Project work | 0 | 0 | 0 | 10 |
| 22220PEE | Programme Exit Examination | - | - | - | 2 |
| | **Total** | 14 | 0 | 0 | **27** |
| | Total credits for the program | | | | **96** |

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## Discipline Specific Electives

| Semester | Discipline Specific Elective Courses |
|---|---|
| I | a) 22220DSC16A - WAP and XML<br>b)22220DSC16B - Advanced Computer Architecture<br>c) 22220DSC16C - Internet and HTML Programming<br>d) 22220DSC16D – Parallel Processing<br>e) 22220DSC16E – IT Infrastructure and clous security<br>f) 22220DSC16F – Service Oriented Architecture and Web Servixe |
| II | a) 22220DSC26A - Artificial Intelligence<br>b) 22220DSC26B - Distributed Operating System<br>c) 22220DSC26C - Rapid Application Development Using Python<br>d) 22220DSC26D – Client Server Computing<br>e) 22220DSC26E –Computer Vision<br>f) 22220DSC26F – Graphical programming and visual |
| III | a)20220DSC35A - Real time Operating Systems<br>b)22220DSC35B - Wireless Communication Network<br>c) 22220DSC35C – Data Analysis and Business Inteligence<br>d) 22220DSC35D - Fundamentals of PHP<br>e) 22220DSC35E – Open Source Technologies<br>f) 22220DSC35F - Machine Learning<br>g) 22220DSC35G – Cyber Security |

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| | |
|---|---|
| IV | a) 22220DSC43A - Multimedia and its application<br>b) 22220DSC43B - Middleware Technology<br>c) 22220DSC43C - Telecommunication and Networks and Optimization<br>d) 22220DSC43D – Image Processing<br>e) 22220DSC43E - Mobile Communication<br>f) 22220DSC43F - Resource Management Techniques |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| III | a) 222ENOEC – Writing for the Media<br>b) 222MAOEC-Applicable Mathematics Techniques<br>c) 222PHOEC-Bio-medical Instrumentation<br>d) 222CHOEC-Green Chemistry<br>e) 222BCOEC-Herbal Medicines<br>f) 222CMOEC- Financial Service |

CREDIT DISTRIBUTION

| SEMESTER | AEC | SEC | DSC | OEC | RESEARCH | OTHERS | TOTAL |
|---|---|---|---|---|---|---|---|
| I | 4 | 12 | 4 | | 1 | | 21 |
| II | | 16 | 4 | | 4 | | 24 |
| III | | 15 | 4 | 3 | 2 | | 24 |
| IV | | 11 | 4 | | 10 | 2 | 27 |
| **TOTAL** | **4** | **59** | **12** | **2** | **15** | **2** | **96** |

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## SIGNATURE OF THE MEMBERS PRESENT

| S.No. | NAME OF THE MEMBERS | SIGNATURE |
|---|---|---|
| 1. | Dr.K.T.Senthil Kumar | |
| 2. | Dr.K.Mohan Kumar | |
| 3. | Mr.S.Karthikeyan | |
| 4. | Dr.K.Saravanan | |
| 5. | Dr.R.Maruthi | |
| 6. | Dr.G.Preethi | |
| 7. | Mrs.M.Aarthi | |
| 8. | Mrs.R.Suganya | |
| 9. | Mr.D.S.ChozhaBharathi | |
| 10. | Mr.K.Vijayabaskar | |

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SCHOOL OF ARTS & SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

NEW COURSES
2022-23

BCA (BACHELOR OF COMPUTER APPLICATION)

REGULATION 2022 – 2023

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC13 | PROBLEM SOLVING USING PYTHON | 0 | 0 | 3 | 4 |

UNIT – I

Introduction: The essence of computational problem solving – Limits of computational problem Solving-Computer algorithms-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types.

UNIT - II

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python-Multi-Way Selection – Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flags and Indefinite Loops. Lists: List Structures - Lists in Python - Iterating overlists in Python.

UNIT - III

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python –

UNIT - V

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules.

UNIT - V

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism.

TEXT BOOKS

a) Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.

REFERENCE BOOKS:

1. Mark Lutz, "*Learning Python Powerful Object Oriented Programming*", O'reilly Media 2018,5th Edition.

2. Timothy A. Budd, "*Exploring Python*", Tata McGraw Hill Education Private Limited 2011, 1st Edition.

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3. Allen Downey, Jeffrey Elkner, Chris Meyers, "*How to think like a computer scientist: learning withPython*", 2012.

4. Sheetal Taneja & Naveen kumar, "*Python Programming a Modular approach – A Modularapproach with Graphics, Database, Mobile and Web applications*", Pearson, 2017.

5. Ch Satyanarayana M Radhika Mani, B N Jagadesh, "*Python programming*", Universities Press2018.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC16L | PROBLEM SOLVING USING PYTHON LAB | 0 | 0 | 3 | 3 |

**LIST OF EXERCISES:**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:

Grade A: Percentage >=80 Grade B: Percentage >=70 and <80

Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60

Grade E: Percentage <40

3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

4. Program to display the first n terms of Fibonacci series.

5. Program to find factorial of the given number using recursive function.

6. Write a Python program to count the number of even and odd numbers from array of N numbers.

7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.

8. Python program to reverse a given string and check whether the give string is palindrome or not.

9. Write a program to find sum of all items in a dictionary.

10. Read a file content and copy only the contents at odd lines into a new file.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC33 | JAVA AND DATASTRUCTURES | 4 | 1 | 0 | 4 |

**UNIT I**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

**UNIT II**

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps. Insertion into a Max Heap, Deletion from a Max Heap, java.util package-Array List, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

**UNIT III**

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-Hash Map, Hash Set, Hash table. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

**UNIT IV**

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-dfs and bfs, Java code for graph traversals. Applications of Graphs- Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

**UNIT V**

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- Tree Set, Tree Map Classes, Tries(examples only),Comparison of Search trees, Text compression-Huffinan coding and decoding, Pattern matching-KMP algorithm.

**TEXT BOOKS:**


1. S. Sahni, "Data structures, Algorithms and Applications in Java", Universities Press. [ISBN:0-07-109217-x]
2. 2. Adam Drozdek, "Data structures and Algorithms in Java", 3rd edition, Cengage Learning. [ISBN:978-9814239233]



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**REFERENCE BOOKS:**

1. R.Lafore "Data structures and Algorithms in Java", Pearson education. ISBN: 9788 131718124.

2. J.P.Tremblay and G.A.Cheston "Data structures and Software Development in an ObjectOriented Domain", Java edition, Pearson Education.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC36L | JAVA AND DATASTRUCTURES LAB | 0 | 0 | 3 | 2 |

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods: a) Linear search b) Binary search

2. Write Java programs to implement the following using arrays and linked lists a) List ADT

3. Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT

4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).

5. Write a Java program to implement circular queue ADT using an array.

6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.

7. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT

8. Write Java programs to implement the deque (double ended queue) ADT using a) Array b) Singly linked list c) Doubly linked list.

9. Write a Java program to implement priority queue ADT.

10. Write a Java program to perform the following operations: a) Construct a binary search tree of elements. b) Search for a key element in the above binary search tree.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122DSC63D | WAP AND WML | 0 | 0 | 3 | 4 |

**Unit I**

Overview of WAP: WAP and the wireless world – WAP application architecture – WAP internal structure – WAP versus the Web – WAP 1.2 – WTA and push features. Setting up WAP: Available software products – WAP resources – The Development Toolkits.

**Unit II**

WAP gateways: Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway Basic WML: Extensible markup language – WML structure – A basic WML card – Text formatting – navigation – Advanced display features.

**Unit III**

Interacting with the user: Making a selection – Events – Variables – Input and parameter passing. WML Script: Need for WML script – Lexical Structure – Variables and literals – Operators – Automatic data type conversion – Control Constructs Functions – Using the standard libraries – programs – Dealing with Errors.

**Unit IV**

XML: Introduction XML: An Eagle's Eye view of XML – XML Definition – List of an XML Document – Related Technologies – An introduction to XML Applications – XML Applications – XML for XML – First XML Documents Structuring Data: Examining the Data XMLizing the data – The advantages of the XML format – Preparing a style sheet for Document Display.

**Unit V**

Attributes, Empty Tags and XSL: Attributes – Attributes Versus Elements – Empty Tags – XSL – Well formed XML documents – Foreign Languages and Non Roman Text – Non Roman Scripts on the Web Scripts, Character sets, Fonts and Glyphs – Legacy character sets – The Unicode Character set – Procedure to Write XML Unicode.

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Text Books:

1) For Unit I, II, III
   Charles Arehart and Others. "Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML" Shroff Publishers and Distributers Pvt. Ltd 2000.

2) For Unit IV & V
   Eliotte Rusty Harlod "XML TM Bible", Books India (P) Ltd, 2000

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC61 | INTRODUCTION TO DATA SCIENCE | 0 | 0 | 3 | 4 |

Unit – I:

Introduction Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II:

Data Collection and Data Pre-Processing Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III:

Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV:

Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making

Unit – V:

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016.

2. Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015.

3.David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013

4. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics", IGI Global.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22122SEC64L | DATA SCIENCE LAB | 0 | 0 | 3 | 3 |

1. Editing and executing Programs involving Flow Controls.
2. Editing and executing Programs involving Functions.
3. Program in String Manipulations
4. Creating and manipulating a Tuple
5. Creating and manipulating a List
6. Creating and manipulating a Dictionary
7. Object Creation and Usage
8. Program involving Inheritance
9. Program involving Overloading
10. Reading and Writing with Text Files and Binary Files
11. Combining and Merging Data Sets
12. Program involving Regular Expressions
13. Data Aggregation and GroupWise Operations

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22121DSC54D | BLOCK CHAIN TECHNOLOGY | 0 | 0 | 3 | 4 |

**UNIT I**

Discover Block chain Technology: Blockchain, Growth of blockchain technology, Distributed systems, History of blockchain and Bitcoin, Types of blockchain.

**UNIT II**

Blockchain: Architecture, Versions, Variants, Use cases, Life use cases of blockchain, Blockchain vs shared Database, Introduction to cryptocurrencies, Types, Applications. Bitcoins: Introducing Bitcoin, Bitcoin digital keys and addresses, Transactions, Blockchain mining. Alternative Coins. Limitations of Bitcoin.

**UNIT III**

Concept of Double Spending, Hashing, Proof of work. Bitcoin Network and payments, Bitcoin network, Wallets, Bitcoin payments, Innovation in Bitcoin, Bitcoin Clients and APIs.

**UNIT IV**

Introduction to Block chain Platforms: Ethereum, Hyperledger, IOTA, EOS, Multichain, Bigchain, etc. Advantages and Disadvantages. EthereumvsBitcoin, Design a new block chain, Potential for disruption, Design a distributed application, Block chain applications.

**UNIT V**

Decentralization: Methods of decentralization, Routes of decentralization, Block chain and full ecosystem decentralization, Smart contracts, Decentralized organizations and platforms for decentralization.

**Textbook/ Textbooks:**

Mastering Block chain - Distributed ledgers, decentralization and smart contracts explained, Author- Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1- 78712-544-5, 2017

**Reference Books**

Blockchain Basics: A Non-Technical Introduction in 25 Steps, Author- Daniel Drescher, Apress, First Edition, 2017

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC33 | Visual Programming | 4 | 1 | 0 | 4 |

**AIM:**

To equip the students with principles of various visual programming environment

**OBJECTIVE:**

- To learn the basic principles of visual programming
- To study the necessary skills to create software solutions using visual programming
- Understood the Open Data Base Connectivity using Visual programming.
- To inculcate knowledge on Programming and Project Development using Visual Basic.

**UNIT I**

Visual Basic – Integrated Development Environment (IDE) features – VB editor – customizing the IDE – anatomy of a form working with form properties – setting form's properties – introducing form events and form methods.

**UNIT II**

Variables in Visual Basic : Declaring variables – Data types – Null values, Error value – emptyvalue – the scope of a variable – Module level variable – Constants – Creating your own constants – Scope of a constant – Converting data types – arrays – Declaring arrays – Fixed size arrays – Dynamicarrays – Preserve keywords – ReDim. Writing code in Visual Basic – The anatomy of a procedure – Subroutine and Functions – Language constructs – For…Next, The While loop, Select case…End select, Exit statement, with structure.

**UNIT III**

Selecting and Using controls – Introduction to standard controls: command buttons – Text boxes – labels – frames – option buttons – Check boxes – Scroll Bars – Timer – working with CommonDialog Control.

**UNIT IV**

The Image list control – the List view control – slider control – status bar control – Tool bar control – The Tree view control – Menu editor. –File System Controls (Drive, Dirlist, File List boxes).

**UNIT V**

OLE properties – OLE automation – building COM/OLE DLL servers – Data control – designtime(for access – style databases) –programming with the data control– Database access – set using SQL –transaction control – testing the control – Open Database Connectivity.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC35L | Visual Programming Lab | 0 | 0 | 3 | 2 |

1. Simple exercises using standard controls.

2. Write a program to design a calendar of any year.

3. Write a program to expand and shrinking an object – while program is running.

4. Write a code to design and implement a scientific calculator.

5. Write a program to create animation by using move method and timer Object.

6. Write a program for preparing students mark list.

7. Write a program to populate the label entities using data bound control.

8. Write a program to expand and shrink Objects using timer control and move method

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC13 | PROBLEM SOLVING USING PYTHON | 0 | 0 | 3 | 4 |

**OBJECTIVES:**

- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries.

**OUTCOMES:**

- To understand the principles of Python and acquire skills in programming in python
- To develop the emerging applications of relevant field using Python
- Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
- Able to develop simple turtle graphics programs in Python

**UNIT – I**

Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types.

**UNIT - II**

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection – Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flags and Indefinite Loops. Lists: List Structures - Lists in Python - Iterating over lists in Python.

**UNIT - III**

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python –

**UNIT - V**

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules.

**UNIT - V**

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism.

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TEXT BOOKS

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2215.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 21120SEC16L | PROBLEM SOLVING USING PYTHON LAB | 0 | 0 | 3 | 4 |

- understand the numeric or real life application problems and solve them.
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features available in Python to solve the situational problems.

**LIST OF EXERCISES:**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:

   Grade A: Percentage >=80 Grade B: Percentage >=70 and <80

   Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60

   Grade E: Percentage <40
3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number using recursive function.
6. Write a Python program to count the number of even and odd numbers from array of N numbers.
7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.
8. Python program to reverse a given string and check whether the give string is palindrome or not.
9. Write a program to find sum of all items in a dictionary.
10. Read a file content and copy only the contents at odd lines into a new file.



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC43 | JAVA AND DATASTRUCTURES | 4 | 1 | 0 | 4 |

**UNIT I**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

**UNIT II**

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack,implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

**UNIT III**

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

**UNIT IV**

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees.Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-dfs and bfs, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

**UNIT V**

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

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**TEXT BOOKS:**


1. S. Sahni, "Data structures, Algorithms and Applications in Java", Universities Press. [ISBN:0-07-109217-x]
2. 2. Adam Drozdek, "Data structures and Algorithms in Java", 3rd edition, Cengage Learning. [ISBN:978-9814239233]



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC45L | JAVA AND DATASTRUCTURES LAB | 0 | 0 | 3 | 2 |

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods: a) Linear search b) Binary search

2. Write Java programs to implement the following using arrays and linked lists a) List ADT

3. Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT

4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).

5. Write a Java program to implement circular queue ADT using an array.

6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.

7. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT

8. Write Java programs to implement the deque (double ended queue) ADT using a) Array b) Singly linked list c) Doubly linked list.

9. Write a Java program to implement priority queue ADT.

10. Write a Java program to perform the following operations: a) Construct a binary search tree of elements. b) Search for a key element in the above binary search tree.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120DSC54D | SEMANTIC WEB | 0 | 0 | 3 | 2 |

**UNIT I**

Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**UNIT II**

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

**UNIT III**

Ontology Engineering, Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**UNIT IV**

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

**UNIT V**

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

**Text Books:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008. 1. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

**Reference Books:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22120SEC61 | ADVANCED WEB TECHNOLOGY | 4 | 1 | 0 | 4 |

**Unit-1**

Introduction to Web Technology: Hypertext Markup Language and its components, HTML tags and attributes, Text formatting tags, List tags, Image tags, HTML tables, HTML Forms, Document Object Model (DOM), Cascading Style Sheets – Inline Style, Embedded Style, External Style Sheet, Imported Style Sheet, Ruleset, @ rule, Contextual Selector, Attribute Selector, CSS Properties, JavaScript - Data types, Operators, Variables, length, substring, Conditional Statements - if, Loops - for, & Functions. HTML DOM and JavaScript - Finding HTML Elements, Changing HTML elements, DOM events.

**Unit-2**

Events Handlers & Forms in Java Script: Define Events, Events in JavaScripts, EventHandlers, this keyword, Event handlers in JavaScripts, Emulating Events in java scripting, onLoad and onUnload Event Handlers, Web-Hopping with window.open(), Resetting Event Handlers.

**Unit-3**

Messaging & Timing Events in Java Script: Alert Box: syntax & its example, Confirm Box: syntax & its example, Prompt Box: syntax & its example, Line Breaks: syntax & its example, JavaScript Timing Events, setInterval() Method, window.clearInterval() method, setTimeout() Method, window.clearTimeout() method.

**Unit-4**

XML and Ajax: XML – Declaration, Root Element, Child Elements, Element Attributes, Entity References, Comments, Ajax – XML HttpRequest Object, Sending Ajax requests, Handling Ajax Responses, Adding Ajax Functionality in JavaScript, Adding Ajax Functionality to a Web Page.

**UNIT 5**

Web Application Creation: Creating a Web Application – putting it all together, The MVC Design Pattern – Basic Web Architecture, MVC Architecture, Coding Considerations, Setting up our Development Environment, Building our MVC Framework, Building a PHP Application on our MVC framework.

"Web Development with Node and Express: Leveraging the JavaScript Stack"

**Text books:**

1. Ethan Brown "Web Development with Node and Express: Leveraging the JavaScript Stack" 2nd Edition.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC17C | **Augmented Reality** | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Augmented Reality

**What is AR?** Basic definition and differences between AR and Virtual Reality (VR).**History and Evolution**: How AR has developed over time. **Applications of AR**: Common uses in gaming, education, healthcare, and more.**AR Devices**: Overview of devices such as smartphones, tablets, and AR glasses.

## Unit 2: AR Technologies and Tools

**Core Technologies**: Basics of AR technologies like computer vision, sensors, and tracking.**AR Software Development Kits (SDKs)**: Introduction to popular SDKs (e.g., ARKit,ARCore).**3D Modelling and Graphics**: Basics of creating and integrating 3D models in AR.**AR Platforms**: Overview of platforms for building and deploying AR applications.

## Unit 3: Designing AR Experiences

**User Experience (UX) Design**: Principles for creating engaging AR experiences. **Interface Design**: Designing intuitive interfaces for AR applications. **Interaction Design**: Methods for user interaction in AR (e.g., gestures, voice commands).**Content Creation**: Basics of designing and integrating content for AR.

## Unit 4: Developing AR Applications

**Basic Development Workflow**: Steps to build an AR app from scratch. **Programming Basics**: Introduction to languages and frameworks used in AR development (e.g., Unity with C#, JavaScript).**Testing and Debugging**: Techniques for testing AR applications and debugging issues. **Deployment**: How to deploy AR apps to various platforms (e.g., iOS, Android).

## Unit 5: Future Trends and Challenges

**Emerging Trends**: New developments in AR technology (e.g., advanced sensors, improved user interfaces).**Challenges**: Common issues in AR development, such as privacy concerns and technical limitations. **Ethical Considerations**: Impact of AR on privacy, security, and social behaviour. **Career Opportunities**: Exploring career paths and skills needed for a career in AR.

**Text books:**


1. Dieter Schmalstieg and Tobias Hollerer "Augmented Reality: Principles and Practice" 1st Edition (2016)



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC17D | Ruby on Rails | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Ruby on Rails

**What is Ruby on Rails?** Basic introduction and overview of the framework. **Ruby Basics**: Introduction to the Ruby programming language (syntax, variables, control structures).**Rails Architecture**: Overview of Model-View-Controller (MVC) architecture and how Rails uses it.**Setting Up Your Environment**: Installing Ruby, Rails, and necessary tools (e.g., IDEs, databases).

## Unit 2: Building Your First Rails Application

**Creating a New Rails Project**: Using the Rails command-line tools to start a new project. **Rails Conventions**: Understanding Rails conventions (e.g., directory structure, naming conventions).**Generating Resources**: Using Rails generators to create models, views, and controllers. **Running Your Application**: How to start the Rails server and view your application in the browser.

## Unit 3: Working with Databases

**Active Record Basics**: Introduction to Rails' Object-Relational Mapping (ORM) system, Active Record. **Migrations**: Creating and running database migrations to modify the database schema. **CRUD Operations**: Implementing Create, Read, Update, and Delete functionalities in your models. **Validations and Associations**: Adding validations and setting up associations between models (e.g., one-to-many, many-to-many).

## Unit 4: Creating and Managing Views

**Rails Views**: Understanding how to create and use views in Rails. **Layouts and Partials**: Using layouts for common design elements and partials to reuse code. **Forms**: Building and handling forms for user input and submissions. **View Helpers**: Utilizing Rails view helpers to simplify common tasks (e.g., form helpers, URL helpers).

## Unit 5: Advanced Features and Deployment

**Testing**: Introduction to testing in Rails using tools like RSpec or MiniTest.**Authentication**: Implementing basic user authentication and authorization (e.g., using Devise gem).**Deploying Your Application**: Basics of deploying a Rails app to a cloud service (e.g., Heroku).**Performance and Optimization**: Tips for improving the performance of your Rails application.

**Text books:** Obie Fernandez "The Rails 5 Way" 1st Edition (2017)

Obie Fernandez "Rails 4 Way" 1st Edition (2014)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC17E | **Soft Computing Techniques** | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Soft Computing

**Overview**: What is soft computing and how it differs from traditional computing? **Key Techniques**: Introduction to major techniques (Neural Networks, Fuzzy Logic, Genetic Algorithms).**Applications**: Where soft computing is used in real-world problems.

**Unit 2: Neural Networks Basics**: Introduction to neural networks and their components (neurons, layers).**Training**: How neural networks learn (e.g., back propagation).**Types**: Overview of different types (e.g., Feed forward Neural Networks, Convolutional Neural Networks).

## Unit 3: Fuzzy Logic

**Basics**: Introduction to fuzzy logic and how it differs from classical logic. **Fuzzy Sets**: Understanding membership functions and fuzzy sets. **Fuzzy Inference**: How fuzzy rules and inference systems work for decision-making.

## Unit 4: Genetic Algorithms

**Concepts**: Basic principles (selection, crossover, mutation).**Application**: Simple examples of optimization problems solved by genetic algorithms. **Implementation**: Basic steps to implement a genetic algorithm.

## Unit 5: Hybrid and Advanced Topics

**Hybrid Systems**: Combining neural networks, fuzzy logic, and genetic algorithms for complex problems. **Applications**: Real-world examples and case studies. **Future Trends**: Emerging trends and future directions in soft computing.

Text books:


1. S. N. Sivanandam, S. N. Deepa "Soft Computing: Fundamentals and Applications" 1st Edition (2006)
2. K. S. Rajasekaran, G. A. Vijayalakshmi Pai "Soft Computing and Intelligent Systems Design: Theory, Tools and Applications" 1st Edition (2003)



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC17F | Quantum information and computation | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Quantum Mechanics

**Fundamentals of Quantum Mechanics**

Qubits and quantum states Superposition and entanglement **Quantum Measurement:** Measurement postulates. Quantum state collapse

## Unit 2: Quantum Gates and Circuits

**Basic Quantum Gates**

Pauli-X, Y, Z gates, Hadamard gate, CNOT gate. **Quantum Circuits:** Building and analysing quantum circuits, Quantum circuit diagrams

## Unit 3: Quantum Algorithms

**Grover's Search Algorithm:** Problem statement and solution, Algorithm steps and efficiency**Shor's Factoring Algorithm:** Problem statement and solution, Algorithm steps and implications for cryptography

## Unit 4: Quantum Error Correction

**Types of Quantum Errors**

Bit-flip, phase-flip, and depolarizing errors. **Error Correction Techniques:** Simple error-correcting codes (e.g., 3-qubit repetition code), Introduction to more advanced methods

## Unit 5: Applications and Current Research

**Quantum Cryptography:** Quantum key distribution (e.g., BB84 protocol), Applications in secure communication **Future Directions:** Overview of emerging technologies, Current challenges and research trends in quantum computing

**Textbook:**


1. Michael A. Nielsen and Isaac L. Chuang b "Quantum Computation and Quantum Information" 10th Anniversary Edition (2010)
2. John Preskil "Quantum Computation and Quantum Information Theory" 1st Edition (2004)


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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC27D | Haskell programming | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Haskell

**Basic Concepts**: What is Haskell? Overview of functional programming. Installing and setting up Haskell. **Basic Syntax and Data Types**. Haskell syntax, comments, and basic operations. Primitive data types (e.g., int, Float, Bool, Char).

## Unit 2: Functions and Lists

**Defining Functions**: Function syntax, definitions, and simple recursion. Higher-order functions and lambda expressions. **Lists and List Operations**: Basic list operations (e.g., head, tail, map, filter). List comprehensions and pattern matching.

## Unit 3: Types and Type Classes

**Custom Data Types:** Defining and using custom types (e.g., `data`, `newtype`). Algebraic data types (ADTs) and pattern matching. **Type Classes:** Understanding and creating type classes, using common type classes (e.g., `Eq`, `Ord`, `Functor`).

## Unit 4: Monads and IO

**Understanding Monads**: Introduction to monads and their uses. Common monads (e.g., `Maybe`, `IO`).**Input/Output Operations**: Basic IO operations and handling user input. File operations and dealing with IO actions.

## Unit 5: Advanced Topics and Libraries

**Advanced Functional Concepts**: Lazy evaluation and infinite data structures. Understanding recursion schemes and higher-kinded types. **Using Libraries and Tools**: Introduction to common Haskell libraries (e.g., `text`, `containers`). Managing projects with Cabal or Stack.

Textbook:


1. Christopher Allen and Julie Moronuki "Haskell Programming from First Principles" 1st Edition (2016)
2. Miran Lipovača "Learn You a Haskell for Great Good!" 2nd Edition (2011)



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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC27E | Natural Language Processing | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to NLP

**Overview of NLP**: What is NLP? Key concepts and applications. Basic text processing (tokenization, normalization, stop words removal).

## Unit 2: Text Representation

**Vector zing Text**: Bag-of-Words (Bow) model. Term Frequency-Inverse Document Frequency (TF-IDF).Introduction to word embedding's (Word2Vec, Glove).

## Unit 3: Language Models and Text Classification

**Language Models**: Basics of language models (N-grams).Introduction to neural language models (RNNs, LSTMs).**Text Classification**: Classification algorithms (e.g., Naive Bayes, SVM).Evaluation metrics (accuracy, precision, recall).

## Unit 4: Sequence Modelling and Named Entity Recognition

**Sequence Modelling**: Recurrent Neural Networks (RNNs).Introduction to Transformers and Attention Mechanism. **Named Entity Recognition (NER)**: Concepts and techniques for identifying named entities in text.

## Unit 5: Advanced Topics and Applications

**Advanced Models**: Pre-trained models (e.g., BERT, GPT).Transfer learning and fine-tuning. **Applications**: Practical applications (chat bots, sentiment analysis).Ethical considerations and challenges.

Textbook:

1. "Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit" by Steven Bird, Ewan Klein, and Edward Loper. 2nd edition, published in 2009.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC27F | **Artificial Neural Network** | 4 | 1 | 0 | 4 |

## Unit 1: Basics of NLP and AI

**Introduction to NLP**: What is Natural Language Processing? Key applications (e.g., chat bots, translation).**Introduction to AI:** Basics of Artificial Intelligence, Relationship between AI and NLP.

## Unit 2: Text Processing and Representation

**Text Pre-processing:** Tokenization, stemming, and lemmatization, Removing stop words and normalization. **Text Representation:** Bag-of-Words (BoW) and TF-IDF, Introduction to word embedding's (Word2Vec, GloVe).

## Unit 3: Machine Learning Models for NLP

**Supervised Learning for NLP:** Basic algorithms (Naive Bayes, Logistic Regression)., Model evaluation (accuracy, precision, recall).**Introduction to Neural Networks:** Basics of Neural Networks and Deep Learning, Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks.

## Unit 4: Advanced NLP Techniques

**Transformers and Attention:** Introduction to Transformer models (e.g., BERT, GPT).Understanding the Attention Mechanism. **Sequence Models:** Applications of sequence models in NLP (e.g., machine translation).

## Unit 5: Practical Applications and Future Trends

**Applications of NLP:** Practical examples (sentiment analysis, named entity recognition).Building and deploying NLP applications (chat bots, information retrieval).**Future Trends and Challenges:** Current research trends and emerging technologies. Ethical considerations in NLP and AI.

**Textbook:**

2. **"Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville. 1st edition,** published in 2016

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC36D | Software forensics | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Software Forensics

**Overview of Software Forensics**: What is software forensics? Importance and applications. Key concepts and principles. **Legal and Ethical Considerations:** Legal frameworks and guidelines. Ethical issues and professional responsibilities.

## Unit 2: Digital Evidence Collection

**Evidence Gathering**: Methods for collecting digital evidence (e.g., logs, files).Ensuring evidence integrity (hash functions, chain of custody).**Tools and Techniques:** Introduction to common forensic tools (e.g., Encase, FTK).Techniques for data acquisition and preservation.

## Unit 3: Analysing Software Artifacts

**Static Analysis**: Examining source code and binary files without execution. Techniques for reverse engineering (e.g., disassembly, DE compilation).**Dynamic Analysis:** Analysing software behaviour during execution. Techniques for monitoring and debugging.

## Unit 4: Malware Analysis

Malware Fundamentals: Types of malware (viruses, worms, Trojans).Common techniques used by malware. **Malware Investigation:** Tools and methods for analysing and dissecting malware. Identifying and understanding malware functionality and impact

## Unit 5: Reporting and Presentation

**Documenting Findings**: Writing forensic reports (structure, content, clarity).Presenting evidence and findings effectively. **Case Studies and Practice:** Reviewing real-world case studies. Practical exercises and scenarios to apply forensic skills.

Textbook:

3. "Software Forensics: An Introduction to the Investigation and Analysis of Software" Richard W. M. Van Wyk 1st Edition (2014)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC36E | **Information system management** | 4 | 1 | 0 | 4 |

### Unit 1: Introduction to Information Systems

**Basics of Information Systems**: What are Information Systems? Components and functions. Types of information systems (e.g., ERP, CRM, MIS).**Role in Business:** How information systems support business operations and decision-making.

### Unit 2: Information Systems Planning and Development

**Systems Development Life Cycle (SDLC):** Key phases: Planning, Analysis, Design, Implementation, Maintenance. **Project Management:** Basic project management concepts (e.g., scope, time, cost management).

### Unit 3: IT Infrastructure and Networking

**IT Infrastructure**: Components: hardware, software, networks, and data centres. Basics of cloud computing and virtualization. **Networking Basics:** Network types (LAN, WAN) and protocols. Introduction to network security measures.

### Unit 4: Data Management and Security

**Data Management**: Introduction to databases and data management systems (DBMS) Basics of data governance and data quality. **Information Security:** Fundamental concepts (e.g., encryption, access controls).Key practices for protecting information systems.

### Unit 5: Strategic Management and Emerging Trends

**Strategic Alignment:** Aligning IT strategy with business goals, Managing IT investments and evaluating performance. **Emerging Trends:** Overview of new technologies (e.g., AI, big data).Impact of these technologies on business and information systems.

**Textbook:**

"Information Systems Management in Practice"
**Authors:** Gary A. Davis, & William H. Newton
**Edition:** 9th Edition (2016)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC36F | **Social Media Mining** | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Social Media Mining

**Overview of Social Media Mining:** What is social media mining? Key concepts and goals, Types of social media data (e.g., text, images, videos).**Applications and Use Cases:** Common applications (e.g., sentiment analysis, trend detection).

## Unit 2: Data Collection and Pre-processing

**Data Collection**: Methods for collecting social media data (e.g., APIs, web scraping).Tools and platforms for data collection (e.g., Twitter API, Facebook Graph API), **Data Pre-processing:** Text pre-processing (e.g., tokenization, stop word removal), Handling missing or noisy data.

## Unit 3: Text Analysis and Sentiment Analysis

**Text Analysis**: Techniques for analysing text data (e.g., topic modelling, keyword extraction), Introduction to Natural Language Processing (NLP) in the context of social media. **Sentiment Analysis:** Methods for sentiment classification (e.g., positive, negative, neutral).Tools and libraries for sentiment analysis (e.g., VADER, Text Blob).

## Unit 4: Network Analysis and Community Detection

Network Analysis: Basics of social network analysis (nodes, edges), Metrics and visualization techniques (e.g., centrality, clustering).**Community Detection:** Techniques for identifying communities or groups within social networks, Algorithms and methods (e.g., modularity, Louvain method).

## Unit 5: Applications and Ethical Considerations

**Applications of Social Media Mining:** Case studies and real-world applications (e.g., brand monitoring, crisis management).Building and deploying social media mining solutions. **Ethical and Privacy Issues:** Ethical considerations in social media mining (e.g., privacy concerns, data consent), Legal and regulatory aspects.

**Textbook:**

**"Information Systems Management: A Practical Approach"**
**Author:** Gary A. Davis
**Edition:** 8th Edition (2014)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC36G | **Business Intelligence and Analytics** | 4 | 1 | 0 | 4 |

**Unit-1: An Overview of Business Intelligence, Analytics, and Decision Support**

Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics.

**Unit-2: Decision Making**

Introduction and Definitions, Phases of the Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.

**Unit-3: Neural Networks and Sentiment Analysis**

Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process,, Sentiment Analysis, Speech Analytics.

**Unit-4 :Model-Based Decision Making**

Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making With Pairwise Comparisons.

**Unit-5: Automated Decision Systems and Expert Systems**

Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.

**Suggested Learning Resources:**

**Text Books:**

1. Ramesh Sharda, Dursun Delen, Efraim Turban, J.E.Aronson,Ting-Peng Liang, David King, "Business Intelligence and Analytics: System for Decision Support", 10th Edition, Pearson Global Edition, 2013

**Reference books:**

1. Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017by Edward Mize.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC44B | **Computer Ethics** | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Computer Ethics

**Overview of Computer Ethics**: What is computer ethics? Importance and scope, Key ethical principles and theories (e.g., utilitarianism, deontology).**Ethical Issues in Computing**: Common ethical dilemmas in technology and computing.

## Unit 2: Privacy and Data Protection

**Privacy Concerns**: Definition and importance of privacy in the digital age. Types of personal data and privacy risks. **Data Protection Laws:** Overview of key regulations (e.g., GDPR, CCPA), Best practices for protecting personal data.

## Unit 3: Intellectual Property and Digital Rights

**Intellectual Property Basics**: Copyright, patents, and trademarks in the digital context. Software licensing (e.g., open source vs. proprietary).**Digital Rights**: Issues related to digital rights management (DRM) and fair use.

## Unit 4: Cyber security and Ethical Hacking

**Cyber security Fundamentals**: Key concepts in cyber security (e.g., encryption, access control).Ethical considerations in cyber security practices. **Ethical Hacking**: Definition and role of ethical hacking (e.g., penetration testing). Legal and ethical boundaries for hackers.

## Unit 5: Social Impact and Professional Responsibilities

**Social Impact of Technology**: How technology affects society (e.g., automation, digital divide). Ethical implications of technological advancements. **Professional Responsibilities**: Codes of ethics for IT professionals (e.g., ACM Code of Ethics). Building ethical practices into technology development and use.

**Textbook:**

"Computer Ethics: A Case-Based Approach"
Author: Richard A. Spinello
Edition: 4th Edition (2017)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC44C | Web Mining | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Web Mining

**Overview of Web Mining**: What is web mining? Definition and goals, Types of web mining (web content mining, web structure mining, and web usage mining).**Applications of Web Mining**: Common applications (e.g., search engines, recommendation systems).

## Unit 2: Data Collection and Pre-processing

**Web Data Collection:** Methods for collecting web data (e.g., web scraping, crawling), Tools and techniques for data extraction (e.g., Beautiful Soup, Scrappy).**Data Pre-processing:** Cleaning and preparing web data (e.g., handling missing data, normalization), Techniques for text pre-processing (e.g., tokenization, stop word removal).

## Unit 3: Web Content Mining

**Text Mining Techniques:** Analysing and extracting useful information from web content, Methods for text classification and clustering. **Sentiment Analysis:** Techniques for understanding sentiment in web data (e.g., sentiment scoring).

## Unit 4: Web Structure Mining

**Understanding** Web Structure: Concepts of web graph analysis (e.g., nodes, edges, link analysis).Importance of web structure in mining. **Algorithms and Techniques:** PageRank and HITS algorithms for analysing web links.Community detection and clustering in web graphs.

## Unit 5: Web Usage Mining and Applications

**Web Usage Mining:** Techniques for analysing web usage data (e.g., clickstream analysis).Extracting patterns and user behaviour insights. **Applications and Ethical Considerations**: Applications of web mining (e.g., personalized recommendations, targeted advertising), Ethical issues in web mining (e.g., privacy concerns, data consent).

**Textbook:**

**"Web Mining: Applications and Techniques"**
**Authors:** Soumen Chakrabarti
**Edition:** 1st Edition (2002)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC44E | Graphics and computer vision | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Computer Graphics

**Basics of Computer Graphics:** What is computer graphics? Key concepts and applications, Graphics pipelines and rendering processes.**2D Graphics:** Drawing shapes, lines, and text, Basic transformations (scaling, rotation, translation).

## Unit 2: 3D Graphics and Modelling

**3D Graphics Fundamentals**: Introduction to 3D graphics (vertices, edges, faces).Camera models and perspectives.**3D Modelling**: Creating and manipulating 3D models. Basic techniques (e.g., extrusion, subdivision).

## Unit 3: Computer Vision Basics

**Introduction to Computer Vision**: What is computer vision? Key concepts and goals, Basic image processing techniques (e.g., filtering, edge detection).**Feature Detection and Matching:** Techniques for detecting and matching features in images (e.g., SIFT, SURF).

## Unit 4: Advanced Computer Vision Techniques

**Object Recognition:** Techniques for object detection and recognition (e.g., Haar cascades, HOG features), Introduction to deep learning for object recognition (e.g., CNNs).**Image Segmentation** Methods for segmenting images into regions (e.g., thresholding, clustering).

## Unit 5: Applications and Integration

**Applications of Graphics and Vision:** Real-world applications (e.g., augmented reality, autonomous vehicles).Integration of graphics and computer vision in applications. **Current Trends and Future Directions:** Emerging technologies and research areas in graphics and computer vision.

**Textbook:**

1. **"Computer Graphics: Principles and Practice"**
   **Authors:** John F. Hughes, Andries van Dam, Morgan McGuire, David FinkelHALT, Kurt Akeley, and others 4th Edition (2019)

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22222DSC44F | **Agile framework** | 4 | 1 | 0 | 4 |

## Unit 1: Introduction to Agile Frameworks

**What is Agile ?:** Overview of Agile principles and values. Key differences between Agile and traditional project management (Waterfall).**Agile Manifesto:** The 12 principles of Agile, The four core values of Agile.

## Unit 2: Scrum Framework

**Basics of Scrum:** Scrum roles: Product Owner, Scrum Master, and Development Team, Scrum artifacts: Product Backlog, Sprint Backlog, Increment. **Scrum Events:**Key events: Sprint, Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective.

## Unit 3: Kanban Method

**Overview of Kanban:** Principles and practices of Kanban. Key concepts: Kanban board, Work In Progress (WIP) limits. **Implementing Kanban:** Visualizing workflow and managing work items.Continuous improvement and flow optimization.

## Unit 4: Other Agile Frameworks

**Extreme Programming (XP):** Key practices of XP (e.g., pair programming, test-driven development).**Lean Software Development:** Principles of Lean and its application in software development. **Feature-Driven Development (FDD):** Overview of FDD and its process.

## Unit 5: Agile Implementation and Best Practices

**Adopting Agile:** Steps for implementing Agile in an organization. Common challenges and strategies for overcoming them. **Continuous Improvement:** Techniques for ongoing improvement in Agile practices, Metrics and feedback loops for Agile teams.

**Textbook:**

"Agile Estimating and Planning"
Author: Mike Cohn
Edition: 1st Edition (2005)



| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22220DSC35G | Cyber Security | 4 | 1 | 0 | 4 |

**Unit – 1 Network security:** Network security model, network security threats, firewalls, intrusion detection systems, intrusion prevention systems, public key infrastructure, and digital signature schemes.

**Unit – 2 DevOps security**

Configuration management, container security, orchestration and hardening, auditing with OpenSCAP, and automating compliance.

**Endpoint security:** Endpoint security architecture, threats, and solutions.

**Unit – 3 Cybersecurity architecture**

Logical design, security analysis, physical design, architecture types and case studies, IDS, and cryptography

**Unit – 4 Incident response and digital forensics:** Incident response methodologies, planning, and digital forensics fundamentals

**Security operations and log management:** SOC design, log collection and analysis, and SIEM systems

**Unit – 5 Cyber law:** Classification of cyber crimes, common cyber crimes, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, and more

**Suggested Learning Resources:**

Text Books:

1. Cybersecurity Career Master Plan: Proven techniques and effective tips to help you advance in your cybersecurity career · CompTIA Cybersecurity Analyst
2. Beginners Guide: How to Become a Cyber-Security Analyst: : Phase 2 - Security Engineering and Ethical Hacking.

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## VALUE ADDED COURSE SYLLABUS 2022-2023

COURSE: Diploma in Web Application development and hosting
SUBJECT CODE: 21DPWP123

**MODULE -1**

Basics of Web Designing - Multimedia and its Applications - Web Technologies - Introduction to Web Design & Applications - Computer Graphics - Mathematical Structure for Computer Science
HTML
CSS
JavaScript
Bootstrap

**MODULE -2**

Adobe Dreamweaver - Adobe Flash - Available Software for Graphic Designing - Animation Techniques - Web Hosting Basics - Types of Hosting Packages - Registering domains - Defining Name Servers
Using Control Panel - Creating Emails in C panel - Using FTP Client - Maintaining a Website

**MODULE -3**

HTML5 Elements and Semantics - CSS3 Advanced Styling Techniques - Responsive Design and Media Queries - JavaScript Fundamentals - JavaScript Syntax and Operators - DOM Manipulation and Event Handling - Asynchronous JavaScript (Promises, Async/Await)

**MODULE -4**

Server-Side Scripting - Introduction to Node.js and Express.js (or other server-side languages/frameworks) - RESTful API Design and Implementation - Handling HTTP Requests and Responses -- Databases - Introduction to Databases (SQL vs. NoSQL) - CRUD Operations with SQL (e.g., MySQL, PostgreSQL) - Working with NoSQL Databases (e.g., MongoDB)

**MODULE -5**

User Authentication (e.g., OAuth, JWT) - Role-Based Access Control - Security Best Practices - Full-Stack Development - Integrating Front-End and Back-End - Connecting Front-End to Back-End APIs - Handling Form Submissions and Data Processing - Error Handling and Validation

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**Academic year: 2022-2023**
**Course: Designing [Photoshop, Premium, Illustrator]**
**Subject Code: 22CC01**

**Aim:**

To learnt the image creation, graphic design and photo editing software developed by Adobe

Objectives:

- Navigate the Photoshop interface.
- Perform basic photo retouching tasks.
- Understand how to work with layers.
- Use effects and filters.
- Combine two separate images into one.
- Understand image resolution and file output for print and web graphics.

UNIT-1

Getting Started, Photo Retouching, Cropping Photos, Creating Graphics, Combine Photos, Text, & Graphics

UNIT-2

Replacing Background, Blend Modes & Opacity, Color Correction, Using Adjustment Layers, Color Correction Using Curves

UNIT-4

Converting to Black & White & Color Correction, Placing Your Designs in Pre-made Mockups, Adjustment Layers, Masks – Retouching

UNIT-5

Changing Color, Working with Blending Modes, Clipping Masks, Filling Shapes with Images Using Adjustment Layers as Clipping Masks, Camera Raw Fundamentals, Camera Raw as a Filter

**COURSE OUTCOMES:**

-Appreciate the importance of visualization in the data analytics solution
-Apply structured thinking to unstructured problems. Understand a very broad collection of machine learning algorithms and problems.
-Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory. Develop an appreciation for what is involved in learning from data.

**REFERENCE:**

Adobe Photoshop CS6 on Demand
Adobe Photoshop 7.0 Classroom in a Book

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**Course: Certificate Course On Google IT Support**
**Subject Code: 22CC05**

**Aim:**

- To learn the basics of Google IT Support is all about troubleshooting and problem solving, and providing great customer service along the way.

**Course objective:**

- To know the fundamental concepts of Google IT Support
- To study various analytics on stream data.

**Unit 1:**

Technical Support Fundamentals- Offered by Google. This course is the first of a series that aims to prepare you for a role as an entry-level IT Support Specialist.

**Unit 2:**

The Bits and Bytes of Computer Networking- Offered by Google. This course is designed to provide a full overview of computer networking. We'll cover everything from the fundamentals

Unit 3:

Operating Systems and You: Becoming a Power User- Offered by Google. In this course, you'll learn a combination of video lectures, demonstrations, and hands-on

Unit 4:

System Administration and IT Infrastructure Services- Offered by Google. This course will introduce you to working on a single computer in an entry-level System Administrator in the field.

Unit 5:

IT Security: Defense against the digital dark arts- Offered by Google. This course covers a wide variety of IT security concepts, tools, and best practices. It introduces threats and attacks,

**COURSE OUTCOMES**

- -Appreciate the importance of visualization in the data analytics solution
- -Apply structured thinking to unstructured problems Understand a very broad collection of machine learning algorithms and problems
- -Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory Develop an appreciation for what is involved in learning from data

**REFERENCE BOOKS**

The IT Support Handbook- A How-To Guide to Providing Effective Help and Support to [illegible]

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**Course: Diploma course on Graphical Programming[Flash, Swish]**
**Subject Code: 22DIP03**

**Aim:**

To learnt the basics of Web Designing & Hosting. To introduce students with fundamental concepts and theory of computer graphics. It presents the important drawing algorithm, polygon filling, clipping and 2D transformation curves and an introduction to 3D transformation.

**Objectives:**

**Unit-1**

Flash Syllabus Introduction To Flash Object based animation Motion Tween Presets File menu Edit menu View menu Insert menu Modify menu Text menu Commands menu Control menu Debug menu Windows menu Help menu

Unit-2

Tools in Flash Free Transform tool Lasso tool Pen tool Pencil tool Eye Dropper tool Paint Bucket tool Ink Bottle tool Text tool Rectangle tool Oval tool Brush tool Deco tool Bone tool Paint Behavior tool Camera tool Hand tool Zoom tool Stroke Color Fill Color Swap Colors tool Creating Objects in Flash Editing the fills and strokes Adding strokes to shapes Reshaping Objects Using the Eraser tool Creating Gradient fills

Unit-3

Adjusting Color Intensity Grouping Object Creating and Editing Art works in Flash Vector Graphics and Bitmap Graphics Paths Drawing Modes and Graphics Objects Reshape line and shape Transforming Object Combining Object Arranging Object Snapping art into position ColorPlatics 3D Graphics Working with Layers in Flash Adding a layer and Deleting working with layer in the timeline Adding the stacking order Adding Classic Motion guide layer Adding a plain guide layer Adding a mask layer Working with Animation in Flash .

**Unit-4**

PHOTO SHOP Introduction to Photoshop Introduction What's new in Photoshop Adjustment panel Masks panel Advanced compositing Canvas rotation Smoother panning and zooming Better raw processing in camera Raw Improved light room work flow Powerful printing option 3d acceleration Compressive 3d tools High performance on very large images . Menu commands in Photoshop Using the start menu Using shortcut Menu command Edit menu File menu Image menu Layer menu Select menu Filter menu Analysis menu 3D menu

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Unit-5
Web coding – html div (css)-ess advance dream weaver java script java script advance j-query

COURSE OUTCOMES:

At the end of the course the student will learn basic concepts of 2D Animation, Storyboarding and createanimated digital multimedia content for media using the tools and techniques as available in the Adobe Flash software and swish.

REFERANCE

Multimedia Computing, Communications and Applications
By Ralf Steinmetz, Klara Nahrstedt 2012
Multimedia Communications: Applications, Networks, Protocols and Standards

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**Course: Certificate Course On Introduction To Cyber Security Tools And Cyber Attacks**
**Subject Code: 22CC06**

**Aim:**

To learnt the basics of Introduction to Cyber Security Tools and Cyber Attacks.

**Course objective:**

- To know the fundamental concepts of Introduction to Cyber Security Tools and Cyber Attacks
- To study various analytics on stream data.

**UNIT-1**

• Introduction to cyber security • Cybercrime and different modes of attacks • Intrusion detection system

**UNIT-2**

• It assets and wireless security • Cyber security assurance framework • Desktop security and malware

UNIT-3

• E-commerce and web application security • Social engineering • Cyber security risk management

UNIT-4

UNIT-5

• Authentication and password security • Wireless security • Identification and digital signature • Introduction to cryptography

COURSE OUTCOMES:

Design effective data visualizations in order to provide new insights into a communicate information to the viewer.:

Find and select appropriate data that can be used in order to create a visualization that answers a particular question

Understand how Cultures of Practice influence the way data may be collected, described, or formatted in order to align their own data management practices with those of their discipline

**REFERENCE BOOKS**

Introduction to Cyber-Warfare A Multidisciplinary Approach By Paulo Shakarian, John Shakarian, Andrew Ruef - 2013

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**COURSE: Certificate Course On Network Simulator**
**SUBJECT CODE:22CC07**

**Aim:**

To learnt the basics of Network Simulatorusing a network simulator is a software program that can predict the performance of a computer network or a wireless communication network.

**Objectives:**

A network simulator is a software program that can predict the performance of a computer network or a wireless communication network.

**Unit 1:**

Simulation of Computer Networks: Computer Networks and the Layering Concept- System Modelling- Basics of Computer Network Simulation- Time-Dependent Simulation - A Simulation Example: A Single-Channel Queuing System

**Unit 2:**

Introduction to Network Simulator 2 (NS2)- Installation - Directories and Convention - Running NS2 Simulation- A Simulation Example- Including C++ Modules into NS2 and the make Utility -

**Unit 3:**

Implementation of Discrete-Event Simulation in NS2- NS2 Simulation Concepts- Event and Handler- The Scheduler (Sequencing)

**Unit 4:**

Developing New Modules in NS2- Adding a New Protocol- Packet Scheduling- Queuing and Drop Policies

**Unit 5:**

Real Simulation Processing- Debugging, Tracing, and Result Compilation- Debugging- A Process to Remove Programming Errors- Variable Tracing - Packet Tracing

COURSE OUTCOMES:

1.Develop effective presentation of business analyses, research, and recommendations through written forms of communication with specificity and appropriate to the intended audience

2.Develop effective presentation of business analyses, research, and recommendations through oral communication of conventions and forms with specificity and appropriate to the intended audience.

**REFERENCE BOOKS**

1. Introduction to Network Simulator NS2 By Teerawat Issariyakul, Ekram Hossain 2008
2.How to Write a Perfect Network Simulator - 3 Program (NS - 3)
NS - 3 WorkShop Manuel for All By N.N.Sharma - 2019

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## SIGNATURE OF THE MEMBERS PRESENT

| S.No. | NAME OF THE MEMBERS | SIGNATURE |
|---|---|---|
| 1. | Dr.K.T.Senthil Kumar | |
| 2. | Dr.K.Mohan Kumar | |
| 3. | Mr.S.Karthikeyan | |
| 4. | Dr.K.Saravanan | |
| 5. | Dr.R.Maruthi | |
| 6. | Dr.G.Preethi | |
| 7. | Mrs.M.Aarthi | |
| 8. | Mrs.R.Suganya | |
| 9. | Mr.D.S.ChozhaBharathi | |
| 10. | Mr.K.Vijayabaskar | |

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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF BIOCHEMISTRY

BOARD OF STUDIES COMMITTEE MEETING

## CIRCULAR

**Date: 28.04.2022**

There will be a Board of Studies Meeting on 04.05.2020 at 12.30 am in CRD Block, PRIST University, Thanjavur. All the staff members are requested to attend the meeting.

**Agenda:**

Curriculum

Feedback

**Dean**
(DR.L.Chinnappa)

**Signature**

DR. Bakrudeen Ali Ahamed
DR.A.Sohna Chandra Packiavathi
Dr.S.Ambiga
DR.S.Sathishkumar
MR.R.Viswalingam

Dr. L. CHINNAPPA
M.Sc., M.Phil., M.B., PGDA, PGDA, M.Phil., Ph.D.,
PROFESSOR OF PHYSICS,
PRIST UNIVERSITY,
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## SCHOOL OF ARTS AND SCIENCE
## DEPARTMENT OF BIOCHEMISTRY

**Composition of Board of Studies 2022-2023**

| | Designation | Name | Qualification | Designation & Affiliation | Mail id |
|---|---|---|---|---|---|
| 1 | Chairperson/HoD | DILBAKHUSEN ALI | M.Sc., Ph.D., | Head & Professor Department of Biochemistry, School of Arts and Science, PRIST Deemed to be University, Thanjavur | bakru24@gmail.com - |
| 2 | External Expert-Academic | DR. K. JEYAPRAKASH | M.Sc., M. Phil, Ph.D., PGDCA., | Head & Asst Professor Department of Biochemistry, Rajah Serfoji Government college (Autonomous), (Affiliated to Bharathidasan University, Tiruchirappalli), Thanjavur-613001, Mobile: 9994709294 | Email: jeyaprakash1.com |
| 3 | External Expert-Industry | Dr.R.SUKIRTHA | Ph.D | Research Director, Ashwath Diagnostics and Research Centre, No 7, Rathe Nagar, Madurai 625017, Tamil nadu, 8047034901 | sukirtha@gmail.com |
| 4 | Professor | DR.A.SOHNA | M.Sc., M. Phil, | Professor Department of Biochemistry, School of | |

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|---|---|---|---|---|---|
| | | CHANDRA PACKIAVATHI | Ph.D., | Arts and Science, PRIST Deemed to be University, Thanjavur | |
| 5 | **Associate Professor** | Dr.S.AMBIGA | M.Sc., M. Phil, Ph.D., | Associate Professor Department of Biochemistry, School of Arts and Science, PRIST Deemed to be University, Thanjavur | ambigabtec@gmail.com |
| 6 | **Assistant Professor** | DR.S.SATHISHKUMAR | M.Sc., M. Phil, Ph.D., | Professor Department of Biochemistry, School of Arts and Science, PRIST Deemed to be University, Thanjavur | drsathishbiochem@gmail.com |
| 7 | **Assistant Professor** | MR.R.VISWALINGAM | M.Sc., M. Phil, | Assistant Professor Department of Biochemistry, School of Arts and Science, PRIST Deemed to be University, Thanjavur | rviswalinguniform@gmail.com |
| 8 | **Special Invitee-Dean** | Dr.L.Chinnappa | M.Sc., M. Phil, Ph.D., PGDCA., | Dean, School of Arts and Science, PRIST Deemed to be University, Thanjavur | artsnasc2020@gmail.com |
| 9 | **Special Invitee-Alumnus/Alumna** | L.VIJUNE LAWRENCE | BSC | I MSC BIOCHEMISTRY, SASTRA UNIVERSITY, KUMBAKONAM | vijunelawrence@gmail.com |
| 10 | **Special Invitee - Current student - UG or PG** | M.ANBUMATHI | BSC | II Msc Biochemistry | anbumathi2@gmail.com |

Dr. A. RAKHUDEEN ALI AHMED
Associate Professor Dept. of Bio Chemistry
Center for Research & Development (CRD)
PRIST Deemed University, Thanjavur-613 403
Tamil Nadu, India

Dr. L. CHINNAPPA
M.Sc.,M.Phil.,PGDCA.,PGDBA.,M.Tech.,Ph.D.
Dean of Arts & Science
PRIST Deemed to be University

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THANJAVUR - 613 403, TAMIL Nadu, India

Ponnaiyah Ramajayam Institute of Science and Technology
PRIST Deemed to be University
School of Arts & Science
Department of BIOCHEMISTRY

Minutes of the meeting of the Board of Studies (BoS)*

Date: 4/5/22
Venue: Seminar Hall, CRD
Time: 12.30 pm

Members present:

Chair: (Name/Degree/Designation/Dept./PRIST) Dr. A. Bakrudeen Ali Ahamed, Professor & Head Department of Biochemistry, School of Arts & Science PRIST Deemed to be University Thanjavur

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. K. Jeyaprakash | Rajah Serfoji Govt. College, Thanjavur | Physical | |
| 2 | Dr. P. Sakthi Priyanka | Assistant Professor, Department of Biochemistry, Sri Sankara Arts & Science College, Enathur, Kanchipuram | Physical | |
| ... | | | | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. Bakrudeen Ali Ahamed | Biochemistry | Physical | |
| 2 | Dr. D. Ashok Kumar | Biochemistry | Physical | |
| 3 | Dr. S. Amalraj | Biochemistry | Physical | |
| 4 | Dr. T. Jayaraman | Biochemistry | Physical | |
| 5 | R. Vijayalakshmi | Biochemistry | Physical | R. Vijayalakshmi |

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class Institute/Organization/Address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | I. Vijaya Lakshmi | M.Sc Biochemistry, PRIST | Physical | |
| 2 | S. Inbaraan | M.Sc Biotechnology, PRIST | Physical | |
| 3 | Dr. T.J. Nawaz Ali | Asst Prof & Head, Chemistry | Physical | |

Agenda

1. Confirmation of the previous Meeting Minutes
2. Action taken on the previous Meeting Minutes
3. To Scrutinize the stakeholder feedback on UG, PG curriculum.
4. To consider the inclusion of audit course in the curriculum
5. To consider the introduction of employment oriented add on course
6. To approve the panel of examiners for BSc, MSc
7. Any other matter.

Contd.....

* This "Minutes" contain a total of ____ (in words) pages





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**Department of Biochemistry**
**Minutes of the Board of Studies**

The Board of Studies meeting was held on 04.05.2022. The Chairman Dr. A.Bakrudeen Ali Ahmed welcomed the members of the Board of studies and outlined the changes to be made in the following for the board approval.

Item 1. To consider changes in the Curriculum and Syllabi of Bsc, Msc Biochemistry, course and approval.

Item 2. To suggest the panel of names for appointment of examiners.

Item 3. Other academic activities in the department.

As per the suggestions and recommendations given by the Stakeholders on the above items discussed, the existing/revised Scheme of Curriculum/Scheme of Examination syllabi and Panel of Examiners is to be followed is annexed herewith for the implementation from the commencement of the Academic year 2020-2021. The Regulations and Syllabus for B.Sc, Biochemistry, M.Sc Biochemistry and Allied Biochemistry Courses were discussed in the BOS.

The members after careful scrutiny of the changes to be made unanimously accorded approval for the proposed changes/modifications. They also resolved to authorize the Chairman of Board of Studies to place the changes/modifications now approved by the BOS before the Standing Committee on Academic affairs and Academic Council.

| Agendum 1: Confirmation of the previous Meeting Minutes |
|---|
| Discussion: Minutes of the previous meeting were confirmed and accepted. |
| Resolution: The coordinator read the minutes of earlier meeting and the minutes were reviewed and passed by the members. |

| Agendum 2: Action taken on the previous Meeting Minutes |
|---|
| Discussion: The details of the action taken were presented to the members |
| Resolution: The members expressed satisfaction over the action taken |

| Agendum 3: To scrutinize the stakeholder feedback on UG, PG curriculum |
|---|
| Discussion: 1.More courses covering the entrepreneurship should be offered<br>2. nutrition based papers to be introduced in BSc syllabus<br>3. More appropriate and enterpreneurship based new allied biochemistry papers should be offered for Bsc Microbiology and Biotechnology programes<br>4. plant based biochemistry paper to be offered for MSc biochemistry |
| Resolution: The board unanimously resolved to make necessary changes as requested by the stake holders |





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| |
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| |
|---|
| **Agendum 4: To consider the inclusion of audit course in the curriculum** |
| Discussion: |
| Resolution: The members of the board resolved to approve the continuation of audit course in the curriculum |

| |
|---|
| Agendum 5: **Agendum 5: To consider the introduction of employment oriented add on courses** |
| Discussion : The existing syllabus gives enough opportunity for employability and there was no urgent need to introduce new add on courses. Also, it was pointed out that, the syllabus should be revised compulsorily if the university decides to offer 4 years BSc programme according to New Education Policy 2022 |
| Resolution: Resolved to introduce some more employment oriented add on courses in the next BOS meeting |

| |
|---|
| Agendum 6: To recommend the panel of examiners for BSc, MSc programme |
| Discussion: Members suggested the names of the experts who would serve as a panel of examiners for different programs. |
| Resolution: The BOS approved a tentative list of subject experts for paper setting , moderation and examiners. If required few more experts may be included with the permission of the concerned authorities. |

| |
|---|
| Agendum 7:<br>Review of curriculum & syllabus in BSc biochemistry-regulation 2020 |
| Discussion<br>• To discuss the modifications in the syllabi for First- Bsc Microbiology allied Biochemistry Syllabus.<br>• As such, the curriculum is revisited and certain sweeping changes have been made – by introducing new courses and improvising the syllabi of many courses. The honorable members Board of Studies has expressed their appreciations for the changes made commenting that they address the current demands of the Industry Profession. |
| Resolution:<br>**Resolved to Improvements in Course Contents of the following paper**<br>Allied Biochemistry for BSc Microbiology |

| Course Title | Category | Introduced in |
|---|---|---|
| 22115AEC14-Biochemistry -I | Core Theory | I semester |
| 22115AEC14L-Biochemistry Lab-I | Core Practical | I semester |
| 22115AEC24- Biochemistry -II | Core Theory | II semester |
| 22115AEC24L-Biochemistry Lab-II | Core Practical | II semester |



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**Resolved to introduce new paper**

Allied Biochemistry paper for BSC Biotechnology course

| Course Title | Category | Introduced in |
|---|---|---|
| 20115AEC34- Biochemistry -I | Core Theory | III semester |
| 20115AEC36L-Biochemistry Lab-I | Core Practical | III semester |
| 20115AEC44- Biochemistry -II | Core Theory | IV semester |
| 20115AEC46L-Biochemistry Lab-II | Core Practical | IV semester |

**The following new courses are introduced in the curriculum BSC Biochemistry regulation 2022:**

| Course Title | Category | Introduced in |
|---|---|---|
| 20115AEC43-Human Physiology And Nutritional Biochemistry | Core Theory | IV semester |
| 22115DSC54C- Structural Biology | Electives Theory | V semester |
| 22115DSC54D- Human Genetics | Electives Theory | V semester |
| 22115DSC54E- Virology | Electives Theory | V semester |
| 22115DSC63C- Introductory Microbiology | Electives Theory | VI semester |
| 22115DSC63D- Bioethics & Biosafety | Electives Theory | VI semester |
| 22115DSC63E- Immunochemistry | Electives Theory | VI semester |

**Review of curriculum & syllabus in M.Sc biochemistry-regulation 2022**

1. **Resolved to introduce the following Courses in the M.Sc (Biochemistry) programme curriculum with effect from 2022-23**

| Course Title | Category | Introduced in |
|---|---|---|
| 20215DSC15B-Biotechnology | Electives Theory | I semester |





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| | | |
|---|---|---|
| 20215SEC31- Molecular Biology and Genetics | Core Theory | III semester |
| 20215SEC41-Plant Biochemistry | Core Theory | IV semester |
| 20215SEC42-Immunology | Core Theory | IV semester |
| 20215SEC43L-Immunology Lab | Core Practical | IV semester |
| 22215DSC15C - Functional Genomics and Metabolomics | Elective Theory | I semester |
| 22215DSC15D - Genetic Engineering and Applied Biology | Elective Theory | I semester |
| 22215DSC15E - Organic and Biophysical Chemistry | Elective Theory | I semester |
| 2215DSC25D -Microbial Biochemistry and Fermentation Technology | Elective Theory | II semester |
| 2215DSC25E - Molecular Oncology | Elective Theory | II semester |
| 2215DSC25F - Computational Biology | Elective Theory | II semester |
| 22215DSC34C -Molecular Nutrition and Nutrigenomics | Elective Theory | III semester |
| 22215DSC34D- Cell Dynamics | Elective Theory | III semester |
| 22215DSC34E -Industrial enzymes | Elective Theory | III semester |
| 22215DSC44C -Glycobiology | Elective Theory | IV semester |
| 22215DSC44D - Animal Biotechnology | Elective Theory | IV semester |
| 22215DSC44E -Classical and Molecular Genetics | Elective Theory | IV semester |

Dr. K. Jeyaprakash proposed including problem-based questions for postgraduate students. Members of the Board updated the panel of examiners and submitted the same to the Academic Council for its approval.

| |
|---|
| **Agendum 8: Submission of project proposals for Faculty Development Programs, Major, Minor Research projects and conference/ seminar/ workshop** |
| Discussions: The external members recommended that faculty members and students should also apply for these types for projects to enhance research output of the department. |



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Resolution: Resolved to insist faculty members to submit proposals for Major-Minor research projects to different funding Agencies during the academic year.

**Other Academic Activities:** The students should complete a SWAYAM-MOOC before the completion of the 6th semester and the course completed certificate should be submitted to the HoD.

Signature:
Chair/HoD:
Dept.: Biochemistry
Name: Dr.A.Bakrudeen Ali Ahmed
Date: 04.05.2022

Dr. A. BAKRUDEEN ALI AHMED
Associate Professor, Dept. of Bio Chemistry,
Centre for Research & Development (CRD)
PRIST Deemed University, Thanjavur-613 403
Tamil Nadu, India

Signature:
Dean:
School:Arts and Science
Name: Dr.L.Chinnappa
Date: 4.05.2022

Dr. L. CHINNAPPA
M.Sc.,M.Phil.,PGDCA.,PGDBA.,M.Tech.,Ph.D.
Dean of Arts & Science
PRIST Deemed to be University
Thanjavur - 613 403, Tamilnadu.

Mandatory Attachments:

1. Minutes of the previous BoS meeting minutes and report on the follow-up action taken.
2. BoS Meeting 'Notification' sent to all members, including online meeting link.
3. Online Screenshots and geo-tagged photos in the venue.
4. Attendance sheet print of online attenders.
5. Detailed syllabi with PEOs, POs, COs, etc. (in Annexures), if new Programme(s) introduction /Curriculum revision is discussed.

**Note: The 'minutes' of the BoS meeting along with the attachments as listed above must be mailed to the Registrar by the HoD within three days after the meeting, copying Dean concerned, Dean - Academic Affairs and the VC's office.**

*** This 'Minutes' contain a total of six (in words) pages**

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**PRIST Deemed to be University**
**Thanjavur**
**BOS meeting**
**Date: 4.5.2022**
**Department of Biochemistry**
**LIST OF EXTERNAL MEMBERS**

| | Designation | Name | |
|---|---|---|---|
| 1 | Chairperson/HoD | DR.BAKRUDEEN ALI | Dr. A. BAKRUDEEN ALI ATHMED, Associate Professor, Dept. of Bio Chemistry, Center for Research & Development (CFRD), PRIST Deemed University, Thanjavur-613 403, Tamil Nadu, India |
| 2 | External Expert-Academic | DR. K. JEYAPRAKASH | Dr. K. JEYAPRAKASH, M.Sc.,M.Phil.,Ph.D.,PGDCA., Head, PG & Research Dept. of Biochemistry, Rajah Serfoji Govt. College (Autonomous), THANJAVUR - 613 005 |
| 3 | External Expert-Industry | Dr.R.NIKIRTHA | |
| 4 | Professor | DR.A.SOHNA CHANDRA PACKIAVATHI | |
| 5 | Associate Professor | Dr.S.AMBIGA | |
| 6 | Assistant Professor | DR.S.SATHISHKUMAR | |
| 7 | Assistant Professor | MR.R.VIJAYALINGAM | |
| 8 | Special Invitee-Dean | Dr.L.Chinnappa | |
| 9 | Special Invitee-Alumnus/Alumna | L.VIJUNE LAWRENCE | |
| 10 | Special Invitee -Current student - UG or PG | M.ANBUMATHI | |



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# SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF BIOCHEMISTRY

## B.Sc., BIOCHEMISTRY- REGULATION 2022

## COURSE STRUCTURE

## SEMESTER – I

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC11/ 22111AEC11/ 22132AEC11/ 22135AEC11 | Tami – I/Advanced English-I/Hindi-I/ French - I | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22115AEC13 | Biomolecules | 6 | 1 | 0 | 5 |
| 22114AEC14 | Chemistry –I | 6 | 1 | 0 | 4 |
| | **PRACTICAL** | | | | |
| 22115AEC15L | Biomolecules Lab-I | 0 | 0 | 3 | 2 |
| 22114AEC16L | Volumetric Analysis Lab | 0 | 0 | 3 | 2 |
| | **Total** | **20** | **2** | **6** | **17** |
| | **AUDIT COURSE** | | | | |
| 221ACLSICN | Indian Constitution | - | - | - | 2 |
| 221ACLSUHV | Universal Human Values | - | - | - | 2 |

## SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |

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| | | | | | |
|---|---|---|---|---|---|
| 22110AEC21/ 22111AEC21/ 22132AEC21/ 22135AEC21 | Tamil – II/ Advanced English-II/Hindi-II/ French – II | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22115AEC23 | Biochemical Techniques | 6 | 1 | 0 | 5 |
| 22114AEC24 | Chemistry – II | 6 | 1 | 0 | 4 |
| | **PRACTICAL** | | | | |
| 22115AEC25L | Biochemical Techniques Lab-I | 0 | 0 | 3 | 2 |
| 22114AEC26L | Organic Analysis Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22115RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **20** | **2** | **6** | **18** |
| | **AUDIT COURSES** | | | | |
| 221ACLSCOS | Communication Skills | - | - | - | 2 |
| 221ACSSBBE | Basic Behavioral Etiquette | - | - | - | 2 |

**SEMESTER – III**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC31/ 22132AEC31/ 22111AEC31/ 22135AEC31 | Tamil – III/Hindi-III/Advanced English-III/ French – III | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22115AEC33 | Cell Biology and Genetics | 4 | 1 | 0 | 4 |
| 22120AEC34 | Programming in C | 4 | 1 | 0 | 5 |
| | **PRACTICAL** | | | | |
| 22115AEC35L | Cell Biology and Genetics Lab | 0 | 0 | 3 | 2 |
| 22120AEC36L | Programming in C Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22115RMC37 | Research Methodology | 2 | 0 | 0 | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| | Total | 18 | 2 | 6 | 19 |
| AUDIT COURSE | | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |

**SEMESTER – IV**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| THEORY | | | | | |
| 22110AEC41/ 22111AEC41/ 22132AEC41/ 22135AEC41 | Tamil-IV/Advanced English-IV /Hindi-IV/ French – IV | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22115AEC43 | Human Physiology and Nutritional Biochemistry | 4 | 1 | 0 | 4 |
| 22120AEC44 | Fundamentals of Computing | 5 | 1 | 0 | 5 |
| 221ENSTU45 | Environmental studies | 2 | 0 | 0 | 2 |
| PRACTICAL | | | | | |
| 22115AEC46L | Biochemical Techniques Lab-II | 0 | 0 | 3 | 2 |
| 22120AEC47L | Web Design Lab | 0 | 0 | 3 | 2 |
| | Total | 19 | 2 | 6 | 19 |
| AUDIT COURSE | | | | | |
| 221ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 221ACSSAQA | General Aptitude and Quantitative Ability | - | - | - | 2 |

**SEMESTER – V**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| THEORY | | | | | |
| 22115AEC51 | Enzymes | 4 | 1 | 0 | 4 |
| 22115AEC52 | Bioenergetics and Metabolism | 4 | 1 | 0 | 3 |
| 22115AEC53 | Immunology | 4 | 1 | 0 | 4 |
| 22115DSC54__ | Discipline Specific Elective -I | 4 | 1 | 0 | 3 |
| PRACTICAL | | | | | |
| 22115AEC55L | Food and enzyme Analysis Lab | 0 | 0 | 3 | 2 |



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| | | | | | |
|---|---|---|---|---|---|
| 22115AEC56L | Immunology Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22115BRC57 | Participation in Bounded Research | - | - | - | 1 |
| | **Total** | **16** | **4** | **6** | **19** |
| | **AUDIT COURSE** | | | | |
| 221ACLSPSL | Professional Skills | - | - | - | 2 |

**SEMESTER – VI**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22115AEC61 | Clinical Biochemistry | 4 | 1 | 0 | 4 |
| 22115SEC62 | Molecular Biology | 4 | 1 | 0 | 5 |
| 22115DSC63_ | Discipline Specific Elective -II | 4 | 1 | 0 | 3 |
| 221—OEC (2 DIGIT COURSE Name) | Open Elective Course | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 22115AEC64L | Hematology and clinical biochemistry Lab | 0 | 0 | 3 | 2 |
| 22115SEC65L | Molecular Biology Lab | 0 | 0 | 3 | 2 |
| 22115PRW66 | Project Work | - | - | - | 4 |
| 22115PROEE | Program Exit Examination | - | - | - | 1 |
| | **Total** | **16** | **3** | **6** | **23** |
| | **AUDIT COURSE** | | | | |
| 221ACSSIST | Interview Skills Training and Mock Test | - | - | - | 2 |
| 221ACLSCET | Community Engagement | - | - | - | 1 |
| | | | | | |
| **Total Credits -Programme** | | | | | **115** |
| **Total Credits - Audit Courses** | | | | | **19** |



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**Discipline Specific Electives**

| Semester | Discipline Specific Elective Courses-I |
|---|---|
| V | a) 221UDSC54A – Pharmaceutical Biochemistry<br>b) 221UDSC54B - Basic Biotechnology<br>c) 221UDSC54C - Structural Biology<br>d) 221UDSC54D- Human Genetics<br>e) 221UDSC54E - Virology |
| | **Discipline Specific Elective Courses-II** |
| VI | a) 221UDSC63A- Biochemistry of plants and nutrition<br>b) 221UDSC63B – Hospital Management<br>c) 221UDSC63C -Introductory Microbiology<br>d) 221UDSC63D -Bioethics & Biosafety<br>e) 221UDSC63E-Immunochemistry |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| VI | a) 221TNOEC-Tamil: Bakkiya Varalaru<br>b) 221ENOEC-Journalism<br>c) 221MAOEC-Development of Mathematical Skills<br>d) 221PHOEC-Instrumentation<br>e) 221CEOEC-Food and Adulteration<br>f) 221CSOEC – E-Learning<br>g) 221CAOEC-Web Technology<br>h) 221CMOEC-Banking service |

**Credit Distribution**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 17 | - | - | - | - | - | 17 |
| II | 17 | - | - | - | 1 | - | 18 |
| III | 17 | - | - | - | 2 | - | 19 |
| IV | 17 | - | - | - | - | 2 | 19 |
| V | 15 | - | 3 | - | 1 | - | 19 |
| VI | 11 | 2 | 3 | 2 | 4 | 1 | 23 |
| Total | 94 | 2 | 6 | 2 | 8 | 3 | 115 |

Dean
School of Arts & Science

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## SCHOOL OF ARTS AND SCIENCE

M. Sc BIOCHEMISTRY -SYLLABUS – REGULATION 2022

### COURSE STRUCTURE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 22215SEC11 | Biomolecules | 6 | 1 | 0 | 5 |
| 22215SEC12 | Biochemical and Instrumental analysis | 6 | 1 | 0 | 5 |
| 22215SEC13 | Enzymology | 6 | 1 | 0 | 4 |
| 22215SEC14L | Biochemical Techniques Lab - I | 0 | 0 | 4 | 2 |
| 22215DSC15_ | Discipline specific elective | 5 | 0 | 0 | 4 |
| 22215RLC16 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **23** | **3** | **4** | **21** |
| | **SEMESTER II** | | | | |
| 22215SEC21 | Cellular Biochemistry | 5 | 1 | 0 | 5 |
| 22215SEC22 | Metabolism and Regulation | 5 | 1 | 0 | 5 |
| 22215SEC23 | Neuro Biochemistry | 5 | 0 | 0 | 4 |
| 22215SEC24L | Enzymology Lab- II | 0 | 0 | 4 | 2 |
| 22215DSC25_ | Discipline Specific Elective -II | 5 | 0 | 0 | 4 |
| 22215RMC26 | Research Methodology | 3 | 0 | 0 | 2 |
| 22215BRC27 | Participation in Bounded Research | - | - | - | 2 |
| | **Total** | **23** | **2** | **4** | **24** |
| | **SEMESTER III** | | | | |
| 22215SEC31 | Molecular Biology and genetics | 6 | 1 | 0 | 6 |
| 22215SEC32 | Clinical Biochemistry | 6 | 1 | 0 | 6 |
| 22215SEC33L | Clinical Biochemistry Lab | 0 | 0 | 5 | 3 |
| 22215DSC34_ | Discipline Specific Elective -III | 5 | 0 | 0 | 4 |
| 222_OEC | Open Elective | 4 | 0 | 0 | 3 |
| 22215SRC35 | Design/Socio technical research | - | - | - | 2 |
| | **Total** | **21** | **2** | **5** | **24** |
| | **SEMESTER IV** | | | | |
| 22215SEC41 | Plant Biochemistry | 6 | 1 | 0 | 6 |
| 22215SEC42 | Immunology | 6 | 1 | 0 | 6 |

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| | | | | | |
|---|---|---|---|---|---|
| 22215SEC43L | Immunology lab | 0 | 0 | 3 | 3 |
| 22215DSC44 | Discipline Specific elective -IV | 5 | 0 | 0 | 4 |
| 22215PW45 | Project Work | - | - | - | 6 |
| 22215PE1 | Programme Exit Examination | - | - | - | 2 |
| | Total | 17 | 2 | 5 | 27 |
| | Total Credits for the Programme | | | | 96 |

**Discipline specific Electives**

| Semester | Discipline specific Elective Courses-I |
|---|---|
| I | a) 22215DSC15A - Biostatistics<br>22215DSC15B- Bioinformatics<br>b) 22215DSC15C Functional Genomics and Metabolomics<br>c) 22215DSC15D Genetic Engineering and Applied Biology<br>d) 22215DSC15E Organic and Biophysical Chemistry |
| | Discipline specific Elective Courses-II |
| II | a) 22215DSC25A - Endocrinology<br>b) 22215 DSC25B- Clinical nutrition and dietetics<br>c) 22215 DSC25C – Bioinformatics<br>d) 22215 DSC25D Microbial Biotechnology and Fermentation Technology<br>e) 22215 DSC25E Molecular Oncology<br>f) 22215 DSC25F Computational Biology |
| | Discipline specific Elective Courses-III |
| III | a) 22215DSC34A - Genetics and Genetic Engineering<br>b) 22215DSC34B- Pharmaceutical Biotechnology<br>c) 22215DSC34C Molecular Nutrition and Nanoparticles<br>d) 22215DSC34D Cell Biophysics<br>e) 22215DSC34E Industrial enzymes |
| VI | a) 22215DSC44A – Medical Biotechnology<br>b) 22215DSC44B – Applied Microbial Biochemistry<br>c) 22215DSC44C Glycobiology<br>d) 22215DSC44D Animal Biotechnology<br>e) 22215DSC44E Classical and Molecular Genetics |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| III | a) 22215OEC – Writing for the media<br>b) 22215AOEC – Applicable Mathematical Techniques<br>c) 22215BOEC – Bio-Medical Instrumentation<br>d) 22215COEC – Green Chemistry<br>e) 22215MOEC – M-Marketing<br>f) 22215FOEC – Financial Services |

**Credit Distribution:**

| Term | SEC | DSC | OEC | AECC Course | Others | Total |
|---|---|---|---|---|---|---|
| I | 3A | 4 | - | 3 | - | 10 |
| II | 3B | 4 | - | 4 | - | 11 |
| III | 3C | 4 | 3 | 3 | - | 13 |
| IV | 3D | 4 | - | 4 | 2 | 13 |
| Total | 6+2 | 16 | 3 | 13 | 2 | 96 |

Director
School of Arts & Sciences
Kalaignar Karunanidhi Institute of Technology
Coimbatore to Sri Vengam
Vellalur, Coimbatore-641 035.



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SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF PHYSICS
MINUTES OF THE MEETING OF THE BOARD OF STUDIES (BOS)

**Board: Physics**

**The Meeting of Board of Studies (BOS) was held as given below:**

| | |
|---|---|
| Name of the Body | Board of Studies |
| Department | Physics |
| Meeting year | 2022-23 |
| Date and Time | 10.05.2022 & 10:00 AM |
| Venue | Department of Physics |
| Members Attended | The details are given in the ANNEXURE-I |

| | AGENDA |
|---|---|
| 1 | Confirmation of the previous meeting minutes |
| 2 | Discussion about the revision of core and elective courses of UG curriculum |
| 3 | Discussion about the revision of core and elective courses of PG curriculum |
| 4 | Organizing industrial visit for students |
| 5 | Submission of project proposals to funding agencies and applying for funding to organize Faculty Development Programs, conference, seminar, workshop |

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Minutes of the meeting of the Board of Studies (BoS)*

Board: Physics

The Board of Studies meeting was held on 10.05.2022. The Chairmen of BOS welcomed all the panel members for the meeting. The item listed in the agenda were taken for discussion.

| **Agendum 1: Confirmation of the previous meeting minutes** |
| --- |
| Discussion:<br>The minutes of the Board of Studies meeting held on 12.05.2021 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the Academic council. |
| Resolution: The Board resolved to accept the same. |

| **Agendum 2: Discussion about core and elective courses of UG curriculum** |
| --- |
| Discussion : The members discussed elaborately about the existing curriculum of UG courses. It was planned that content of core courses was retained without any modification. In addition, new elective course, Physics Workshop Skill (20113DSC55B) was included in place of Laser Physics (20113DSC55B) in the semester-V. BOS members also suggested to include 7 new value added courses.<br>Members proposed that orientation courses can be conducted for first year UG students in such a way that they will understand about why they are studying the course. |
| Resolution: The board members recommended the above mentioned suggestions in UG curriculum |

| **Agendum 3: Discussion about core and elective courses of PG curriculum** |
| --- |
| Discussion : The members discussed decoratively about the existing curriculum of PG courses. Members recommended that PG students can handle classes for their junior so that they can revise their basics.<br>It was planned that content of core courses was retained without any modification. Nevertheless, 4 new elective courses were introduced in all semesters (I, II, III and IV).<br>1. Fluid Mechanics (20213DSC15C)<br>2. Electromagnetic Induction (20213DSC25C)<br>3. Waves and Optics (20213DSC35C)<br>4. Thermal Physics (20213DSC45C)<br><br>BOS members also recommended to include 7 new value added courses. |
| Resolution: The board members approved the above suggestions in PG curriculum |

| **Agendum 4: Organizing Industrial visit for students** |
| --- |
| Discussion: External expert suggested that final year B.Sc., and M.Sc., students have to be allowed to go for industrial visit so that the students can get industrial exposure. External expert can also impart internship training to the students. |

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| |
|---|
| Resolution: After the discussion, the members insisted that final year B.Sc., and M.Sc., students have to be taken to industries so as to get industrial exposure and for getting internships. |

| |
|---|
| **Agendum 5: Submission of project proposals to funding agencies and applying for funding to organize Faculty Development Programs, conference, seminar, workshop** |
| Discussion: The external members recommended that faculty members and students should also apply for these kinds for funding to enhance research output of the department. |
| Resolution: Resolved to insist faculty members to submit proposals for Major-Minor research projects to different funding Agencies during academic year. Improvement of laboratory infrastructure using the funding from different funding agencies. |

The chairman of Board of Studies (BOS) thanked all the members for their active participation and cordially invited them for the next meeting.

Signature
(Dr. M. Sivaaantham)

Date: 10.05.2022 Dean

BOS Chairman/HOD Seal

The Head, Department of Physics,
PRIST Deemed to be University,
Vallam, Thanjavur-613403,
Tamilnadu, India.

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## ATTENDANCE OF THE BOARD OF STUDIES MEETING

**Board: Physics**

**Date: 10.05.2022**

**Time: 10:00 am**

**Venue: Department of Physics**

The following members were present for the Board of Studies meeting

Chair: Dr. M. Sivanantham, M.Sc., M.Phil., Ph. D, Associate Professor & HOD

**External Members**

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Signature |
|---|---|---|---|
| 1 | Dr. T. GANESH, M.Sc., M.Phil., M. Tech., Ph.D., Associate Professor | Department of Physics Rajah Serfoji Government College, Thanjavur- 613005 | T. Ganesh |
| 2 | K. Amirtha Ganesh, M.E., Chief Innovation Officer, Three Dots Innovations | Three Dots Innovations LLP Plot No.121, Rahman Nagar, Neelagiri Thanjavur- 613004 | K. Amirtha |

Internal Members

| S.No. | Name/Degree/Designation | Department | Signature |
|---|---|---|---|
| 1 | Dr. M. Sivanantham M.Sc., M.Phil., Ph.D, HOD, Associate Professor | Physics | M. Sivanantham |
| 2 | Dr. L. Chinnappa, M.Sc., M. Phil, Ph.D., PGDCA., Dean & Professor, School of Arts and Science, PRIST Deemed to be University, Thanjavur | Dean & Professor, School of Arts and Science, PRIST Deemed to be University, Thanjavur | |
| 3 | Dr. S. Subashchandrabose, M.Sc., M.Phil., Ph.D, Professor | Physics | S. Subash |

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| | | | |
|---|---|---|---|
| 4 | Dr. Sutapa Ghosh<br>M.Sc., Ph.D.,<br>Associate Professor | Physics | Sutapa |
| 5 | Dr. V. Vidhya<br>M.Sc., M.Phil., Ph.D.,<br>Assistant Professor | Physics | V. Vidhya |
| 6 | Mr. K. Swaminathan, M.Sc., M.Phil.,<br>Assistant Professor | Physics | |
| 7 | Dr.K.Thirunavukarasu<br>M.Sc., M.Phil., Ph.D.,<br>Assistant Professor | Physics | K. Thiru |

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class<br>Institute/Organization/Address | Signature |
|---|---|---|---|
| 1 | Dr. L. Chinnappa,<br>M.Sc., M. Phil, Ph.D.,<br>PGDCA., Dean &<br>Professor, School of Arts<br>and Science, PRIST<br>Deemed to be University,<br>Thanjavur | Dean & Professor, School of<br>Arts and Science, PRIST<br>Deemed to be University,<br>Thanjavur | |
| 2 | K.T. Barshini,<br>B. Sc., Student | PRIST Deemed to be University,<br>Thanjavur | K.T. Barshini |
| 3 | K. Ranjith kumar,<br>Alumni | PRIST Deemed to be University,<br>Thanjavur | K. Ranjith |

Date: 10.05.2022

Dean

Dean of Arts & Science
PRIST Deemed to be University
Thanjavur-613 403, Tamilnadu.

Signature
(Dr. M. Sivanantham)

BOS Chairman/HOD Seal

The Head, Department of Physics,
PRIST Deemed to be University
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**List of new courses**

1. Physics Workshop Skill
2. Fluid Mechanics
3. Electromagnetic Induction
4. Waves and Optics
5. Thermal Physics

**List of new value-added courses**

1. Diploma course on crystal growth analysis
2. Certificate course on semiconductor physics
3. Certificate course on mathematical foundation for physics
4. Certificate course on industry linked optical fiber technology
5. Certificate course on installation and maintenance of solar photovoltaic systems
6. Certificate course on installation and maintenance of digital circuits
7. Certificate course on microcontroller

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## B.Sc., PHYSICS -COURSE STRUCTURE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| | **THEORY** | | | | |
| 20110AEC11<br>20111AEC11<br>20132AEC11<br>20135AEC11 | Tamil-I<br>Advanced English-I<br>Hindi-I<br>French-I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 20113AEC13 | Properties of Matter | 5 | 1 | 0 | 4 |
| 20112AEC15A | Calculus and Fourier series | 4 | - | 0 | 4 |
| 20112AEC16A | Algebra and Trigonometry | 4 | - | 0 | 3 |
| | **PRACTICAL** | | | | |
| 20113SEC14L | Properties of Matter Lab | 0 | 0 | 3 | 2 |
| | **Total** | 21 | 1 | 3 | 17 |
| | **AUDIT COURSE** | | | | |
| 20IACLSICN | Indian Constitution | - | - | - | 2 |
| 20IACLSUHV | Universal Human Values | - | - | - | 2 |

SEMESTER II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 20110AEC21<br>20111AEC21<br>20132AEC21<br>20135AEC21 | Tamil-II<br>Advanced English-II<br>Hindi -II<br>French-II | 4 | 0 | 0 | 2 |
| 20111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 20113AEC23 | Mechanics And special theory of Relativity | 6 | 1 | 0 | 4 |
| 20112AEC25A | ODE,PDE and Laplace Transform | 5 | 0 | 0 | 4 |
| 20112AEC26A | Analytical Geometry in Vector Calculus | 4 | 0 | 0 | 3 |
| | **PRACTICAL** | | | | |
| 20113SEC24L | Mechanics Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 20113RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | 23 | 1 | 3 | 18 |
| | **AUDIT COURSE** | | | | |
| 20IACLSCOS | Communication Skills | - | - | - | 2 |
| 20IACSSBBE | Basic Behavioral Etiquette | - | - | - | 2 |

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SEMESTER III

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | SEMESTER I | | | | |
| | THEORY | | | | |
| 20110AEC11<br>20111AEC11<br>20132AEC11<br>20135AEC11 | Tamil-I<br>Advanced English-I<br>Hindi-I<br>French-I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 20113AEC13 | Properties of Matter | 5 | 1 | 0 | 4 |
| 20112AEC15A | Calculus and Fourier series | 4 | - | 0 | 4 |
| 20112AEC16A | Algebra and Trigonometry | 4 | - | 0 | 3 |
| | PRACTICAL | | | | |
| 20113SEC14L | Properties of Matter Lab | 0 | 0 | 3 | 2 |
| | Total | 21 | 1 | 3 | 17 |
| | AUDIT COURSE | | | | |
| 201ACLSICN | Indian Constitution | - | - | - | 2 |
| 201ACLSUHV | Universal Human Values | - | - | - | 2 |

SEMESTER IV

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 20110AEC41<br>20111AEC41<br>20132ABC41<br>20135AEC41 | Tamil-IV<br>Advanced English-IV<br>Hindi-IV<br>French-IV | 4 | 0 | 0 | 2 |
| 20111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 20113AEC43 | Optics | 5 | 0 | 0 | 4 |
| 20114AEC45 | Chemistry-II | 6 | 0 | 0 | 5 |
| 201ENVTSTU | Environmental Studies | 2 | 0 | 0 | 2 |
| | PRACTICAL | | | | |
| 20113SEC44L | Optics Lab | 0 | 0 | 3 | 2 |
| 20114SEC46L | Volumetric Analysis Lab -II | 0 | 0 | 3 | 2 |
| | TOTAL | 21 | 0 | 3 | 19 |
| | AUDIT COURSE | | | | |
| 201ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 201ACSSAQA | General Aptitude and Quantitative Ability | - | - | - | 2 |

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SEMESTER V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 20113AEC51 | Electricity and Magnetism | 5 | 0 | 0 | 4 |
| 20113AEC52 | Atomic Physics | 4 | 1 | 0 | 3 |
| 20113AEC53 | Basic Electronics | 4 | 1 | 0 | 4 |
| 20113DSC56 | Discipline Specific Elective – I | 5 | 0 | 0 | 3 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 20113BRC57 | Participation in Bounded research | - | - | - | 1 |
| | **PRACTICAL** | | | | |
| 20113SEC54L | Electricity and Magnetism Lab | 0 | 0 | 3 | 2 |
| 20113SEC55L | Basic Electronics Lab | 0 | 0 | 3 | 2 |
| | TOTAL | 18 | 2 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 201ACLSPSL | Professional Skills | - | - | - | 2 |

SEMESTER VI

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 20113AEC61 | Digital Electronics & Microprocessor | 4 | 1 | 0 | 4 |
| 20113AEC62 | Elements of Theoretical Physics | 5 | 0 | 0 | 5 |
| 20113DSC65 | Discipline Specific Elective –II | 5 | 0 | 0 | 3 |
| 201 OEC | Open Elective Course | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 20113SEC63L | Digital Electronics Lab | 0 | 0 | 3 | 2 |
| 20113SEC64L | Microprocessor Lab | 0 | 0 | 3 | 2 |
| 20113PRW66 | Project Work | - | - | - | 4 |
| 20113PEE | Programme Exit Examination | - | - | - | 1 |
| | **TOTAL** | 18 | 1 | 6 | 23 |
| | **AUDIT COURSE** | | | | |
| 201ACSSIST | Interview Skills Training and Mock Test | - | - | - | 2 |
| 201ACLSCET | Community Engagement | - | - | - | 1 |
| | **TOTAL CREDITS** | | | | 115 |
| | **Total Credits – Audit Courses** | | | | 19 |

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**Discipline Specific Electives**

| Semester | Discipline Specific Elective Courses -I |
|---|---|
| V | a) 20113DSC55A- Digital Photography<br>b) 20113DSC55B- Physics Workshop Skill |

| Semester | Discipline Specific Elective Courses - II |
|---|---|
| VI | a) 20113DSC64A-Polymer Physics<br>b) 20113DSC64B- Physics of Radiography |

**General Electives**

| Semester | General Elective Courses |
|---|---|
| V | a) 20111GEC-Joarnalism<br>b) 20112GEC-Development of Mathematical Skills<br>c) 20114GEC-Food and Adulteration<br>d) 20117GEC-Mushroom Technology<br>e) 20120GEC-Web Technology<br>f) 20122GEC-E-Commerce and its Application<br>g) 20161GEC-Indirect Taxes |

**Skill based Electives**

| Semester | Skill based Elective Courses |
|---|---|
| I | a) 20120SEC01AL-Package Lab – I<br>b) 20160SEC01B-Soft skill – I |
| II | a) 20120SEC02AL-Package Lab – II<br>b) 20160SEC02B-Soft skill – II |
| III | a) 20120SEC03AL-Package Lab –III<br>b) 20160SEC03B-Soft skill – III |
| IV | a) 20120SEC04AL-Package Lab –IV<br>b) 20160SEC04B- Soft skill – IV |
| V | a) 20120SEC05AL-Package Lab –V<br>b) 20160SEC05B-Soft skill - V |
| VI | a) 20120SEC06AL-Package Lab –VI<br>b) 29160SEC06B-Soft skill – VI |

**Credit Distribution**

| SEM | AEC | SEC | DSC | OEC | Research | NON CGP | Total |
|---|---|---|---|---|---|---|---|
| I | 15 | 2 | - | - | - | - | 17 |
| II | 15 | 2 | - | - | 1 | - | 18 |
| III | 13 | 4 | - | - | 2 | - | 19 |
| IV | 13 | 4 | - | - | - | 2 | 19 |
| V | 11 | 4 | 3 | - | 1 | - | 19 |
| VI | 9 | 4 | 3 | 2 | 4 | 1 | 23 |
| Total | 76 | 20 | 6 | 2 | 8 | 3 | 115 |

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## M.Sc., PHYSICS

### COURSE STRUCTURE

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 20213AEC11 | Advanced Mathematical Physics | 6 | 1 | 0 | 5 |
| 20213AEC12 | Classical and Statistical Mechanics | 6 | 1 | 0 | 5 |
| 20213AEC13 | Electronics and Communication | 6 | 1 | 0 | 4 |
| 20213SEC14L | Spectroscopy and General Electronics Lab | 0 | 0 | 4 | 2 |
| 20213DSC15_ | Discipline Specific Elective – I | 5 | 0 | 0 | 4 |
| 20213RLC16 | Research Led seminar | - | - | - | 1 |
| | **Total** | 23 | 3 | 4 | 21 |
| | **SEMESTER II** | | | | |
| 20213AEC21 | Microprocessor and Microcontroller | 5 | 1 | 0 | 5 |
| 20213AEC22 | Quantum Mechanics | 5 | 1 | 0 | 5 |
| 20213AEC23 | Condensed Matter Physics | 5 | 0 | 0 | 4 |
| 20213SEC24L | Advanced General Experiments Lab | 0 | 0 | 4 | 2 |
| 20213DSC25_ | Discipline Specific Elective – II | 5 | 0 | 0 | 4 |
| 20213RMC26 | Research Methodology | 3 | 0 | 0 | 2 |
| 20213BRC27 | Participation in Bounded Research | - | - | - | 2 |
| | **Total** | 23 | 2 | 4 | 24 |
| | **SEMESTER III** | | | | |
| 20213AEC31 | Electro Magnetic Theory | 6 | 1 | 0 | 6 |
| 20213AEC32 | Nuclear and Particle Physics | 6 | 1 | 0 | 6 |
| 20213SEC33L | Advanced Electronics Lab | 0 | 0 | 5 | 3 |
| 20213DSC34 | Discipline Specific Elective – III | 5 | 0 | 0 | 4 |
| 202_OEC35_ | Open Elective | 4 | 0 | 0 | 3 |
| 20213SRC36 | Participation in Scaffold Research (Societal Project) | - | - | - | 2 |
| | **Total** | 21 | 2 | 5 | 24 |
| | **SEMESTER IV** | | | | |
| 20213AEC41 | Laser Physics And Non Linear Optics | 6 | 1 | 0 | 6 |
| 20213AEC42 | Numerical Methods and Computational Physics | 6 | 1 | 0 | 6 |
| 20213SEC43L | Numerical Methods Lab with C++ Programming | 0 | 0 | 5 | 3 |
| 20213DSC44_ | Discipline Specific Elective – IV | 5 | 0 | 0 | 4 |
| 20213PRW45 | Project Work | 0 | 0 | 0 | 6 |
| 20213PEE | Programme Exit Examination | - | - | - | 2 |
| | **Total** | 17 | 2 | 5 | 27 |
| | **Total Credits for the Programme** | | | | 96 |

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**Discipline Specific Electives**

| Semester | Discipline specific Elective Courses- I |
|---|---|
| I | a) 20213DSC15A - Computational Physics<br>b)20213DSC15B- Crystal Growth Processes<br>c) 20213DSC15C- Fluid Mechanics |

| Semester | Discipline specific Elective Courses -II |
|---|---|
| II | a) 20213DSC25A - Radiation Safety<br>b)20213DSC25B- Renewable Energy<br>c) 20213DSC25C-Electromagnetic Induction |

| Semester | Discipline specific Elective Courses -III |
|---|---|
| III | a) 20213DSC34A- Photonics Devices and Applications<br>b)20213DSC34B- Analog Systems and Applications<br>c)20213DSC34C-Waves and Optics |

| Semester | Discipline specific Elective Courses -IV |
|---|---|
| IV | a)20213DSC43A- Elements of Modern Physics<br>b)20213DSC43B- Non-linear Dynamics<br>c)20213DSC43C- Thermal Physics |

General Electives

| Semester | General Elective Courses |
|---|---|
| III | a) 20211GEC-Writing for the Media<br>b) 20212GEC-Applicable Mathematics Techniques<br>c) 20214GEC- Green Chemistry<br>d) 20215GEC-Bio-analytical Techniques<br>e) 20220GEC-Internet and Web Design<br>f) 20261GEC- Insurance Services<br>g) 20280GEC-Counselling Psychology |

**Credit Distribution:**

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 14 | 2 | 4 | - | 1 | - | 21 |
| II | 14 | 2 | 4 | - | 4 | - | 24 |
| III | 12 | 3 | 4 | 3 | 2 | - | 24 |
| IV | 12 | 3 | 4 | - | 6 | 2 | 27 |
| Total | 52 | 10 | 16 | 3 | 13 | 2 | 96 |

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| Course Code | Physics Workshop Skills |
|---|---|
| 20113D5C55H | |

The aim of this course is to enable students to get familiar with various mechanical and electrical tools in hands-on mode

**Unit I: Introduction**

Measuring units, conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

*Unit II: Mechanical Skill*

Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects.

**Unit III:** *Materials*

Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils.

*Unit IV: Electrical and Electronic Skill*

Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

*Unit V: Introduction to prime movers:*

Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever, use of pulley, braking systems, working principle of electrical power generation systems.

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Reference Books:


[1] A text book in Electrical Technology-B L Theraja – S. Chand andCompany.
[2] Performance and design of AC machines – M.G. Say, ELBSEdn.
[3] Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt.Ltd
[4] Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
[5] NewEngineeringTechnology,LawrenceSmyth/LiamHennessy,TheEducationalCompany ofIreland[ISBN: 0861674480]


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| Course Code | |
|---|---|
| 20213DSC15C | FLUID MECHANICS |

**Aim:** The course is designed to give fundamental knowledge of fluid, its properties and behavior under various conditions.

| Sr. No | Content |
|---|---|
| 1 | **Fluids and Their Properties:** Introduction of fluid, fluid classifications, hypothesis of continuum, Shear stress in a moving fluid, molecular structure of material, fluid density, viscosity, causes of viscosity in gases and liquids, surface tension, capillary effect, vapor pressure, cavitation, compressibility and the bulk modulus |
| 2 | **Pressures and Head:** Types of Pressure, Pascal's law of pressure at a point, variation of pressure vertically in a fluid under gravity, equality of pressure at the same level in a static fluid, general equation for the variation of pressure due to gravity from a point to point in a static fluid, pressure and head, the hydrostatic paradox, pressure measurements using Elastic Pressure Transducers, Force Balance Pressure gauge, Electrical Pressure Transducers |
| 3 | **Static Forces on Surface and Buoyancy:** Fluid static, action of fluid pressure on surface, resultant force and center of pressure on a plane surface under uniform pressure, resultant force and center of pressure on a plane surface immersed in a liquid, pressure diagrams, forces on a curved surface due to hydrostatic pressure, buoyancy, equilibrium of floating bodies, stability of a submerged body, stability of floating bodies, determination of the metacentric height, determination of the position of the metacentre relative to the center of buoyancy. |
| 4 | **Motion of Fluid Particles and Streams:** Fluid flow, different types of flow, frames of reference, analyzing |

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| | |
|---|---|
| | fluid flow, motion of a fluid particle, acceleration of a fluid particle, discharge and mean velocity, continuity of flow, continuity equations for 2-D and 3-D flow in Cartesian coordinates of system. |
| 5 | **The Energy Equation and its Application:** Momentum and fluid flow, Momentum equation for 2-D and 3-D flow along a stream line, momentum correction factor, Euler's equation of motion along a stream line, Mechanical energy of a flowing fluid – Bernoulli's theorem, kinetic energy correction factor, pitot tube, determination of volumetric flow rate via pitot tube, changes of pressure in tapering pipe, principle of venturimeter, pipe orifices, theory of small orifices discharging to atmosphere, theory of large orifices, Rotameter, elementary theory of notches and weirs, flow in a curved path |

**Reference Books:**


1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K.Kataria & Sons
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications
3. Fluid Mechanics and Hydraulic Machines by R.K. Rajput, S.Chand & Co.
4. Fluid Mechanics by Frank .M. White, McGraw Hill Publishing Company Ltd.
5. Fundamentals of Fluid Mechanics by Munson, Wiley India Pvt. Ltd
6. Fluid Mechanics by A. K. Mohanty, PHI Learning Pvt. Ltd.
7. Laboratory Manual Hydraulics and Hydraulic Machines by R.V Raikar


**Course Outcome:**

After learning the course the students should be able to:

- Understand the basic concept of fluid mechanics.
- Understand statics, dynamics and various approaches in fluid mechanics.
- Understand fundamentals of flow through pipes
- Understand basics of compressible flow
- Correlate fundamentals of fluid mechanics with various mechanical systems


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| Course Code | |
|---|---|
| 20213DSC25C | ELECTROMAGNETIC INDUCTION |

| Pre-Requisites |
|---|
| Different coordinate systems, Laplace's equation, conducting & non-conducting medium, basic definitions in magnetism, propagation of electromagnetic waves, plasma |

| Learning Objectives |
|---|
| ➢ To acquire knowledge about boundary conditions between two media and the technique of method of separation of variables<br>➢ To understand Biot – Savart's law and Ampere's circuital law<br>➢ To comprehend the physical ideas contained in Maxwell's equations, Coulomb & Lorentz gauges, conservation laws<br>➢ To assimilate the concepts of propagation, polarization, reflection and refraction of electromagnetic waves<br>➢ To grasp the concept of plasma as the fourth state of matter |

| UNITS | Course Details |
|---|---|
| UNIT I: ELECTROSTATICS | Boundary value problems and Laplace equation – Boundary conditions and uniqueness theorem – Laplace equation in three dimension – Solution in Cartesian and spherical polar coordinates – Examples of solutions for boundary value problems.<br>Polarization and displacement vector - Boundary conditions - Dielectric sphere in a uniform field – Molecular polarizability and electrical susceptibility – Electrostatic energy in the presence of dielectric – Multipole expansion. |
| UNIT II: MAGNETOSTATICS | Biot-Savart's Law - Ampere's law - Magnetic vector potential and magnetic field of a localized current distribution - Magnetic moment, force and torque on a current distribution in an external field - Magneto static energy - Magnetic induction and magnetic field in macroscopic media - Boundary conditions - Uniformly magnetized sphere. |
| UNIT III: MAXWELL EQUATIONS | Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations - Vector and scalar potentials - Gauge invariance - Wave equation and plane wave solution- Coulomb and Lorentz gauges - Energy and momentum of the field - Poynting's theorem - Lorentz force - Conservation laws for a system of charges and electromagnetic fields. |
| UNIT IV: WAVE PROPAGATION | Plane waves in non-conducting media - Linear and circular polarization, reflection and refraction at a plane interface - Waves in a conducting medium - Propagation of waves in a rectangular wave guide.<br>Inhomogeneous wave equation and retarded potentials - Radiation from a localized source - Oscillating electric dipole |

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| | |
|---|---|
| UNIT V: ELEMENTARY PLASMA PHYSICS | The Boltzmann Equation - Simplified magneto-hydrodynamic equations - Electron plasma oscillations - The Debye shielding problem - Plasma confinement in a magnetic field - Magneto-hydrodynamic waves - Alfven waves and magnetosonic waves. |
| UNIT VI: PROFESSIONAL COMPONENTS | Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism |
| TEXT BOOKS | 1. D. J. Griffiths, 2002, *Introduction to Electrodynamics*, 3rd Edition, Prentice-Hall of India, New Delhi.<br>2. J. R. Reitz, F. J. Milford and R. W. Christy, 1986, *Foundations of Electromagnetic Theory*, 3rd edition, Narosa Publishing House, New Delhi.<br>3. J. D. Jackson, 1975, *Classical Electrodynamics*, Wiley Eastern Ltd. New Delhi.<br>4. J. A. Bittencourt, 1988, *Fundamentals of Plasma Physics*, Pergamon Press, Oxford.<br>5. Gupta, Kumar and Singh, Electrodynamics, S. Chand & Co., New Delhi |
| REFERENCE BOOKS | 1. W. Panofsky and M. Phillips, 1962, *Classical Electricity and Magnetism*, Addison Wesley, London.<br>2. J. D. Kraus and D. A. Fleisch, 1999, *Electromagnetics with Applications*, 5th Edition, WCB McGraw-Hill, New York.<br>3. B. Chakraborty, 2002, *Principles of Electrodynamics*, Books and Allied, Kolkata.<br>4. P. Feynman, R. B. Leighton and M. Sands, 1998, *The Feynman Lectures on Physics*, Vols. 2, Narosa Publishing House, New Delhi.<br>5. Andrew Zangwill, 2013, Modern Electrodynamics, Cambridge University Press, USA. |
| WEB SOURCES | 1. http://www.plasma.uu.se/CED/Book/index.html<br>2. http://www.thphys.nuim.ie/Notes/electromag/frame-notes.html<br>3. http://www.thphys.nuim.ie/Notes/em-topics/em-topics.html<br>4. http://drexel.edu/Science/Physics/Electromagnetism/Courses and Tutorials/<br>5. https://www.cliffsnotes.com/study-guides/physics/electricity-and-magnetism/electrostatics |

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| Course Code | Physics of Radiography |
|---|---|
| 20113DSC65B | |

**Course Objectives:**

- Study on x-ray production and its physics, different types of x-ray tube and x-ray generators.
- Learn about different image receptor systems like screen film radiography.
- Trained on Computed tomography and applications.
- Study on basic principles of ultrasound.
- Understand nuclear magnetic resonance and MRI

**1. X-Ray Production, X-Ray Tubes and Generators:** Discovery of X-rays, Production and properties of x-rays ,X-ray tubes, X-ray tube insert, tube housing, filtration and collimation, X-ray generator -function and components, -circuit design, Timers in radiography. Factors affecting x-ray emission Power rating and heat loading x-ray exposure rating charts. Nature of Cooling, Safety devices in X-ray tubes, Mammography - X-ray tube design, X-ray generator and phototimer system, compression scattered radiation and magnification, screen-film cassettes and film processing, Ancillary procedures, radiation dosimetry. (16 hours)

2. Screen-Film Radiography and Film Processing: Basic geometric principles of radiographic image, Latent image, screen-film system, construction and characteristics, optical density, contrast, speed and latitude, Types of films, intensifying screens – construction and action, Types of screens-rare earth, Fluoroscopic, Film exposure, Radiographic grids. Film processing, Automatic Film Processing, artifacts, Processor QA, Contrast and dose in radiography, scattered radiation in projection Radiography, reduction of patient dose, patient dose measurement, dose level for diagnostic procedures, methods to reduce patient dose. Image Quality –Unsharpness, Spatial resolution, Contrast, contrast agents, Image Noise, Image distortion and artifacts, detective quantity efficiency, sampling and aliasing in digital images, contrast-detail curves

(16 hours)

3. **Computed Tomography and Other X-ray techniques:** Basic principles, Historical development, Detectors and detector arrays , Details of acquisition, Reconstruction algorithms, Radon Transform, Back Projection, Filtered Back projection, Iterative Reconstruction, ML-EM, Digital image display, scan motions, x-ray sources, collimation, X-ray detectors, viewing system, Radiation Dose, Image quality, Artifacts, Fluoroscopy, image intensification, Digital fluoroscopy, Automatic Brightness Control, Cine fluorography, Xeroradiography-. Digital Radiography- Thermography-Basic principles, scanning techniques, radiation dose to patients, Radiography of welds-casting and forgings, Microradiography, Autoradiography, Flash radiography, X-ray diffraction analysis.

**(16 hours)**

**4. Ultrasound:** Basic principles, Characteristics of sound, nature and production of ultrasound, interaction of ultrasound with matter, Transducers and their design, Piezoelectric effect, frequency response of transducers, various types of transducers,

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Ultrasound beam properties, Image data acquisition, Dynamic range, Different scan modes-A,B,M modes, Two-Dimensional image display and storage Real time scanning, Principles of Gray-scale imaging, significance of gain and gain compensation, pulse rate and its significance, Resolution and frequency, depth and frequency, Image quality, artifacts, Doppler techniques and principles of colour Doppler , System performance and QA, Acoustic power and biological effect of ultrasound (16 hours)

**5. Nuclear Magnetic Resonance (NMR) and MRI:** Magnetization properties, Generation and detection of magnetic resonance signals, Interaction of nuclei with a static magnetic field, Rotation and precession, Interaction of nuclei with radiofrequency wave, induction of a magnetic resonance signal in a coil, Quantum mechanical interpretation, Bulk magnetization, relaxation processes:T1 and T2, Relaxation times (T1 and T2) quality assurance, acceptance testing and commissioning of radiation system for biologic materials. Pulse sequences, spin echo, Inversion recovery, Gradient recalled echo, signal from flow, perfusion and diffusion contrast, Magnetization transfer contrast, Principles of MRI, Localization of MR signal, k-space data acquisition and image reconstruction, 3d Fourier transform image acquisition, image characteristics, angiography and magnetization transfer contrast, artifacts, instrumentation, safety and bioeffets. (16 hours)

| Expected course outcomes: |
| --- |
| • Able to explain x-ray production and its physics, different types of x-ray tubes and x-ray generators.<br>• Able to handle different image receptor systems like screen film radiography, latent image formation, film processing, dark room and film characteristics. |

STANDARD BOOKS FOR STUDY AND REFERENCES


1. Diagnostic radiology for teachers and students, IAEA Publication, *Pub1394*
2. N. Smith and A. Webb , Introduction to Medical Imaging Physics, Engineering and Clinical Applications 2011,Cambridge University Press
3. W.J. Meredith and J.B. Massey "Fundamental Physics of Radiology" John Wright and Sons, UK, 1989
4. Christensen 'Physics of Diagnostic Radiology' Lea and Febiger – Philadelphia (1990).
5. W.R. Hendee, "Medical Radiation Physics", Year Book – Medical Publishers Inc. London, 1981
6. P. Sprawls, Magnetic Resonance Imaging: Principles, Methods and Techniques, Medical Physics Publishing, Madison (2000)



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| Course Code | |
|---|---|
| 20213DSC44C | Thermal Physics |

Course Objectives:

- To study fundamentals of thermodynamics.
- To study statistical behavior of many particle systems.

Course Outcomes:

**CO1:** Apply the laws of thermodynamics to heat engines and estimate thermal efficiency.

**CO2:** Understand the interrelationship between thermodynamic functions and ability to use such relationship to solve practical problem.

**CO3:** Remember the laws of thermal radiation.

**CO4:** Analyze in depth about statistical radiation and the basic ideas about different statistics.

MODULE I : KINETIC THEORY OF GASES (15 Hrs)

Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

THERMODYNAMICS:

Basics of thermodynamics-Kelvin's and Clausius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature-Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

MODULE II: THERMODYNAMIC POTENTIAL AND MAXWELL'S EQUATIONS

(15 Hrs)

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

LOW TEMPERATURE PHYSICS:

Joule Kelvin effect – liquefaction of gas using porous plug experiment, Joule expansion-

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Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

**MODULE III : QUANTUM THEORY OF RADIATION:** **(15 Hrs)**

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's distribution law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyrolicliometer - determination of solar constant, effective temperature of sun.

MODULE IV: STATISTICAL MECHANICS (15 Hrs)

Introduction, postulates of statistical mechanics, Phase space, concept of ensembles and some known ensembles ,classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas-Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws Application of B-E distribution to Photons-planks radiation formula, Application of Fermi-Dirac statistics to White dwarfs and Neutron star

Textbooks:-

1. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007.
2. Second Year Physics –Telegu Academy.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics)S.Chand & Co.
4. Heat and Thermodynamics by Mark W.Zemansky 5thedition McGraw - Hill
5. Heat and Thermodynamics by D.S. Mathur.

Reference Books:-

1. Modern Physics by G. Aruldhas and P. Rajagopal,Eastern Economy Education.
2. Berkeley Physics Course. Volume-5. Statistical Physics by F. Reif. The McGraw-HillCompanies.
3. An Introduction to Thermal Physics by Daniel V. Schroeder,Pearson Education LowPrice Edition.

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4. Thermodynamics by R.C. Srivastava, Subit K. Saha&Abhay K.Jain Eastern EconomyEdition.
5. Modern Engineering Physics by A.S. Vasudeva,S.Chand& Co. Publications.
6. Feyman's Lectures on Physics Vol. 1,2,3& 4.Narosa Publications.
7. Fundamentals of Optics by Jenkins A. Francis and White E. Harvey,McGraw Hill Inc.
8. .B.B. Laud "Introduction to statistics Mechanics"(Macmillan 1981)
9. F.Reif: "Statistical Physics "(Megraw-Hill,1998)
10. K.Haung: "Statistical Physics "(Wiley Eastern 1988)

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| Subject Code | Subject Name |
|---|---|
| 22513MFP | Certificate course on mathematical foundation for physics |

Syllabus

COURSE OBJECTIVES:

- To equip students with the mathematical techniques needed for understanding theoretical treatment in different courses taught in their program
- To extend their manipulative skills to apply mathematical techniques in their fields
- To help students apply Mathematics in solving problems of Physics

**Unit I: Differential Calculus**

Limits and differentiation-Derivative of functions- Derivative interactive graphs-Differential Equations in Physics

**Unit II: Integral Calculus**

Finite sums- Limits of finite sums-Definite integrals- Integration of functions-Fundamental theorem of calculus

**Unit III: Determinant and Matrix**

Basics of determinants and matrices-Types of matrices- Simultaneous linear equations-Eigenvalue and eigenvectors-Matrices in Physics

**Unit IV: Vector Calculus** Differentiation of vectors-Gradient, divergence, curl-Integration of vectors-line, surface and volume integral

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**Unit V: Few Basic Functions in Physics** Plotting of functions-Beta and Gamma Function-Riemann Zeta Function-Dirac Delta Function

**Probability and Statistics** Probability, Multiplicity, Combinatorics-Bernoulli Distribution-Poisson and Gaussian Distribution-Boltzmann, Power Law, Lorentzian Distribution

**Course Outcomes**

At the end of the course, trainees/students will be able to:

1. Understand use of differential calculus and be able to apply them in real problem
2. Able to understand integral calculus, do integration.
3. Analyze characteristics of matrices and its different types, and the process of diagonalization.
4. Solve differentiation and integral of vectors

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| Subject Code | Subject Name |
|---|---|
| 22513OFT | Certificate course on industry linked optical fiber technology |

Syllabus

**COURSE OBJECTIVES:**

1. To realize the significance of optical fiber communications.
2. To understand the construction and characteristics of optical fiber cable.
3. To develop the knowledge of optical signal sources and power launching.
4. To identify and understand the operation of various optical detectors.
5. To under the design of optical systems and WDM.

**Unit 1- Introduction**

Need for optical communication, salient features of optical fibers, ray theory of light guidance, numerical aperture, modes of a fiber, single and multimode fibers, step-index and graded-index fibers.

Transmission characteristics of optical fibers, attenuation, pulse broadening mechanism, intermodal dispersion, bit rate - length product, material dispersion.

**Unit 2- Basic Optical Communications Concepts**

P2P System, Transmitter, Light Source, LED, Laser Diode, Detector, PIN diode, Avalanche Photo Diode, Optical Amplifiers, EDFA, PDFA, Regeneration, ADM, OADM, Digital Cross Connect, RPR Ring.

**Unit 3- Optical Fiber**

Core, Cladding, Primary Buffer, Types of Fibers, Silica Core Silica Cladding, Silica Core, Plastic Cladding (PCS), Plastic Core Plastic Cladding (POF), fiber fabrication techniques.

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**Unit 4- Cable Splicing**

Fusion Splicing, Mechanical Splicing, Single Fiber Fusion Splicing, Mass Fusion Splicing, Stages of Splicing, Splicing Precautions, Misalignment, End Gap, End Angle, NA Mismatch, Core Mismatch, Waisting, Bulging, Axial Run-out, Bubble, Incomplete Fusion

**Unit 5- Testing of Cables**

Continuity Test, Light Source- Power Meter, OLTS, Visual Fault Locator, OTDR Testing, Measuring Cable Span, Attenuation Coefficient, Connector/ Splice Loss Measurement, Distance to Fault, OTDR Trace Analysis, Optical Loss Budget.

**TEXT BOOKS:**

1.Optical Fiber Communications – Gerd Keiser, Tata Mc Graw-Hill International edition, 4th Edition, 2008.

2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002. REFERENCE BOOKS:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.

2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005. 3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Edition, 2004.

4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

COURSE OUTCOMES:

At the end of the course the student will be able to:

1. Understand and analyze the constructional parameters of optical fibers.
2. Be able to design the optical system.
3. Estimate the losses due to attenuation, absorption, scattering and bending.
4. Compare various optical detectors and choose suitable one for different applications.

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| Subject Code | Subject Name |
|---|---|
| 22513SPS | Certificate course on installation and maintenance of solar photovoltaic systems |

**Syllabus**

**Course Objectives:**
The main objectives of this course are to:

1. To make student to understand the importance of solar energy and its effective utilization.
2. To bring exposure to various tools and equipment used for Solar Photovoltaic installation.
3. To get hands-on training on the Installation and maintenance of Solar Photovoltaic Systems.
4. To bring knowledge on the possibility of Employability and Entrepreneurship avenues in the area of solar energy extraction and utilization.

**Unit 1- Introduction**
An Introduction: Energy from the Sun-Sun Path Diagram and Solar Radiation

**Unit 2- Fundamentals of Solar Photovoltaic Systems**
Components of a Solar PV System-Types of Solar Photovoltaic Systems-Technical Parameters and Performance of a Solar PV Panel.Identification and Uses of Tools and Equipment Used for Solar PV Installation.

**Unit 3- Installation of Solar Photovoltaic Systems**
The Importance of Accurate Load and Site Assessment-Steps for Conducting a Load Assessment-Steps for Conducting a Site Assessment-Procurement of the Solar PV System Components-Civil and Mechanical Parts of Solar PV System-Construction of Equipment

**Unit 4- Components of Solar Photovoltaic Systems**
Foundation-Installation of Mounting System, Photovoltaic Module and Battery Bank and inverter stands. Installation of Electrical Components, Conduits, Cables- Installation of Grounding Systems and Battery Bank.

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**Unit 5- Test & Measurement and Maintenance of SolarPhotovoltaic Systems**

Tools and Accessories Required for PV System Testing-Overall System Inspection-Testing of Solar Array-Wire and Earthing Continuity Tests-Testing of Charge Controller-Testing of Batteries-Start-up the System-Unintentional Islanding Functionality Tests-Sample Test and Commission Record Sheet-Tools Required for Maintenance-Preventive Maintenance of PV System-Troubleshooting and Maintenance.

**Course Outcomes**

At the end of the course, trainees/students will be able to:

1 Gain knowledge on renewable energy sources, solar PV systems, potential, and applications.

2 Analyze the solar geometry, system parameters, challenges, and opportunities.

3 Understand the system sizing, costing, installation, and operation with and without storage systems.

4 Development of solar PV systems for domestic, commercial, and industrial applications.

5 Performance analysis of a solar PV system for livelihood development.

6 Develop an understanding of the perspective on SDGs 7, 8, and 13.

References


1. Solar energy by Sukhatme, Tata McGraw-Hill Education, 1987.
2. Solar Energy Utilization Edited by Hafit Ursell, E. Peykes, Y. Yeats, Springer Netherlands, 1987.
3. Solar Energy Utilization: A Textbook for Engineering Students byG. D. Rai Khanna Publishers, 1987.



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Department of Physics

| Subject Code | Subject Name |
|---|---|
| 22513DC | Certificate course on installation and maintenance of digital circuits |

Total : 45 hours

Syllabus

**Course Objectives:**

The main objectives of this course are to:

1. To make student to understand the importance of digital electronic circuits
2. To bring exposure to various tools and equipment used for installation of digital electronic circuits.
3. To get hands-on training on the installation and maintenance of digital electronic circuits.
4. To bring knowledge on the possibility of Employability and Entrepreneurship avenues in the area of digital electronic circuits.

Unit 1

Digital System and Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McCluskly method (Tabular method).

Unit 2

Combinational logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary addersubtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.

**Unit 3**

Sequential Logic and Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

**Unit 4**

Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

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Unit 5

Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.

**Course Outcomes**

At the end of the course, trainees/students will be able to:

1 Apply concepts of Digital Binary System and implementation of Gates.

2 Analyze and design of Combinational logic circuits.

3 Analyze and design of Sequential logic circuits with their applications

4 Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits

5 Apply the concept of Digital Logic Families with circuit implementation

References

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

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Department of Physics

| Subject Code | Subject Name |
|---|---|
| 22513DC | Certificate course on microcontroller |

Total : 45 hours

Syllabus

Course Objectives:

The main objectives of this course are to:

1. To make student to know the significance of microcontroller
2. To convey details about several tools about microcontroller
3. To acquire hands-on training on the maintenance of microcontroller
4. To transfer knowledge on the possibility of Employability and Entrepreneurship avenues in the field of microcontroller

Unit 1

Block diagram of microcontroller : CPU, input device, output device, memory and buses, common features of Microcontrollers : On-chip Oscillator, program and data memory, I/O Ports, Watchdog timer reset, SFRs, Timers, Counters, Interrupts, ADC, PWM, microprocessor and microcontroller, Hierarchy of microcontrollers, architectures of microcontroller Harvard , Von Neumann RISC and CISC, Applications: House hold , Communication, Office equipment and industrial automation

Unit 2

Blocks of Microcontroller 8051: ALU, PC, DPTR, PSW, Internal RAM, Internal ROM, Latch, SFRs, General purpose registers, Timer/Counter, Interrupt, Ports, Functions of each pin of 8051 Clock circuit, reset Circuit , phase and state in machine cycle of 8051, Memory organization of 8051: Program and Data memory Map, External Memory Addressing and Decoding Logic of 8051, Stack, Stack Pointer and Stack operation, Timers/Counters logic diagram and its operation in various modes, I/O Ports structure: Port 0, Port 1, Port2, Port 3., Serial Communication in various modes, Interrupt structure, vector address, priority and operation

Unit 3

Addressing Modes : Immediate, Register, Direct, Indirect, Indexed, Relative and bit addressing, Instruction set :Data Transfer, Arithmetic, Logical, Branching, and Machine Control, Looping , Counting, sorting and Indexing, Data manipulation, Masking , Stack operation, Conditional programming, Configuration and programming of Timer/Counter using SFRs: TMOD, TCON,

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THx, TLx., Configuration and programming of interrupts using SFRs: IE,IP,Configuration and programming of I/O Port : P0,P1,P2,P3

**Unit 4**

Swach: Pushbution, DIP, Thumbwheel, Tilt, Relay,LED,7 segment LED, LCD, ADC0804,Temperature sensor LM35, DAC0808, ADC0804, Damper Control, Hoper Control, DC Motor, Stepper motor, Serial communication using MAX 232,Hyperterminal

**Unit 5**

Application of microcontroller in various field - Using LM35, ADCC0804, Microcontroller, 7 segment LED - Using Analog Multiplexer 4051,ADC0804,Microcontroller, 7 segment LED,MAX232 - Using GSM Modem, Microcontroller, Relay, Switches - Using Photo interrupter, Microcontroller, 7 Segment LED - Using Pushbutton switches, Microcontroller, Relay, NVRAM.

**Course Outcomes**

i. At the end of the course, trainees/students will be able to:
   I Identify features of various microcontroller
   ii. Select appropriate microcontroller for different application
   iii. Interface microcontroller with hardware for given application
   iv. Write and execute assembly language programs(software) for given application
   v. Develop small microcontroller based applications.

References


1. Microcontrollers : Principles And Applications Pal Ajit EEE, PHI, New Delhi,(Latest edition)

2. The 8051 Microcontrollers: Architecture, Programming and Applications Rao Dr. K Uma Pearson Education India, New Delhi,(Latest edition)

3.The 8051 microcontroller and embedded systems Mazidi Ali, Muhammad Mazidi Gillispie Janice PHI, New Delhi,(Latest edition)

4. The 8051 Microcontroller: Architecture, Programming, and Applications Kenneth Ayala J. Thomson Delmar learning,(latest Edition)

5. The 8051 Microcontroller, Mackenzie Pearson Education India, New Delhi,(Latest edition)

6.Programming and customizing the 8051 microcontroller Predko Michael McGraw-Hill, International edition



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## CRYSTAL GROWTH ANALYSIS

**Course Objectives:**

This course is designed to provide a detailed study on Ceramic materials and their applications in devices. The prerequisite for this would be to do a fist course on concepts of materials science.

**Course Outcomes:**

At the end of this course, students will have a thorough knowledge of functional ceramic materials. Know the methods of synthesis of functional ceramics. Acquire knowledge of how to choose ceramic materials for specific applications.

**Unit I - Thermodynamics of Crystal Growth**

Saturation and super saturation – solubility curve – expression for super saturation-solubility diagram –nucleation – Theories of nucleation – Gibbs Thomson equation for vapour –Modified Thomson's equation for melt – Gibbs Thomson equation for solution – Kinetic of crystal growth– Single and rough faces – Models of surface roughness - KSU theory and BCF theory.

**Unit II - Growth from solutions**

Low temperature solution growth: Slow cooling process – solvent evaporation process –Temperature difference process – Use of electrolytic process high temperature solution growth: Solvent & solutions - slow cooling methods – temperature difference methods – high pressure method – solvent evaporation method – electrolytic process - liquid phase epitaxial.

**Unit III - Growth from melt**

Bridgeman and related techniques – crystal pulling – correction to melts – modeling and simulation of bulk crystal growth considering melt growth – czochralski technique – zone melting technique – skull melting process – verneuil process-Heat exchange method.

**Unit IV - Other Crystal Growth Techniques**

Physical vapour deposition-chemical vapour deposition – chemical vapour transport –definition – fundamentals – choice of transport reactions – specifications – Transported materials and agents-STP,LTVTP,OTP-Hydrothermal growth: Design aspect of autoclave-electro crystallization-Gel method: principle-types of gels-structure of gels-growth in gels-experimental procedure-biological crystallization.

**Unit V - Analysis and Characterization of Crystals**

Optical transmission studies (UV) Micro hardness studies-Structural analysis-XRD-Fourier Transform-IR-Spectral analysis-Scanning Electron Microscope (SEM)-different etching techniques.

**Books for Reference:**


1. Brice J.C. Crystal Growth Processes, John Wiley & sons , New York 1986.
2. Santhanaraghavan P, Ramasamy . P, Crystal Growth – Process and Methods, KRU
3. Publications, Kumbakonam, 2000.
4. Buckly H.E, Crystal Growth, John Wiley & Sons, New York, 1986.
5. Gilman J, The Art of Science of Growing Crystals, John Wiley & Sons, New York, 1956.
6. William Kemp, Organic spectroscopy, 3 rd Edition, , Palgrave, New York, 2004.



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## Semiconductor Physics

**Course Objectives:**
Learn basics in analytical techniques. Characterize the structures and chemistries of materials. Select the proper characterization technique to solve problems in research and/or industry.

**Course Outcomes:**
The students will learn materials characterization techniques and use this knowledge to choose appropriate technique. Surface, interfaces and thin films characterization; Metals, ceramics, polymers, semiconductors and composite characterization.

**UNIT – I: CIRCUIT ELEMENTS:**
Resistance in series and parallel – Capacitor in series and parallel – Conversion of galvanometer into voltmeter – Conversion of galvanometer into ammeter – Multimeter – CRO, AFO (Qualitative study only).

**UNIT – II: ELECTRICITY:**
Ohm;s law – Kirchof's law – Wheatstone bridge – condition for bridge balance – Meter bridge – Specific resistance – Temperature co-efficient of resistance – Potentiometer – Measurement of current – voltage and resistance.

**UNIT – III: SEMICONDUCTORS:**
Conductors, Insulators, Semiconductors, P-type, N-type – semiconductors – PN-Junction diode – Zener diode – Static characteristics – Voltage regulation – Rectifiers – Half wave rectifiers – Bridge Rectifiers – Calculation of ripple factor and efficiency.

**UNIT – IV: BREAK DOWN DEVICES:**
FET – Design of FET – FET characteristics – working of FET – SCR – Design – Characteristics – Triac – design and characteristics – Diac – design and characteristics.

**UNIT – V: OPTO ELECTRONIC DEVICES:**
LED – voltage and current – Advantages and applications of LED – LCD – Photo diode – its operation and application – Phototransistor – LED as Seven segment display.

**REFERENCE BOOKS:**

1) Electricity and Magnitism by Brijlal and Subramaniam.
2) Principles of electronics by V.K. Metha.

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Department of Education

Minutes of the meeting of the Board of Studies (BoS)*

**Date:** 09.05.2022
**Venue:** Silver Jubilee Seminar Hall, First floor ( CRD)
**Time:** 11.00 am

**Members present:**
Chairman: Dr.R.Gunasekaran
M.Sc , M.Ed, M. Phil, Ph.D.,
Head & Professor
School of Education
PRIST Deemed to be University

**External Members**

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. N.Sasikumar M.Sc.,M.Ed.,M.Phil.,Ph.D Associate Professor, Head, Department of Education, Alagappa University,Karaikudi | Head, Department of Education, Alagappa University,Karaikudi | Physical | Dr. N. SASIKUMAR, M.Sc.,M.Ed.,M.Phil.,Ph.D Assistant Professor Department of Education Alagappa University Karaikudi - 630 003 |
| 2 | Dr.K. Muthusamy M.Com,M.Ed,M.Phil,Ph.D., Principal,Annai FathimaCollege of Education, Kumbakonam | Principal,Annai FathimaCollege of Education, Kumbakonam | Physical | Dr.K.MUTHUSAMY, PRINCIPAL |

**Internal Members**

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr.R.Gunasekaran M.Sc , M.Ed, M. Phil, Ph.D., Head & Professor | Department of Education | Physical | 09.05.2022 |

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| | | | | |
|---|---|---|---|---|
| 2 | Dr.P.Rajasekar<br>M.A., M.Ed,M. Phil,<br>Ph.D.,Professor | Department of Education | Physical | |
| 3 | Dr K.B.Jasmine<br>SuthandiraDevi<br>M.A., M.Ed,M. Phil,<br>Ph.D.,Professor | Department of Education | Physical | |
| 4 | Dr.M.Balasubramanian<br>M.A., M.Ed,M. Phil,<br>Ph.D.,Associate Professor | Department of Education | Physical | |
| 5 | Dr.M.Aron Antony<br>CharlesM.Sc., M.Ed,M.<br>Phil, Ph.D.,<br>Associate Professor | Department of Education | Physical | |
| 6 | Dr.S.Selvaraj<br>M.A,M.Ed. M.Phil, Ph.D.,<br>Assistant Professor | Department of Education | Physical | |
| 7 | Mrs.R.Vaishnavi<br>M.A.M.Ed., M. Phil,<br>Assistant Professor | Department of Education | Physical | |
| 8 | T.Selvaraj<br>M.Sc.,M.Ed, M. Phil,<br>Assistant Professor | Department of Education | Physical | |

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class Institute/Organization/Address | On/Line/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr.Chinnappa<br>M.Sc,M.Ed.,M.Phil,Ph.D.,PGDCA<br>Dean, School of Arts and Science, PRIST Deemed to be University, Thanjavur | Dean, School of Arts andScience,<br>PRIST DEEMED TO BE UNIVERSITY, Thanjavur | Physical | |
| 2 | P. Merlin Jesita<br>M.A.,B.Ed.,<br>II - M.Ed Student<br>Teacher,Ponniya Ramajayam CBSC Public School, Thanjavur. | PRIST DEEMED TO BE UNIVERSITY, Thanjavur | Physical | |
| 3 | R.Ramya<br>B.Sc<br>II - B.Ed Studen | PRIST DEEMED TO BE UNIVERSITY, Thanjavur | Physical | |

Agenda

1. Confirmation of the previous Meeting Minutes
2. Action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feedback on B.Ed. and M.Ed. curriculum



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4. To consider about inclusion of syllabus in Pedagogy subjects based upon the Tamil nadu Text book society
5. To consider the introduction of employment oriented add on courses
6. To consider the introduction to new course.
7. To consider the introduction to value added course.
8. To recommend the panel of examiners for B.Ed. & M.Ed.
9. Any other matter

SCHOOL OF EDUCATION

**Department of Education**

**Minutes of the Board of Studies**

The Board of Studies meeting was held on 09.05.2022. The Chairman Dr.R.Gunasekaran Welcomed the members to Board of studies and outlined the changes to be made in the following for the board approval.

Item 1. To consider change in the Curriculum, Scheme of Examination and Syllabi of B.Ed & M.Ed course and approval.

Item 2. To suggest the panel of names for appointment of examiners.

Item 3. Other academic activities in the department.

As per the suggestions and recommendations given by the Stakeholders on the above items discussed, the existing/revised Scheme of Curriculum/Scheme of Examination syllabi and Panel of Examiners are to be followed is annexed herewith for the implementation from the commencement of the Academic year 2021-2022.

The members after careful scrutiny of the changes to be made unanimously accorded approval for the proposed changes/modifications. They also resolved to authorize the Chairman of Board of Studies to place the changes/modifications now approved by the BOS before the Standing Committee on Academic affairs and Academic Council.

The Regulations and Syllabus for B.Ed. and M.Ed. Courses were discussed in the BOS.

| Agendum 1: Confirmation of the previous Meeting Minutes |
|---|
| Discussion: The minutes of the 7th Board of Studies meeting held on 13th July 2021 were communicated to the members. The comments received have been incorporated and placed forconfirmation. The same was approved by the 7th Academic council. |
| Resolution: Resolution: The coordinator read the minutes of earlier meeting and the minutes were Reviewed and passed by the members. |

| Agendum 2: Action taken on the previous Meeting Minutes | |
|---|---|
| Discussion: The details of the action taken were presented to the members | |
| Resolution: The members expressed satisfaction over the action taken | |
| Agendum 3: To scrutinize the stakeholder feedback on B.Ed and M.Ed curriculum | |
| Discussion | 1. Introducing the changes of new trends of curriculum in the pedagogy subjects<br>2. More appropriate topics should be added for M.Ed. curriculum based upon the recenttrends<br>3. For B.Ed. and M.Ed. regular TET and TRB coaching hours should be added<br>4. To introduce the Psychology practical record in the curriculum for M.Ed. |
| Resolution | The board unanimously resolved to make necessary changes as requested by the stake holders |



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|---|
| Agendum 4: To consider about inclusion of syllabus in Pedagogy subjects based upon the TamilnaduText book society |
| Discussion The Tamil nadu text book society changed the school syllabus frequently so B.Ed. pedagogy curriculum syllabus also modify based upon the resent trends |
| Resolution The members of the board resolved to approve the modified syllabus of the pedagogysubjects in the B.Ed. curriculum |

| |
|---|
| Agendum 5: To consider the introduction of employment oriented add on courses |
| Discussion The existing syllabus gives enough opportunity for employability and there was no urgentneed to introduce new add on courses. Also it was pointed out that, the syllabus should be revised compulsorily next year based upon the new education policy |
| Resolution: Resolved to introduce some more employment oriented add on courses in the next BOS meeting |
| Agendum 6: To consider the introduction to new course |
| Discussion The board members give syllabus new course for B.Ed : Childhood and Growing up, Value and Peace Education, Teaching and Learning, Pre - Primary Education, Disasster Management, Professional Course for Teacher Proficiency, Strengthening Language Proficiency, Gender Issues in Education, Understanding the self, Addressing Specials needs in Classroom M.Ed new course: Early Child Care and Education, Inclusive Education, Pre - Service and In-service Teacher Education, Sociology of Education, Educational Measurement and Evaluation, Educational Studies, Comparative Education, ICT on Teaching and Learning, Crucial Understanding of ICT and Cyber Security. |
| Resolution: Resolved to introduce new course in the next BOS meeting |
| Agendum 7: To consider the introduction to value added course |
| Discussion The existing syllabus gives enough ouese of the Value added course Educational and Social action, NCC, Health and Well-Being, Modern Pedagogical Techniques, Technical Writing. |
| Resolution: Resolved to introduce some more employment oriented Value added courses in the next BOS meeting |

| |
|---|
| Agendum 8: To recommend the panel of examiners for B.Ed. & M.Ed. |
| Discussion Members suggested the names of the experts who would serve as panel of examiners forB.Ed. and M.Ed. Programme |
| Resolution: The BOS approved a tentative list of subject experts for paper setting, moderation and Examiners. If required few more experts may be included with the permission of the Concerned authorities |
| Agendum 9: Review Of Curriculum & Syllabus In B.Ed-Regulation 2022 |

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Discussion

- To discuss the modifications in the syllabi for First and Second Year curriculum
- As such, the curriculum is revisited and certain sweeping changes have been made – by introducing new courses and improvising the syllabi of many courses. The honorable members Board of Studies have expressed their appreciations for the changes made commenting that they address the current demands of the education Profession.

Resolution:

Resolved to Improvements in Course Contents of the following paper B.Ed (B.Ed I,II,III and IV semester)I - Semester

Group – A: Perspectives in Education

| | Course Code | Course Title | Revision |
|---|---|---|---|
| Group – B: Curriculum | 22130PE11<br>22130PE12 | Psychology of Learners and Learning Assessment for Learning And Pedagogic studies | I - semester I - semester |
| | 22130CP13A | Pedagogy of Tamil: Part - I | I - semester |
| | 22130CP13B | Pedagogy of English: Part - I | I - semester |
| | 22130CP13C | Pedagogy of Mathematics: Part - I | I - semester |
| | 22130CP13D | Pedagogy of Physical Science: Part - I | I - semester |
| | 22130CP13E | Pedagogy of Biological Science: Part - I | I - semester |
| | 22130CP13F | Pedagogy of Computer Science: Part - I | I - semester |
| | 22130CP13G | Pedagogy of Social Science: Part - I | I - semester |
| | 22130CP13H | Pedagogy of Commerce and Accountancy : Part - I | I - semester |
| | 22130CP13I | Pedagogy of Economics: Part - I | I - semester |
| | 22130CP13J | Pedagogy of History: Part - I | I - semester |
| | 22130CP13K | Pedagogy of Geography: Part - I | I - semester |

II - Semester

| S.N0. | Course Code | Course Title | Revision |
|---|---|---|---|
| Group –:A | Perspectives in | Education | |
| | 22130PE21 | Contemporary India and Education | II - semester |
| | 22130PE22 | Teaching and Learning | II - semester |
| Group – B: | | Curriculum and Pedagogic studies | |
| | 22130CP23A | Pedagogy of Tamil: Part – II | II - semester |



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| | | | |
|---|---|---|---|
| | 22130CP23B | Pedagogy of English: Part - II | II - semester |
| | 22130CP23C | Pedagogy of Mathematics: Part - II | II - semester |
| | 22130CP23D | Pedagogy of Physical Science: Part – II | II - semester |
| | 22130CP23E | Pedagogy of Biological Science: Part - II | II - semester |
| | 22130CP23F | Pedagogy of Computer Science: Part - II | II - semester |
| | 22130CP23G | Pedagogy of Social Science: Part - II | II - semester |
| | 22130CP23H | Pedagogy of Commerce and Accountancy : Part – II | II - semester |
| | 22130CP23I | Pedagogy of Economics: Part - II | II - semester |
| | 22130CP23J | Pedagogy of History: Part - II | II - semester |

III - Semester

| | | | |
|---|---|---|---|
| Group –A | Perspectives in | Education | Revision |
| | 2130PE31 | Knowledge and Curriculum | III - semester |

IV - Semester

| | | | |
|---|---|---|---|
| Group –A | Perspectives in | Education | |
| | 22130PE41 | Language across the Curriculum | IV - semester |

Review Of Curriculum & Syllabus In M.Ed –Regulation 2022

Resolved to introduce the following Courses in the M.Ed programme curriculum witheffect from 2022-23

I - Semester

| Course Code | Course Title | Revision |
|---|---|---|
| 22230TE14 | Teacher Education In India Elementary& Secondary Level | |
| 22230SC15A | Early Child Care and Education | |

II - Semester

| | | |
|---|---|---|
| 22230PC21 | Philosophy of Education | |

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| | |
|---|---|
| 22230SC25B | Pre-service and In-service TeacherEducation |

**III - Semester**

| | |
|---|---|
| 22230PC31 | Sociology of Education |
| 22230TC33 | Educational Measurement andEvaluation |

**IV - Semester**

| | |
|---|---|
| 22230PC41 | Educational Studies |
| 22230PC42 | Comparative Education |
| 22230TC43 | ICT on Teaching and Learning<br>ONLINE COURSE (CHOICE BASED) |
| | MOOC SWAYAM -I Course (Not less than 4 weeks) |

Signature:

Chair/BoS

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Department of Education

Name: Dr. M. Arun Antony Charles

Date: 09.05.22

Signature:

Dean

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Name: Dr. R. RAMASUBRAMANIAN

Date: 09-05-2022

Mandatory Attachments:

1. Minutes of the previous BoS meeting minutes and report on the follow-up action taken.
2. BoS Meeting 'Notification' sent to all members, including online meeting link.
3. Online Screenshots and geo-tagged photos in the venue.
4. Attendance sheet print of online attendees.
5. Detailed syllabi with PEOs, POs, COs, etc. (in Annexures), if new Programme(s) introduction /Curriculum revision is discussed.

**Note:** The 'minutes' of the BoS meeting along with the attachments as listed above must be mailed to the Registrar by the HoD within three days after the meeting, copying Dean concerned, Dean - Academic Affairs and the VC's office.

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VALUE ADDED COURSE
Course code: 22130VAC1 - Education and Socialization

**Objectives:**

- To enable the teacher trainees undertake action research to solve their professional problems.
- To reduce the gap between theory and practice, teacher and education curriculum and school realities.
- The course (B.Ed.,) will provide adequate theoretical orientation regarding the objectives of education in the Indian Background.

**Unit - I : Introduction** : Conceptual clarity, Relationship between society, Education and Development.

**Unit - II : Socialization and Education** :Relations between socialization and Education, Agencies of socialization and Education: Family, Peer Groups, School and Media

**Unit - III : Education, Inequalities and Social Justice:** Concept of Equality of Educational Opportunity, Education and Disparities: Caste, Class, tribe, gender, rural-urban, Education and social mobility

**Unit - IV : Emerging Trends in Education in India:** School education: Existing scenario, Higher Education in India, Governance of Higher Education: Institutional programmes, National Educational policy 1986.

**Outcomes:**

- Applying teaching skills and dealing with classroom problems
- Evolving a system of education which enhances the potential of every learner to acquire, retain and transform knowledge leading to wisdom society through creative, experiential and joyful modes of learning.
- Transform the educational landscape by providing open access to quality, value based and socially relevant education to all by harnessing the disruptive potential of AI.
- Analysis of Curriculum, construction of blue print, selecting appropriate teaching strategies according to needs of students and conducting action research to solve classroom problems.

**Reference book:**


- Roberta Berns: Wadsworth Publishing Co Inc; 8th ed. edition (28 January 2009); CBS Publishers & Distributors Pvt. Ltd. -PH: 011-49344934 ISBN-13 : 978-0495603252
- Grusec, J.E., Lytton, H. (1988). Socialization and the Family. In: SocialDevelopment. Springer, New York, NY. https://doi.org/10.1007/978-1-4612-3768-6_5
- Psychology Press Ltd; 1st edition (28 November 2012) SBN-13 : 978-0415651769


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VALUE ADDED COURSE
Course code: 22130VAC2 - NCC

Objectives:

- To enable the teacher trainees undertake action research to solve their professional problems.
- To reduce the gap between theory and practice, teacher and education curriculum and school realities.
- The course (B.Ed.,) will provide adequate theoretical orientation regarding the objectives of education in the Indian Background.
- National Integration: Importance and Necessity

**UNIT-I:** The NCC

Aim and Objectives of NCC – Organization and Trainings and NCC Song
Incentives – National integration and Awareness- National Integration: Importance and Necessity. Freedom Struggle and Nationalist Movement in India

**UNIT- II:** Drill, Weapon Training

Characteristics of a rifle and its ammunition- Stripping,assembling,careandcleaningof22Rifle
Loading ,cocking and unloading-Different positions for holding and aiming

**UNIT- III:** Personality Development and Leadership

Introduction to Personality development-Communication skills - Leadership traits-Time management- Disaster Management and Civil Affairs-types of Emergencies and Nature Disasters-
Assistancedduring natural and other calamities:Floods,Cyclones, Earth quakes, Accidents

UNIT- IV: Social Awareness Community Development-Basics of Social Service and its needs
Contribution of youth towards social welfare-Civic responsibilities- Health and Hygiene
Hygiene and sanitation-Infectious and contagious diseases and it spreveration.

UNIT- V: Adventure and Obstacle Training-Obstacle training: Environment Awareness and Conservation-Natural resources-conservation and management-Water conservation and rain water Harvesting.

Outcomes:

- Transform the educational landscape by providing open access to quality, value based and socially relevant education to all by harnessing the disruptive potential of AI.
- Analysis of Curriculam, construction of blue print, selecting appropriate teaching strategies according to needs of students and conducting action research to solveclassroom problems.

**Reference book:** Mindset (Carol S. Dweck, 2017): A liberating way to approach life, as per which everything great is work in progress. A must-read and the book I have gifted most often. Read here for more: Winning (Jack Welch, 2005): Probably the best book on leadership out there. Great advice which I keep on referring to regularly. Often while facing a difficult situation at work I am reminded of some of the learnings: "Don't run for office. You are already elected.", or how Candor is the biggest dirty little secret in education.

Good to Great (Jim Collins, 2001): One of the most popular business books. Concepts introduced in this book like Level 5 leadership, Stockdale's paradox, Flywheel & Hedgehodge concept have become almost legendary.

Shoe Dog (Phil Knight, 2016): An adrenalin-pumping story of how Nike was built. If you are not into non-fiction and would like to start somewhere, this could be the perfect start!

Hit Refresh (Satya Nadella, 2017): A great read on leadership, empathy, and how to drive change. Learn how to transform an organization and a bit about partnerships and technology.

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SCHOOL OF EDUCATION
VALUE ADDED COURSE
Course code: 22130VAC3 – Health and Well-Being

**Objectives:**

To introduce the learners to the concept of health and wellness and it sorely
To introduce the learners to the concept to health and wellness and its relevance in daily life.
To introduce the learners to the relation between mind-body and its relevance.
To introduce learners to health behavior and promotion of human strengths for well-being evince daily life.
To introduce the learners to the relation between mind-body and its relevance.

**UNIT-I: INTRODUCTION TO HEALTH & WELLNESS**

Definition of health-WHO definition-Importance of health in everyday life-Components of health-physical, social,mental,spiritual and its relevance Concept of wellness-Mental Health & wellness-Determinants of health behaviors-Using the mass media for health promotion

**UNIT-II:** Mind-Body connection in health-concept and relation-Implications of mind-ede connections. Well being-Digital wellbeing-Understanding health beliefs, and perspectives of in digunous people pertaining to Assam and North Estonia Promoting Human strengths and life enhancement Classification of human strengths and virtues; cultivating inner strengths: Hope and optimism

**UNIT-III:** Science of Wellbeing is an evolving science with contributions from multiple disciplines including Psychology , Sociology , Health & Physical Education , Nutrition , Environmental Science and Finance. With the distinct knowledge base of social and behavioral science at its core , it began as a branch of social science and has since evolved. The term Wellbeing encompasses Holistic Health and Happiness, in addition to positive functioning of physical , emotional and social domains.

**UNIT-IV:** In modern world, " Wellbeing " is referred as stress free living and happiness in terms of positive psychological interventions, good physical functioning in terms of health, nutrition and physical education as well as financial security in terms of commercial studies.

**UNIT-V:** The subject being offered at the Higher Secondary level under the West Bengal Council of Higher Secondary Education provides the scope for the students to choose higher education and vocation at degree course involving Psychology , Physical Education , Sociology and Nutrition for career opportunities as Psychologist , Motivational speaker , Wellbeing Counselor , Physical educator and Yoga Therapist , Nutritionist and Diet Therapist etc.

**LEARNEROUTCOMES:**

After completion of this course the learner will be able to:
Explain the concept and nature of health, wellness and it various implications
Demonstrate quite knowledge on well-being and promotion of healthy behavior.

**REFERENCE BOOK:**


1. Carr, A. (2004). *Positive Psychology: Thescience of happiness and humanstrength.* UK: Routledge.
2. Forshaw,M (2003).*Advancedpsychology:Healthpsychology* London:Hodderand Stoughton.
3. Hick, J.W. (2005) *Fifty signs of Mental Health. A Guide to understanding mental health.* Yale University Press.
4. Snyder,C.R.&Lopez,S.J.(2007).*Positivepsychology: Thescientificandpractical explorations of human strengths.* Thousand Oaks, CA: Sage.


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VALUE ADDED COURSE

Course code: 22130VAC4 – Modern Pedagogical Techniques

Objectives:

- Explain the concept of group analysis, Brain storming, Micro teaching different types of techniques, programmed, inquired, co-operative learning and mind mapping with illustration
- Describe the innovative medias involved in teaching and learning process such as M- Learning and E-Learning in the class room
- Familiar with online Learning Tools which are used to connect the learners to teachthem

UNIT – 1 – Innovative Techniques

Group analysis: Meaning - Methods – Brain Storming: Meaning - Methods - Micro Teaching Technique: Meaning - Characteristics - Procedure - Phases -Principles - Teaching Skills -Set induction - Reinforcement - Probing Questions - Stimulus Variation - Closure - Black Board Skills - Advantages - Disadvantages.

UNIT – 2 – Individualised Instructions

Programmed Learning - Concept - Characteristics - Principles - Styles of Program -InquiryBasedLearning - Concept - Characteristics - Misconception - Criticism - Mind Map - Concept - Characteristics - Examples.

UNIT – 3 – Educational Approaches

Cooperative Learning - Meaning -Techniques - Benefits - Dramatization - Meaning - Importance - Types - Advantages - Limitations -Gamification - Meaning - Techniques - Design – Applications

UNIT – 4 – Audio-Visual Aids

Need for Audio Visual Aids - Role of Audio Visual Aids - Purpose - Print Resources - Newspaper - Magazines - Journal - Encyclopaedia - Audio Resources – DVDs - CD - Visual Resources - Pictures - Flash card – Charts- Posters – Photographs- Models - ICT Resources - Television – Internet- Multimedia.

UNIT – 5 – Interactive Electronic Whiteboard

Highlights - Features - General operation and use - Classroom uses - Benefits - Criticisms

Outcomes:

practice the group analysis, Brain storming and Micro teaching and understanding the application of mind mapping and obtaining knowledge in programmed, cooperative and inquiry based learning

Apply of the innavative medias involved in teaching and learning process such as M- Learning and E-Learning can be practiced in the class room

Reference book:


- **Denning,P.J and Tedre,M. (2019)** Computational Thinking. The MIT Press.
- **Flatley, Joseph .L (2011)** Augumented reality at the Allard Pearson Museum in Netherland.
- **Higgins,s.,Xiao.Z, (2012)** The impact of Digital Technology on learning: A summary for the Education Endowment Foundation, London.
- **Rajasekar,S. and Raja Ganesan,D.(2013)** Methods of Teaching of ComputerScience,Hyderabad: Neelkamal Publications PVT Ltd.


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PRIST DEEMED TO BE UNIVERSITY
DEPARTMENT OF EDUCATION
B.Ed. SYLLABUS, 1st YEAR SEMESTER -I
ENHANCING PROFESSIONAL CAPABILITIES /
ELECTIVE - GUIDANCE AND COUNSELLING
COURSE CODE: 22130EP14B

**COURSE OBJECTIVES:**

**The student teacher will be able to:**

CO1: list out the principles underlying guidance
CO2: elucidate the need of guidance and counselling in schools
CO3: describe the different services in the school guidance programme
CO4: understand the various therapies in counselling
CO5: acquire the skills necessary to administer and interpret standardized tools

**UNIT I: GUIDANCE**

Guidance- Meaning, Definitions, Aims, Nature, Principles and Needs. Types- Educational, Vocational, Personal, Social- History of guidance movement in India- Problems of guidance movement- ways to improve guidance services in India - Benefits- Limitations. **Guidance Movement in India**. Therapies in Counselling: Psycho- behavioral therapy, Psycho - analytic therapy, Gestalt therapy – Stress and stress management, History of guidance movement in India – Problems of guidance movement in India – Ways to improve guidance movement in India.

**UNIT II: COUNSELLING**

Counselling– Meaning, Definitions, Elements-Characteristics – Objectives – Need – Types: Directive Counselling, Non-Directive Counselling, Eclectic Counselling – Meaning, Characteristics, Steps, Advantages, Limitations – Difference between Counselling and Guidance. **Qualities of a Counsellor** Counsellor – Qualities – Functions- Professional Ethics- Role of Teacher as counselor.

**UNIT III: GROUP GUIDANCE AND GROUP COUNSELLING**

Group guidance – Meaning, Definition, Objectives, Problems, Significance – Techniques, Uses. Group counselling – Meaning, Requirements - Uses. **Theories of Vocational Choice** – Ginzberg, Super, Holland, Hoyighurst, Structural theory.

**UNIT IV: TESTING DEVICES IN GUIDANCE**

Testing devices in guidance: Meaning, Definition, Measurement, Uses of psychological tests: Intelligence tests – Aptitude tests- Personality Inventories- Attitude scales – Achievement tests – Creativity tests -Mental health – frustration conflict. **Non –Testing Devices in Guidance** Non-testing devices in guidance: Observation – Cumulative record, Anecdotal record, Case study , Autobiography, Rating Scale, Sociometry etc.

**UNIT V: GUIDANCE SERVICES IN SCHOOLS**

Guidance services at different school levels-Meaning, Significance, Types – Organisation of Guidance services in schools – Role of guidance personnel – Career and Occupational Information – sources, gathering, filing, dissemination- Career Corner- Career Conference- Career exhibitions. Good practices in Tamilnadu - Mobile Counselling centres - State Resource center for counselling children with disability. **Guidance for Exceptional Children** – Meaning, and Types. Guidance for gifted, backward, mentally retarded, orthopedically handicapped, visually impaired, deaf and dumb, juvenile delinquents-guidance for dropouts- Socially disadvantaged children - Alcoholics, Addicts - Sexual harassment-Eve teasing- Gender discrimination - Exemptions in examination for exceptional children.

**SESSIONAL ACTIVITIES:**

- Observe and inquire the process of learning by children from different backgrounds and record your observations.
- Visit any two Special Education Institutions and write a report on the methods of teaching.

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B.Ed. SYLLABUS – 1st YEAR SEMESTER – I
ENHANCING PROFESSIONAL CAPABILITIES /ELECTIVE
EDUCATIONAL ADMINISTRATION AND MANAGEMENT
COURSE CODE: 22130EP14C

**COURSE OBJECTIVES:**

**The student teacher will be able to:**

CO1: acquire knowledge of the terms used in educational administration and management
CO2: understand the role of head master and his/her duties
CO3: develop the mode of inspection and supervision of function
CO4: know the role of teacher in decision making
CO5: develop interest in the educational administration and management techniques

**UNIT I - EDUCATIONAL ORGANIZATION**

Principles or criteria -Organizational structures - Administrative structures at Central and State levels.

**UNIT II- ESSENTIAL FACETS OF ADMINISTRATION**

Headmaster and Teacher's duties and responsibilities. Role of the Head master – Parent Teacher Association-Time-Table- Co-curricular activities - Discipline- Student evaluation.

**UNIT III - INSPECTION AND SUPERVISION**

Aims, Meaning, Modern concepts - Types of Inspection and Supervision - Functions and duties of inspector and supervisor.

**UNIT IV- DECISION MAKING IN ADMINISTRATION**

Meaning - Importance - Process - Decision making techniques - Teachers' role in decision making- Involvement of pupils in decision making.

**UNIT V - MANAGEMENT**

Meaning-Definition -Objectives of Management -Role of Management -Difference between Administration and Management- Functions of Management –PODSCORB (Planning, Organization, Direction, Staffing ,Co-ordination, Reporting, Budgeting) - Modern Functions: Planning ,Organizing ,Leading ,Controlling-Management skills: Conceptual skills, Human skills, Technical skills.

**SESSIONAL ACTIVITIES:**

- A study of any one N.G.O (Non Government Organization) promoting education. (Study includes the objectives, functions, problems & contribution to education.)
- Yogic Practices for healthy living - some select yogic practices:Asanas, Bandha, Kriyas and Pranayama - Supine position, prone position, sitting position, standing position
- Write and display of Education related quotes in your institution.
- Prepare an album about the best practices of various schools.
- Organize an Essay Writing Competition for protecting and safeguarding our Eco – System and submit a write up on it.
- Prepare a detailed report on the code of conduct observed by the teachers in schools

**REFERENCES:**


- Chakraborty, A. K. (2004). Principle & practice of education. Meerut: R Lall Books Depot. NIEP A.
- Chaupe, S. P . (2008). Foundations of education. UP: Vikas Publishing House Pvt Ltd
- Chaube, S. P ., & Chaube, A. (2008). School organisation. New Delhi: Vikas Publishing House.
- Gangadhar, R. M., & Rao, V . P . S. (2000). Organizational behaviour . Delhi: Konark Publishers Pvt. Ltd.


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B.Ed. SYLLABUS – 1st YEAR SEMESTER – I
ENHANCING PROFESSIONAL CAPABILITIES /ELECTIVE
PRE –PRIMARY EDUCATION
COURSE CODE: 22130EP14D

**COURSE OBJECTIVES:**

**The student teacher will be able to:**

CO1: gain the knowledge of the development of Pre-Primary education
CO2: acquaint with the policy perspectives of ECCE in India and world
CO3: systematize experiences and strengthen the professional competencies of pre-school Teachers.
CO4: organize meaningful learning experiences for pre-school children
CO5: develop skills required in selecting and organizing learning experiences

**UNIT I: HISTORICAL APPROACH**

Contribution of great educators to the development of child education: Comenius, Rooseau Pestalozzi, Froebel, Montessori, Dewey, Tagore and Gandhiji Development of Pre – Primary and Primary Education in India – Brief survey of Ancient India : Moghal, British period and Indeperadent India Implications for Pre – Primary and Primary Education in our country – Reports of different Education commissions – Particularly the secondary education commission, the Kothari commission of 1964-66 and the new policy of education, 1986 – Development of Pre – Primary and Primary Education under the five year plans – the place of Pre- School and Primary education in the 10+2+3 pattern of education.

**UNIT II: ECCE: POLICY AND PERSPECTIVES**

Concept, significance and objectives of ECCE. ECCE in India: Policies and programs in nations policy on Education (NPE, 1986) and POA (1992), National plan of action for children, 1992 and 2005 National curriculum framework (2005). ECCE in Global perspectives: United Nations convention on Rights of the child (UNCRC, 1989), Millenium Development Goals (2000) and Global monitoring repor (UNESCO) 2007 – concerns and issues.

**UNIT III: THE DEVELOPMENT OF CHILDREN**

Aspects of Child Development: Physical including sensory motor development, intellectu including concept formation, language development, emotional and social - Development tasks up to late childhood, growth norms and their implications for education. Needs of normal and exceptional children biological, psychological, socio- cultural, health and nutritional needs - Needs as motives for child learning.

**UNIT IV: PRE-PRIMARY EDUCATION**

Principles involved in planning the programme of activities with reference to the aims and objectives of this stage - Basic schedule of activities - Planning and implementation, factors influencing planning - Importance ofpersonal hygiene and environmental sanitation in the programme - Technique o developmental activities: Play , storytelling, language games, number work, creative work and activitie for self-expression, group and individuals activities. Role of ICDS - Functions of Anganwadi.

**UNIT V: STRATEGIES / APPROACHES AND RESOURCES**

Characteristics of programmes for different settings – Pre-primary schoolers and early primary grade children – needed emphasis and rationale, General principles to curricular approaches – activity based play-way , child- centred, theme-based, holistic, joyful, inclusive – meaning, rationale and practica implications in specific contexts; puppetry , musical and rhythmic exercises, dramatization, art activities indoor and outdoor play , field trips and explorations as methods in primary and early primary stages - meaning, rationale, selection criteria, method of transaction Local specific community resources – human and material & their integration in curricular activities; preparation & use of learning and play materials - principles and characteristics; community involvement in effective implementation of ECCE programme Informal evaluation through observation & remediation training of ECCE workers. Exhibitions, parent' day programmes etc.

**SESSIONAL ACTIVITIES:**

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DEPARTMENT OF EDUCATION
B.Ed. SYLLABUS, 1st YEAR SEMESTER -II
ENHANCING PROFESSIONAL CAPABILITIES / ELECTIVE
EXPLORING LIBRARY AND OTHER LEARNING RESOURCES
COURSE CODE: 22130EP24B

**COURSE OBJECTIVES:**

**The student- teachers will be able to:**

CO1: Define library and acquire knowledge on information sources and services.
CO2: Develop understanding about user education.
CO3: Understand the place of MOOCs in the changing scenario.
CO4: develop an understanding about organizing different types of library
CO5: acquire knowledge about various instructional strategies to teach the students

**UNIT I – EXPLORING LIBRARY AND INFORMATION SOCIETY**

Library – Meaning – Definition – Types of Library; functions and objectives – laws of library science and implications in teacher education libraries. Information Science as a discipline and its relationship with other subject field.

**UNIT II – INFORMATION SOURCES**

Information: definition – sources of information – types of references – sources.Documentary Sources: Primary, Secondary and Tertiary – Non Documentary Sources: Electronic/Web learning – Sources – e book – e journal, e – learning – subject gateways in teacher education.

**UNIT III – INFORMATION SERVICES**

Reference Services – Types of reference services Current Awareness Services, Selective Dissemination of information, Translation service, Reprographic Services, Bibliographic Service, Indexing and Abstracting Services – on line services – learning resource centre.

**UNIT IV – LIBRARY NETWORK**

Library Automation – Digital Library, Electronic Library, Virtual Library, Library Networks: BRNET, DELNET, INFLIBNET – Documentation centres – NASSDOC, INSDOC – on line search of teacher education database – MOOCS.

**UNIT V – USER EDUCATION**

User Education in academic libraries – Role of teachers in the use of library, Library Committee: constitution and its functions, Library resources for classroom transactions – encouraging reading and referring habit.

**SESSIONAL ACTIVITIES:**

- Study the Social Customs prevailing in the local community and submit a report.
- Study the religious diversities existing in the community and describe the root causes for such diversities.
- Education and vertical/ Horizontal Social Mobility – Conduct a Survey in a village/ward and prepare a report.
- Study the Social Stratification in a Village/ ward and prepare a report on it.
- Study the Essential skills & Life skills in education and prepare a report on it.

**REFERENCES:**


- Kusum, Veerma (2005) Digital Library: Preservation Strategies: New Delhi: Akansha Publishing House.
- Krishna Kumar (2004) Reference Services. New Delhi – Sterling Publishers.
- Navalani K. & Satija, MPC (1996). Library and Information Services: Emerging Challenges. Jaipur: RBSA Publishers.


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B.Ed. SYLLABUS, 1st YEAR SEMESTER-II
ENHANCING PROFESSIONAL CAPABILITIES /ELECTIVE
TEACHING OF EARLY CHILDHOOD EDUCATION
COURSE CODE: 22130EP24C

**COURSE OBJECTIVES:**

**The student teacher will be able to**

CO1: develop awareness about the importance of Early Childhood Education.

CO2: acquire a sound knowledge about the contributions of various philosophers to the cause of early childhood education.

CO3: develop an understanding about organizing different types of early childhood education programmes.

CO4: acquire knowledge about various instructional strategies to teach young children.

CO5: develop awareness about the various developmental aspects of children.

**UNIT I: HISTORY OF EARLY CHILDHOOD EDUCATION IN INDIA:**

Concept of Early Childhood Education - Need and importance of Early childhood Education - Objectives - Early Childhood Education movement in India and Abroad - Problems of Early Childhood Education in India.

**UNIT II: CONTRIBUTIONS OF PHILOSOPHERS TO PRE SCHOOL EDUCATION :**

Contributions of Froebel- Rousseau-Montessori- Piaget- Comenius- Gandhiji-Tagore and Dhara Bai Modak.

**UNIT III: PLANNING AND ORGANIZATION OF PRE SCHOOLS:**

Planning of pre-school programmes - Yearly plan, Monthly plan, Weekly plan, Daily plan -Organisation of a pre-school - site, space, material, personal and time- Types of pre-school programmes - Nursery , Kindergarten, Montessori, pre-basic and Balwadi - Role of ICDS (Integrated Child Development Scheme).

**UNIT IV: GROWTH AND DEVELOPMENT OF CHILD:**

Developmental stages - parental period - factors affecting parental period- Birth hazards, immunization schedule - various aspects of development with special emphasis to early childhood period.

**UNIT V: SPECIAL NEEDS AND PROBLEMS OF PRE-SCHOOL CHILDREN:**

Needs of pre-school children - children with special needs - physical, visual and hearing impairment - Learning disabilities - Behaviour problems - Aggression, temper tantrum, stealing, lying, eating problems, nail biting, bed wetting, thumb sucking - their causes and remedial measures.

**SESSIONAL ACTIVITIES:**

- Observe and inquire the process of learning by children from different backgrounds and record your observations.
- Prepare an album of any 10 psychologists and their contributions to the learning process.
- Visit any two Special Education Institutions and write a report on the methods of teaching.

**REFERENCES:**


- Hurlock, Elizabeth. B, (2001). Child growth and development, T ata McGraw Hill publishing company , New Delhi.
- Kaul Vinetha (2001). Early Childhood Education Programme. National council of Educational Research and Training, New Delhi.
- Mohanthy jagannath and Bhagvadhar Mohanthy (2000). Early Childhood care and Education, Deep and Deep Publication, New Delhi.
- Ruth Katherine et al. (1987). Early Childhood programmes. New York


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B.Ed. SYLLABUS, 1st YEAR -SEMESTER –II
ENHANCING PROFESSIONAL CAPABILITIES /ELECTIVE
PROFESSIONAL COURSE FOR TEACHER PROFICIENCY
COURSE CODE: 22130EP24D

**COURSE OBJECTIVES:**

**The student teachers will be able to**

CO1: Acquire knowledge on various concepts of Pedagogy.
CO2: Extrapolate on various stages of developmental tasks.
CO3: Enumerate various aspects of guidance and counseling.
CO4: Apprise on cognitive development.
CO5: Acquire mastery in the professional course for teachers' proficiency.

**UNIT I – CHILD DEVELOPMENT AND PEDAGOGY**

Nature of Educational Psychology – Human Growth and Development – Cognitive Development – Social, Emotional and Moral Development – Learning – Intelligence and Creativity – Motivation and Group Dynamics – Personality and Assessment – Mental Health and Hygiene – Guidance and Counseling.

**UNIT II – TEXT BOOK ANALYSIS**

Syllabus prescribed for Standard VI, VII and VIII by Government of Tamil Nadu (From time to time) (Tamil, English and Subject)

**UNIT III – TEACHING PROFICIENCY**

Definition for Proficiency – The role of teacher in the class-room management – Tactics for effective Instructional communication - Criteria for the selection of Tools and Techniques for teaching and Learning.

**UNIT IV - PROFESSIONAL ETHICS FOR TEACHER**

Code of conduct of Teacher – Ethics and Etiquettes – Unethical activities – qualities of professional towards student development and curriculum – Right of Children to free and compulsory Education – concept of Disciplinary proceedings and Punishment.

**UNIT V – LEADERSHIP PROFILE**

School vision – Instructional Leader – Organizational Leader – Community Leader – communication skill commitment – Decision Making and Problem Solving- Transformational Leader.

**SESSIONAL ACTIVITIES:**

- Prepare a question paper for classes IX to X and XI to XII to asses all the aspects of language learning.
- Analyse the text books of English of Tamil Nadu Govt. in terms of organization and integration of essential components, skills, needs and requirements with special reference to learners.

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PRIST DEEMED TO BE UNIVERSITY
DEPARTMENT OF EDUCATION
B.Ed. SYLLABUS SECOND YEAR SEMESTER – III
ENHANCING PROFESSIONAL CAPABILITIES / ELECTIVE
STRENGTHENING LANGUAGE PROFICIENCY
COURSE CODE: 22130EP33C

**COURSE OBJECTIVES:**

**The students will be able to**

CO1: Develop comprehending ideas, for reflection and thinking, as well as for expression and communication.

CO2: Enhance one's facility in the language of instruction is thus a vital need of student-teachers, irrespective of the subject areas that they are going to teach.

CO3: visualize as a range of primarily text-based language activities, which will aid in strengthening the ability to 'read', 'think', 'discuss and communicate' as well as to 'write' in the language of instruction.

CO4: Develop a taste for and abilities in reading and making meaning of different kinds of texts.

CO5: Use language for effective communication. Familiarize with nature and structure of English language

**UNIT I: ENGAGING WITH NARRATIVE AND DESCRIPTIVE ACCOUNTS**

The selected texts could include stories or chapters from fiction, dramatic incidents, vivid descriptive accounts, or even well-produced comic strip stories.

**UNIT II: ENGAGINGWITH POPULAR SUBJECT BASRD EXPOSIYORY WRITING**

The selected texts could include articles, biographical writing, or extracts from popular non-fiction writing, with themes that are drawn from the subject areas of the student teachers (various sciences, mathematics, history, geography, literature/language pieces)

**UNIT III: ENGAGING WITH JOURNALISTIC WRITING**

The selected texts would include newspaper or magazine articles on topics of contemporary interest.

**UNIT IV: ENGAGING WITH SUBJECT-RELATED REFERENCE BOOKS**

For this Unit, the student-teachers should work in groups divided according to their subjects. Within these groups, pairs of student-teachers would make a choice of a specific topic in their subject area which they could research from a set of available reference books. The focus of this Unit is, as much the learning of effective processes of reference research and its presentation, as the actual reading of the reference books themselves.

**UNIT V: ENGAGING WITH EDUCATIONAL WRITING**

Selected texts could be drawn from the wide range of popular educational writing in the form of well-written essays, extracts or chapters from authors who deal with themes from education, schooling, teaching or learning. The writings selected should present a definite point of view or argument about some aspects of the above themes.

**SESSIONAL ACTIVITES:**

- Write an essay on various contemporary social and educational emerging issues and problems in detail
- Enumerate the activities from the school text book
- Suggest your own activities using supplementary materials
- Analysis the tasks given at the end of any one unit in the text book

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PRIST DEEMED TO BE UNIVERSITY
DEPARTMENT OF EDUCATION
B.Ed. SYLLABUS SECOND YEAR SEMESTER – III
ENHANCING PROFESSIONAL CAPABILITIES / ELECTIVE
GENDER ISSUES IN EDUCATION
COURSE CODE: 22130EP33D

**COURSE OBJECTIVES:**

**The student teacher will be able to:**

CO1: develop basic understanding and familiarity with key concepts–gender, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism;

CO2: understand the gradual paradigm shift from women's studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period;

CO3: learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, religion and region; and

CO4: understand how gender, power and sexuality relate to education (in terms of access, curriculum and pedagogy).

CO5: understand how the female, power and sexuality relate to education.

**UNIT I: GENDER ISSUES: KEY CONCEPTS**

Gender, sex, sexuality, patriarchy, masculinity and feminism - Gender bias, gender stereotyping, and empowerment - Equity and equality in relation with caste, class, religion, ethnicity, disability and region.

**UNIT II: GENDER STUDIES: PARADIGM SHIFTS**

Paradigm shift from women's studies to gender studies - Historical backdrop: Some landmarks from social reform movements of the nineteenth and twentieth century's with focus on women's experiences of education - Contemporary period: Recommendations of policy initiatives commissions and committees, schemes, programmes and plans.

**UNIT III: GENDER, POWER AND EDUCATION**

Theories on Gender and Education: Application in the Indian Context – Gender Identities and Socialization - Schooling of Girls: Inequalities and resistances (issues of access, retention and exclusion).

**UNIT IV: GENDER ISSUES IN CURRICULUM**

Gender, culture and institution: Intersection of class, caste, religion and region - Curriculum and the gender question - Construction of gender in curriculum framework since Independence: An analysis - Gender and the hidden curriculum - Gender in text and context (textbooks' inter-sectionalist with other disciplines, classroom processes, including pedagogy) - Teacher as an agent of change - Life skills and sexuality.

**UNIT V: GENDER, SEXUALITY, SEXUAL HARASSMENT AND ABUSE**

Linkages and differences between reproductive rights and sexual rights - Development of sexuality, including primary influences in the lives of children (such as gender, body image, role models) - Sites of conflict: Social and emotional - Understanding the importance of addressing sexual harassment in family, neighbourhood and other formal and informal institutions - Agencies perpetuating violence: Family, school, work place and media (print and electronic) - Institutions redressing sexual harassment and abuse.

**SESSIONAL ACTIVITIES:**

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B.Ed. SYLLABUS – SECOND YEAR SEMESTER – IV
ENHANCING PROFESSIONAL CAPABILITIES / ELECTIVE
UNDERSTANDINH THE SELF
COURSE CODE: 22130EP45B

**COURSE OBJECTIVES:**

The Student – Teachers will be able to:

CO1: Enable students to develop a vision of life for themselves

CO2: Encourage students to give conscious direction to their lives to take responsibility for their actions.

CO3: Develop a holistic and integrated understanding of the human self and personality.

CO4: Facilitate the personal growth of the students by helping them to identify their own potential.

CO5: Develop the power of positive attitude.

**UNIT – I EXPLORING THE AIM OF LIFE WORKSHOP THEMES:**

Vision as a person - aspiration and purpose of life – Giving a conscious direction to life – Understanding difference dimensions of self and personality and way in which they influence the dynamics of identity formations, values and direction of life.

**UNIT – II DISCOVERING ONE'S TRUE POTENTIAL:**

Understanding one's strengths and weaknesses through self observation exercises – Taking responsibility for one's own actions – Developing positivity, self esteem and emotional integration – Exploring fear and trust competition and cooperation – Developing skills of inner self organization and self reflection – Writing a self-reflective journal

**UNIT – III DEVELOPING SENSITIVITY:**

Understand and challenge the unconscious, conditional attitudes that are stereotyped and prejudiced gender, caste, class, race region, disability etc and critically examine the sources of stereo typed messages (eg. media) – Defining consciously one's own values towards self and society and develop a capacity to understand and appreciate divergent points of view – Widening their realm of consciousness – Developing the capacity for empathic listening and communications skills – Understanding one's own childhood and adult – child gaps in society.

**UNIT – IV PEACE, PROGRESS AND HARMONY:**

Establishing peace with in oneself - exercises of concentration and meditation – Understanding group dynamics and communication – Creating group harmony – Exploring methods of creating a collective aspiration for progress and conflict resolution – Exploring the bases of social disharmony: becoming the agents and catalysts of change and exploring methods of facilitating change.

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PRIST DEEMED TO BE UNIVERSITY
DEPARTMENT OF EDUCATION
B.Ed. SYLLABUS - SECOND YEAR SEMESTER - IV
ENHANCING PROFESSIONAL CAPABILITIES / ELECTIVE
ADDRESSING SPECIAL NEEDS IN THE CLASSROOM
COURSE CODE: 22130EP45D

**OBJECTIVES:**

**The student- teachers will be able to:**

CO1: demonstrate knowledge of different perspectives in the area of education of children with disabilities;
CO2: reformulate attitudes towards children with special needs;
CO3: identify needs of children with diversities;
CO4: plan need-based programmed for all children with varied abilities in the classroom;
CO5: use human and material resources in the classroom;

**UNIT I: PARADIGMS IN EDUCATION OF CHILDREN WITH SPECIAL NEEDS**

Historical perspectives and contemporary trends - Approaches of viewing disabilities: The charity model, the bio centric model, the functional model and the human rights model - Concept of special education, integrated education and inclusive education; Philosophy of inclusive education.

**UNIT II: LEGAL AND POLICY PERSPECTIVES**

Important International Declarations/Conventions/Proclamations – Biwako Millennium Framework (BMF, 1993-2012); Recommendations of the Salamanca Statement and Framework of Action, 1994; Educational Provisions in the UN Convention on the Rights of Persons with Disabilities (UNCRPD), 2006; Constitutional Provisions; Programmed and Schemes of Education of Children with Disabilities.

**UNIT III: DEFINING SPECIAL NEEDS**

Understanding diversities-concepts, characteristics, classification of children with diversities (Visual Impairment, Hearing Impairment, Specific Learning Difficulties, Locomotors and Neuromuscular Disorders, Mental Retardation, Autism, Leprosy Cured Persons, Mental Illness and Multiple Disabilities) - Special needs in terms of the curriculum in the context of different disabilities and their learning styles - Concept of an inclusive school – infrastructure and accessibility, human resources, attitudes to disability, whole school approach.

**UNIT IV: INCLUSIVE PRACTICES IN CLASSROOMS FOR ALL**

School's readiness for addressing learning difficulties - Assessment of children to know their profile - Technological advancement and its application – ICT, adaptive and assistive devices, equipments and other technologies for different disabilities - Classroom management and organization - Responding to special needs by developing strategies for differentiating content, curricular adaptations, lesson planning and TLM

**UNIT V: DEVELOPING SUPPORT NETWORKS**

Addressing social climate of the classroom - Child-to-child programmed - Developing partnerships in teaching: Teacher and special teacher; Teacher and co-teaching personnel; Parents as partners - developing positive relationships between school and home - Involving community resources as source of support to teachers- Involving external agencies for networking – setting up appropriate forms of communication with professionals and para professionals.

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M.Ed. SYLLABUS–SEMESTER–I
SPECIALIZATIONCORECOURSE-1
EARLY CHILD CARE AND EDUCATION
COURSECODE: 22230SC15A

**COURSE OJECTIVES:**

1. Knowthehistoricaldevelopmentofearlychildhoodcareandeducation.
2. Understandthedifferentaspectsofchilddevelopment.
3. Reviewthevariouscommitteesandcommissionssuggestionsonearly childhood education.
4. Executetheprinciplesofplanningandmanagementofearlychildhoodcareandeducation.
5. Explainthevariousorganizationscontributionsinearlychildhoodcare andeducation.

**UNIT-I:OVERVIEWOFEARLYCHILDHOODEDUCATION**

Early Childhood Education: Concept, meaning, nature, objectives, need and importance – EarlyChildhood Education Movement in India and Abroad – Prominent promoters of Early ChildhoodCare and Education: Plato, Rousseau, Montessori, Froebel, Piaget, Tagore, Gandhi, Aurobindo,GijuBhaiPateland TarabaiModak.

**UNIT–II:DEVELOPMENTDURINGEARLYCHILDHOODPERIOD**

PatternandFactorsinfluencingthePhysicaldevelopment,Motordevelopment,Emotionaldevelopment,Socialdevelopment,Cognitivedevelopmentand Languagedevelopmentofthe Pre-school children – Concept development: Importance and learning of various concepts such assize,shape, colour,weight,timeandnumber.

**UNIT – III: COMMITTEES AND COMMISSIONS ON EARLY CHILDHOODCARE ANDEDUCATION**

SargentReport (1944),Secondary Education Commission(1952-53),ChildcareCommittee(1963-64),IndianEducationCommission(1964-66), ReportoftheStudyGroup(1972),NationalPolicy on Education (1986); Millennium Development Goals (2000),National FocusGroup onECCE (2006) and Education for All GlobalMonitoringReport (2007)-International Treatiesin Agreement relating to ECCE: Declaration of Human Rights (1948), Declaration of the Rightsof the Child (1959), Convention on the Rights of the Child (1989), Salamanca Statement (1994)andDakarFrameworkforActionofEducationforAll(2000).

**UNIT – IV: PLANNING AND MANAGEMENT OF EARLY CHILDHOODCARE ANDEDUCATION**

Principles involved in planning Pre-school programmes – Short-term and Long-term planning –Importance of Rhymes, Songs, Stories, Scienceexhibitions,Field trips,Puppetshows andDramatization – Habit formation: Eating, Sleeping, Dressing and Toilet training-Requirementsfor Starting Early Childhood Care and Education: Finance, Place, Building, Staff and Records -Crèches:Aims,objectives,importance,andtypes.

**UNIT – V: ORGANISATIONS INVOLVEMENT IN HEALTH CARE OFEARLY CHILDHOOD STAGE**

Organizations working for pre-school education: NIPCCD (National Institute for Co-operativeChild Development), NCERT, ICDS, UNICEF and CARE (Co-operative Assistance and ReliefEverywhere) - Nutrition and Health of an Early Childhood Stage - Common CommunicableDiseasesofEarlyChildhoodStage.

**SUGGESTEDACTIVITIES:**

1. Makearesourcefileoncollectionofpictures,availablematerialsandarticlesrelated earlyChildhoodEducation.
2. VisittoICDScooterandobservingtheICDSProgramme.

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M.Ed. SYLLABUS–SEMESTER–I
SPECIALIZATIONCORECOURSE–III
INCLUSIVE EDUCATION
COURSECODE:22230SC15C

**COURSE OBJECTIVES:**

1. Enable studenstounderstandthehistoricalperspectiveseneducationofchildrenwithdiverseneeds
2. Develop critical understanding of the recommendations of various commissions and committeestowardsinclusiveeducation,
3. Understand the nature of difficulties encountered by children and prepare conducive teachinglearningenvironmentininclusiveschools,
4. Analyze special education, integrated education, mainstream and inclusive education practices,identifyandutilizeexistingresourcesforpromotinginclusivepractice
5. Todevelopawarenessoflearnertowardsinclusiveeducationanditspractices.

**UNIT-I:INTRODUCTIONTOINCLUSIVE EDUCATION**

Definition- concept and importance of inclusiveeducation - Historical perspectives on education ofchildren with diverse needs - Difference between special education, integrated education and inclusiveeducation-Advantagesofinclusiveeducationforeducationforallchildren.

**UNIT-II:CONCEPTANDNATURE**

Concept and principles of Inclusion-Benefits of Inclusion - Need of Inclusive education - Policies andlegislations for Inclusive Education and Rehabilitation - National legislation's for Inclusive Education -GovernmentSchemeandProvisions.

**UNIT-III:COMPETENCIESDEVELOPMENTFORINCLUSIVEEDUCATION**

TheoriesofInclusive Education-PhilosophicalApproachestoInclusiveEducation-Attitudeandpositivebehavior for Inclusion – Developing attitude and Competencies for Inclusion – Attitude, Self- Efficacy,SkillsandIdeologies-Socialskillsforinclusion.

**UNIT-IV: RECOMMENDATIONS OF EDUCATION COMMISSIONS AND COMMITTEESINTERNATIONALINITIATIVES**

The Convention on the Rights of the Child – the World Declaration on Education - World Declaration onthe Survival, Protection and Development of Children - Plans of action - Asian and Pacific decade ofDisabled Persons - World Conference on Special needs Education and the Salamanca Statement andframework for action on Special Needs Education-National Initiatives-Indian Education Commission -integrated Education for Disabled Children - National Policy on Education - Establishment of NationalInstitutesandtheirRegionalCenters-ProjectIntegratedEducationfordisabledchildren-DistrictPrimaryEducation Programme - Persons with Disabilities Act - Sarva Shiksha Abhiyan- Mental Health Act, - RehabilitationCouncilofIndiaAct,PersonswithDisabilitiesAct,Protectionofrightsandfullparticipation,NationalTrustfortheWelfareofPersonswithautism.

**UNIT-V:PREPARATIONFORINCLUSIVE EDUCATION**

Concept and meaning of diverse needs- Educational approaches and measures for meeting the diverseneeds- concept of remedial education, special education, integrated education and inclusive education -Brief account of existing special, integrated and inclusive education services in India - Building inclusive learningfriendly classrooms,overcomingbarriersfor inclusion-Creating andsustaininginclusivepractices - Role of teachers, parents and community for supporting- Techniques and methods used foradaptationofcontent,laboratoryskillsandplaymaterial.

**SUGGESTEDACTIVITIES:**

1. Varioustypesofeducationalneedsofchildrenwithrespecteducationidentified
2. MasterylectureonGovernmentSchemeandProvisionsforInclusiveEducation



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M.Ed.SYLLABUS–SEMESTER-II
SPECIALIZATIONCORECOURSE–IV
ADVANCED EDUCATIONAL TECHNOLOGY
COURSECODE:22230SC25A

**COURSEOBJECTIVES:**

1.Understand themeaningofEducational Technology
2. Attainknowledgeaboutbehaviouraltechnology
3. Understandthefeatures,workinganduseofthe Internetandweb
4. Appreciatetheuseofmultimediaandwebcontentforteachinglearning
5. Attainknowledgeaboute-learning

**UNIT-I:INTRODUCTIONTOICT**

ICT meaning and importance- Introduction to computer - Types of Computers - Computer in Education -Characteristics of Computer – Role of ICT – Different uses of computer in education - Advantages anddisadvantages ofComputer -Assisted Instruction education –Introduction to a personal computer -standard computer accessories-their configurations-conceptions and functioning- Functional overview oftheoperating system-Standardofficeandmediaselection.

**UNIT–II:BEHAVIOURALTECHNOLOGY**

Technology-Meaningand nature-Microteaching-meaningand objectives-Different phasesof microteaching-Merits and demerits of microteaching – Microteaching cycle-Meaning andnature-Programmedinstruction-Meaning-natureandprinciples-Typesofprogrammedinstruction-Linear-Branching-andMathematics-MeritsanddemeritsofprogrammedInstruction.

**UNIT-III:INTERNETANDTHEWORLDWIDEWEB**

The internet and the World Wide Web-Information-services and functions of the Internet and the web-connecting to and using the web- using search engines and web utilities-keywords and search strategies-synchronousandasynchronouscommunicationontheweb-e-mail-chat-newsgroupsandforums-Websitesrelevant to educational content-Search-locate and maintain lists of educational web sites-Critically examine thecontent of websites using the web as a teaching-learning resource - Academic and Research content ontheweb-Online journals and Extraction services.

**UNIT-IV:MULTIMEDIAANDWEBCONTENT**

Multimedia packages- educational implications of media use and interactivity-websites with educationalcontent-using the web as a teaching-learning resource-online learning-Multimedia Content-Multimediapackages – installation and use-Critical analysis of multimedia content-educational implications of media useandinteractivity.

**UNIT-V:NEWHORIZONSOFEDUCATIONALTECHNOLOGY**

Elementsof e-learning:e-content and e-books-virtual classroomand virtualuniversity-meritsandlimitations-Recent trends in the area of educational technology-interactive video-video-conferencing –M-learning-MOOC-Watsup etc-Recent experiments in the third world countries and pointers for India withreferencetoEducation.

**SUGGESTEDACTIVITIES:**

1. Preparepowerpointpresentationforanytwounitsin EducationalTechnologyandsubmitit.
2. DevelopaBlog(yourownandadditiononline.
3. Visitto anyIT Company toknowaboutlatestsoftware's.
4. Analyseanyone topicindifferentwebsiteand presentyourreporthy comparingit.
5. ExploretheUsageofOffice365andwritethemeritsanddemeritsinCD.

**TEXTBOOKS:**

1. Kulkarni,S.S.-IntroductiontoEducationalTechnology,NewDelhi-Oxford

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M.Ed.SYLLABUS–SEMESTER–III
PERSPECTIVECOURSEV
SOCIOLOGY OF EDUCATION
COURSECODE:22230PC31

**COURSE OBJECTIVES:**

1. Enablethestudentstounderstandthebasicconceptsofsociologyofeducation
2. Motivatethestudentstoexploretherelationshipbetweensocialsystemandeducation
3. Makethestudentstoanalyzetheroleofeducationin culturalchange
4. Enablethestudentstoidentifyvariousagenciesofeducation
5. Makethestudentstoexaminetheroleofeducationinpromotingnationalintegrationand internationalunderstanding

**UNIT–I:SOCIOLOGYANDEDUCATION**

Sociology of Education: Meaning, concept and importance –Sociology and Education - Basicconceptsof sociologyandeducation. -Difference between sociologyof education andEducationalSociology–ScopeandfunctionsofeducationalSociology.

**UNIT-II:SOCIALSYSTEMANDEDUCATION**

SocialSystem:Meaning,ConceptandCharacteristics,EducationasaSubsystem– Education and Social change; Social mobility, social stratification, social deviants; Constraints on socialchangeinIndia(Caste,ethnicity,class,language,religion,regionalism).

**UNIT– III:PROCESSOFSOCIALISATION**

Agencies of socialization- Family, School, Religion, Community - Education as a socialsystem,socialprocessandsocialprogress;Technologicalchange– Industrialization,Modernizationand Urbanization.

**UNITIV:EDUCATIONANDDEMOCRACY**

Democracy:Meaningandconcept- Education andDemocracy-Education for nationalintegrationandinternationalunderstanding-Constitutionalideals of education-Socialequityandequalityofeducationalopportunities– Educationforsociallyandeconomicallydisadvantagedsectionofthesociety:SC/ST/OBC/Women/ Disabledandruralpopulation.

**UNITV:EDUCATIONIN CULTURALCONTEXT**

Culture: Meaning, concept and characteristics - Education and cultural change -Cultural lag –Meaning, concept, major causes and its effect on education –Education for multi-lingual andmulti-culturalIndiansociety.

**SUGGESTEDACTIVITIES:**

1. DiscussionontherelationshipbetweenSociologyandEducation.
2. AnalysetheConstraintsonsocialchangeinIndia.
3. Collectdetailsonthetypesofeducationalfacilitiesavailableforsociallyandeconomicallydisadvantagedsectionofthesocietyin India
4. Discussiononsocialequityandequalityofeducationalopportunities
5. Power Pointpresentationoneducationalsociologyandtheireducationalimplications

**TEXTBOOKS:**


1. AgarwalJ.C.(2002).*Philosophical andsociologicalperspectives oneducation*.Shipra.
2. Jayapalan, N.(2001). *Sociologicaltheories*.AtlanticPublishers.
3. MujibulHasanSiddiqui(2009).*PhilosophicalandsociologicalperspectivesinEducation*.Neeraj.
4. Ruhela, S.P.(1970). *Sociological foundationofeducation incontemporary India*,DhanpatRai.


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M.Ed.SYLLABUS-SEMESTER-III

TOOL COURSE- EDUCATIONAL MEASUREMENT AND EVALUATION

COURSECODE:22230TC33

**COURSEOBJECTIVES:**

1. Comprehendthe concept,meaningandnatureofmeasurementandevaluation
2. Understandtherelationship,betweenmeasurementandevaluation.
3. Acquireknowledgeaboutvariousstoolsofmeasurementandevaluationinexistence.
4. Developskillsonusingpsychologicaltestformeasurementandevaluation.
5. GethandsonSPSStolearnvariousstatisticalmeasurementanditsanalysis.
6. Enabletodistinctvariouscompetenciesinstandardizingdifferenttypesofmeasuringinstrument.
7. Familiarizetoconstructdifferentkindsoftestsandtools.
8. Obtainknowledgeonstatisticalconcepts,testscoresanditstransformation.
9. Assimilatethenewtrendsinevaluationintermsofgrading,semester,CCEandonlinetest.
10. Preparequestionbanks andotherself-studymaterials.

**UNIT-I:CONCEPTOFMEASUREMENTANDEVALUATION**

Measurementand Evaluation– Concept, Meaning,nature and need. Relationshipbetweenmeasurementandevaluation,Functionsofmeasurementandevaluation.

**UNIT-II:TOOLSOFMEASUREMENTANDEVALUATION**

Subjective and objective tools - Tests: Essay tests, objective test, scales, questionnaires, schedules, inventories, observation, interviews, performance tests, oral tests-diagnostic tests and remedialmeasures.

**UNIT-III:PSYCHOLOGICALTESTING**

Construction and Standardization of Psychologicaltests, Aptitude, Attitude, personality tests,Intelligence and its nature - Theories: Spearman, Thorndike, Thurston and Guilford - Types ofintelligencetest-theirfunctionsand uses.

**UNIT-IV:STATISTICALCONCEPTS**

Testscoresandtheirtransformation:ZandTScores,percentile-Interpretationofqualitativedata Correlationanalysis,Itemanalysis-Itsassumption,Methods

**UNIT-V:NEW TRENDSINEVALUATION**

Grading System, Semester system, Continuous Comprehensive Evaluation, Question Bank, usesofcomputerin evaluation.

1. .

**TEXTBOOKS:**


1. Adams, G.S.(1964). *Measurement andevaluation ineducation, psychology andguidance*.Holt,Rinehart&Winstone.
2. Anastasi.(1984).*Annpsychologicaltesting*.TheMacMillan.
3. Aggarwal,Y.P.(1998).*Statisticalmethods*.Sterling.
4. Cooper, D.(2007).*Talkaboutassessment, strategyandtoolstoimprove learning*.ThomsonNelson
5. Earl,L.M.(2006). *Assessment as learning: Using class room assessment tomaximizestudentlearning*.CorwinPress.


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M.Ed.SYLLABUS–SEMESTER–
IIOIPERSPECTIVECOURSEVIIEDUCATIONALSTUDIES
COURSECODE:22238PC41

**COURSEOBJECTIVES:**

1. Understand the theoretical perspectivesof education as a disciplinein terms of social,cultural,political, economic, technological factors, and other substantialeducationsystemandtheprocessofknowledgeconstruction.
2. Explorethewideningofinterdisciplinaryknowledgeineducationwithrespecttophilosophy,psychology,sociology,management,economics,anthropology, ICT, etc.and insightfulconstructionofknowledge.
3. Incorporatethesocio-culturalcontextofindia,inlinewith_unityindiversity'withreferenceto multilingual and multicultural, socialisation and acculturation among the community andits stakeholders, Equality in educational opportunities and education for socio-economically deprived groups,andPolicyofinclusionandmulti- foundational approachestolearning disabilities.
4. Acquire knowledge about multiple school contexts and its personnel management system,contemporarychallenges,participationofdifferentstakeholdersandreconceptualisedlearningresources.
5. Acquainwithinstitutions,systemsandstructureofeducationalongwithitsvariousregulatoryand advisorybodiesineducation.

**UNIT–I:THEORETICALPERSPECTIVESOFEDUCATIONASADISCIPLINE**

Education as a socially contrived system influenced by social, cultural, political, economic, and technological factors - Critical analysis of concepts, principles, theories, assumptions related toeducationdiscipline,sustainableeducation,schooling,curriculum,syllabus,textbooks,assessment, teaching-learning process - Critical analysis of education as a discipline - Aims ofIndian Education in democratic, secular,egalitarianand humane society- Bridging gap of knowledgeconstructionbetweenConcernsinknowledgeandPedagogyknowledge, Schoolknowledge and out of the school knowledge, Experiential knowledge and empirical knowledge,Knowledge on action and reflection as outcome of action,Theoretical knowledge and practicalknowledge,Universalknowledgeandcontextualknowledge.

**UNIT-II:EDUCATIONASINTERDISCIPLINARYKNOWLEDGE**

Interdisciplinarynatureofeducationpertaintophilosophy,psychology,sociology,management,economics,anthropology,ICTetc.and theframeworkforinsightful constructionofknowledge - Contributionof sciencesandtechnologytoeducation andchallengesahead-Axiological issues in education: Role of peace and other values, aesthetics in education - Issuesinplanning,management,andmonitoringofschoolandteachereducation Inbehaviouralmanagement-Interrelationbetweeneducationand development.

**UNIT- III:SOCIO-CULTURALCONTEXTOFEDUCATION**

Socialpurposivenessofeducation-Understandingindiansociety:Multilingualandmulticultural,appropriate approaches for teaching of diversity - Process of socialization and acculturation ofthechild-criticalappraisal.Roleofschool,parents,peergroup,communityandotherstakeholders-Equalityineducational opportunity-criticalanalysisinschooling,teaching-learningandcurriculumfor socialinequality - Education of socio-economically deprived groups based ongender, local (rural/urban),income differential and different disabilities in society - Policy ofinclusionand multi-foundationalapproachestolearningdisability.

**UNIT-IV:SCHOOLCONTEXT**

Multiple school contexts: Rural/urban, tribal etc. - Role of personnel's inschool management: Teacher,headmaster,andadministrators-Nurturinglearnerfriendlyschool

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M.EdSYLLABUS–SEMESTER–
IVPERSPECTIVECOURSEVIII
COMPARATIVE EDUCATION
COURSECODE:22230PC42

**COURSEOBJECTIVES:**

1. Understandtheneed,scopeand historyofcomparativeeducation.
2. Comprehendtheprimaryandsecondaryeducation'saimsandmethodsofinstructioninU.S.A,U.K,Japan,Finlandand India.
3. Analyzethe role ofnationalandstategovernmenton education.
4. Explorethecomparativeeducationofprimaryandsecondaryeducationof U.S.A,U.K,Japan,Finlandand India.
5. Realizetheissuesandchallengesinprimaryandsecondaryeducationofperspectiveofcountries:U.S.A.,U.K,Japan,Finlandand India.

**UNIT-I:HISTORYOFCOMPARATIVEEDUCATION**

Comparative Education: meaning,need and scope, brief history of comparative education-Determinants of a National education system: Geographical, social, economic, political,cultural, linguistic,historicaletc.approachestocomparativeeducation,historical,sociological,philosophicalandscientificapproaches.

**UNIT-II:PRIMARYEDUCATIONANDSECONDARYEDUCATION**

Primaryand Secondary Education inU.S.A, U.K, Japanand India - Aims,Content, Methods ofInstructionand Evaluationsystem.ConceptofUniversalizationofPrimaryEducationinIndia:implications. SalientfeaturesofEducationsystemofU.S.A,U.K,Japanand India.

**UNIT-III:CONSTITUTIONALPROVISIONSFORCOMPARATIVEEDUCATION**

Basicrequirement ofEducationin differentcountries-ConstitutionalProvisionsforComparative Education – Federal Acts on Education – Relationship between Federal, State andLocalGovernments – InternationalProjectforthe EvaluationofEducationalAchievement(IEA) Universal compulsoryEducation – Higher Education– Educational Finance – World Bank – UNESCO,UNICEFandIMF.

**UNIT-IV:COMPARATIVEEDUCATIONATPRIMARYANDSECONDARYLEVEL**

ComparativeEducation: ImportanceofComparison-studyaboutcomparativeeducationatprimary and secondary level in U.S.A., U.K. Japan and India. Vocationalizationof SecondaryEducation.

**UNIT-V:ISSUESANDCHALLENGES IN EDUCATION**

Issues and challenges in primary and secondary education from the perspective of countries:U.S.A., U.K. Japan, Finland and India. Education for disadvantaged Children, Girls 'education,Child labour, Tencheredcation,expenditureandqualityconcernsin Elementaryeducation.

**SUGGESTEDACTIVITIES:**

1. Groupdiscussiononthe need,meaningandscopeofcomparativeeducation.
2. Prepareascrapbookonthesystemofprimaryeducationandsecondaryeducationin U.K,U.S.A, Japan,FinlandandIndia.
3. DebatetheroleofFederalandStategovernment oneducation.
4. Explorethe issuesandchallengesinprimaryandsecondaryeducationfromtheper-



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M.Ed.SYLLABUS-SEMESTER-IV
TOOL COURSE- ICT ON TEACHING AND LEARNINGCOURSECODE:22230TC43

**COURSEOBJECTIVES:**

1. Developtheprofessionalabilityin ICT
2. Understandtheimpactof ICT
3. Explainthevariouseducationalresources
4. Describethevariousassessmenttechniques
5. Explainwaystocreateonlinecommunity

**UNIT-I:INFORMATION ANDCOMMUNICATIONTECHNOLOGY(ICT)**

Definition,meaning,importanceandscopeof ICT-ApplicationsofInformationandCommunicationTechnologies-ClassroomandICT;Professionaldevelopmentand ICT-Emergenceofnew informationtechnology-convergenceofcomputingandtelecommunications.

**UNIT-II:ICTMEDIATED EDUCATION**

Concept, Importance,Meaning,Objectives& Nature of ICT mediated education- Teaching-Learning Environment: Types and Modes of using ICT - Learning Environments - Features of an ICT Mediated Teaching-Learning Environment-Physical Constituents of Classroom/Environment-Social Constituents-Supporting Learners in learning

**UNIT-III:ICTANDTEACHINGLEARNINGPROCESS**

ICT and Teaching and learning Process-Need for ICT Selection-Factors affecting ICT Selection-Selection of ICT – Integration of ICT – TPACK – E- learning,Web based learning,MOOC - Educational e-resources.

**UNIT-IV:ICTFOREDUCATIONALMANAGEMENTANDASSESSMENT**

Definition – e-governance – importance of ICT in manpower planning and HRD – Applications of ICT in Educational Management-Use of ICT in financial management-Creating online community of Parents, Teachers and students for Effective management- TQM and application of ICT in TQM - Concept and meaning of Computerized Test construction and Administration -Role of ICT in Assessment – Web based Assessment – Electronic support as a tool in assessment process- Use of Blogs for assessment- Advantages and Disadvantages of ICT based assessment

**UNIT-V:ARTIFICIALINTELLIGENCE(AI)INEDUCATION**

Artificial intelligence: Meaning and history – AI integrated education – Principles and objectives of AI integrated learning- Role of schools in the success of AI integrated learning-Meeting of National Goal through AI integration - Assessment of AI integrated learning.

**SUGGESTEDACTIVITIES:**

1. Selectanyonetopicinthe B.Ed.syllabusandintegrate ICTintheselectedtopic
2. Createonlinecommunitytointegratethestudentsandteachersintheclassroom
3. Administer a Testusing ICT
4. Createpersonalblogandupload the ICT toolsintheblog
5. Visit anearby Teacher Education Institution and teach the students using ICT

**TEXTBOOKS:**


1. Kulkarni,S.S.(1986). *Introduction to Educational Technology*.Oxford&IBH.
2. Kumar,K.L.(1997).*Educational Technology*.NewAgeInternational(P)Ltd
3. Mangal, S.K.(2002).*Essentials of teaching learning and information technology*.




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SPECIALIZATIONCORECOURSE–XGUIDANCE AND COUNSELINGCOURSECODE:22230SC45

**COURSEOBJECTIVES:**

1. Enablethestudentstoexplaintheconceptualaspectsof Guidanceandproceduralaspectsofguidance services.
2. Makethestudentstounderstandtheknowledgeabouttheoreticalandprocedural issuesin Educationaland Vocationalguidance.
3. Enablethestudents toexplaintheroleofcounsellor,andTeacherintheguidanceprogramme.
4. Enablethestudentstoidentifythedifferentactivitiesrenderedbythedifferentguidancepersonne
5. Makethestudentstofamiliarizewithself,groupandcareerappraisaltechniques.

**UNIT–I:CONCEPTOFGUIDANCE**

Guidance - Concept, need, scope, assumptions, issues and problems of guidance. Differencebetween Guidance and Counselling. Bases of Guidance – Philosophical, Psychological andSociological. Types of Guidance – Educational, Vocational, RecreatSocial andMoral,Personal,LeadershipandHealth,GroupandIndividualGuidance.AimsandObjectivesof Guidance-aspertherecommendationsof KothariCommission.

**UNIT–II:THEGUIDANCESERVICE**

OrganizingGuidanceservicesinSchool–Principlesandimportance,Roleofl leadmaster, Teachers, Parents and Counsellor's In organizing guidance services in School. Pupil Personalwork–Itsnature,scopeandrelation tovocationalguidance.TheStudentInformationServices,the CounsellingServices,PlacementService,Occupationalinformation Service, IndividualInventoryService.

**UNIT–III:TECHNIQUESAND THEORIESOFGUIDANCE**

Techniques – Testing and Non-Testing. Essential in launching GuidanceProgramme – Scienceof information needed, use of interview and questionnaire in collecting information. Appraisalof Personal quality and interest – Inventory, Rating Scales, Anecdotal Record, Socio-metricmethods, Cumulative Record Cards. Theories of Vocational Guidance – Ginsberg's theory andSuper'sVocationalChoiceTheory.

**UNIT–IV:COUNSELLING**

Counselling Concept,steps,Individualandgroup.Counselling.ApproachesofCounselling – Directive Counselling, Non Directive Counselling, Eclectic Counsellingand their utility,Role of the Career Master, Vocational Counselling Service – Nature, Qualification of theVocational Counsellor, Place of counselling in a vocational guidance programme, counsellingfor all,setting, preparingand conducting the interview,TeacherCounsellor,VocationalCounsellor,CharacteristicsofaCoordinator.

**UNIT–V:GUIDANCEFOREXCEPTIONALCHILDREN**

Guidance for Exceptional Children-MeaningandTypes.Guidance for gifted, backward,mentally retarded, orthopedically handicapped, visually impaired, deaf and dumb, juveniledelinquents guidance for dropouts-Sociallydisadvantaged children- AlcoholicsAddicts -SexualharassmentEve teasing-Gender discrimination- Exemptions in examinationforexceptionalchildren.

**SUGGESTEDACTIVITIES:**

1. Conduct an interview of B.Ed students of any college, to find out the burden/psychological effects of practical/other programme. Mention how counsel/guide them



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## SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF MICROBIOLOGY

**Minutes of Board of Studies Meeting**

The Board of Studies meeting for the department of Microbiology is held on 28.4.2022 at 11 a.m. in, PRIST Deemed to be University, Thanjavur under the chairmanship of Dr.A.Xavier Fernandes.

**The following members were present:**

1. Dr.A.Xavier Fernandes /Assistant Professor, PRIST (Member, BOS)
2. Dr. L.Chinnappa / Dean, PRIST (BOS, Member)
3. Dr. S. Ramesh, Professor, PRIST (Member, BOS)
4. Dr.S.Mohanraj /Associate Professor, (BOS, Member)
5. Dr. T. Usharani/ Associate Professor PRIST (Member, BOS)
6. Dr. K. Sundar / Assistant Professor, PRIST (Member, BOS)
7. Dr. R. Sathya/Assistant Professor, PRIST (Member, BOS)
8. Dr.A.Xavier Fernandes /Assistant Professor, PRIST (Member, BOS)
9. Dr. P. Anantharaman Professor, CAS in Marine Biology, Annamalai University (External Member, BOS)

The Chairman (BOS) welcomed all the members and presented the feedback about existing curriculum received from various Stakeholders and also from the department academic advisory committee.

The members of the Board have unanimously discussed and carefully reviewed the existing syllabus for (B.Sc., Microbiology, M.Sc., Microbiology and M.Phil.,) in detail and made the necessary changes in upcoming (B.Sc., Microbiology, M.Sc., Microbiology and M.Phil.,) as mentioned below.

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**1.Resolved to introduce the following New Discipline elective Courses in the B.Sc., (Microbiology) programme curriculum with effect from 2022-2023**

I. To improve the skill development in Microbiology

| S.No | Course Code | Course Name | Year of introduce |
|---|---|---|---|
| 1. | Bioinoculants | 22116DSC54A | 2022 |
| 2. | Bioremediation practices | 22116DSC54B | 2022 |
| 3. | Advanced immunology | 22116DSC54C | 2022 |
| 4. | Genomics and proteomics | 22116DSC54D | 2022 |
| 5. | Bioethics | 22116DSC63A | 2022 |
| 6. | Biomolecules | 22116DSC63B | 2022 |
| 7. | Medical Microbiology | 22116DSC63C | 2022 |
| 8. | Bacterial Genetics | 22116DSC63D | 2022 |
| 9. | Immunotechnology | 22216DSC15A | 2022 |
| 10. | Aquatic Microbiology | 22216DSC15B | 2022 |
| 11. | Food Technology | 22216DSC15C | 2022 |
| 12. | Modern Industrial Biotechnology | 22216DSC15D | 2022 |
| 13. | Clinical research and development | 22216DSC25A | 2022 |
| 14. | Soil and Water Engineering | 22216DSC25B | 2022 |
| 15. | Fungal Immunology | 22216DSC25C | 2022 |
| 16. | Pollution Research | 22216DSC25D | 2022 |

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| | | | |
|---|---|---|---|
| 17. | Microalgal Technology | 22216DSC34A | 2022 |
| 18. | Drug Development Product Management | 22216DSC34B | 2022 |
| 19. | Biomolecules and Polymers | 22216DSC34C | 2022 |
| 20. | Nanotechnology | 22216DSC34D | 2022 |
| 21. | Molecular Immunology | 22216DSC44A | 2022 |
| 22. | Metabolic Engineering of Bacteria | 22216DSC44B | 2022 |
| 23. | Toxicology | 22216DSC44C | 2022 |
| 24. | Biomedical Science | 22216DSC44D | 2022 |

II. To improve the Value-added course

| S.No | Name of the Course | Course code | Year of introduce |
|---|---|---|---|
| 1. | Certificate Course on Food processing | 22516FP | 2022 |
| 2. | Certificate Course on Clinical Laboratory Technology | 22516CLT | 2022 |

**2. Resolved to introduce "Bioinoculants/ 20116DSC54A"** has to be retained as it is without any changes, but the new course code **22116DSC54A** is implemented **Unit I to V** content newly added:

**UNIT I:**

Mineralization of Organic & Inorganic Matter in Soil. Biological Nitrogen fixation-Chemistry and Genetics of BNF. Phytopathology and Disease cycle of Plant pathogens - Tikka and Citrus canker, Types of disease symptoms, Structural and Inducible biochemical defenses - Systemic Acquired Resistance (SAR), pathogenesis related (PR) proteins, Plantibodies, Phenolics, Phytoalexins

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**UNIT II:**

Microbial Interactions - Mutualism, Commensalism, Amensalism, Synergism, Competition, Rhizosphere- Rhizosphere effect, Mycorrhizae – Types, Endophytes, PGPR- Plant growth promoting bacteria– symbiotic (Bradyrhizobium, Rhizobium, Frankia), Non-Symbiotic (Azospirillum, Azotobacter, Mycorrhizae, MHBs, Phosphate solubilizers, algae). Novel combination of microbes as biofertilizers, PGPRs. Biofertilizers and Biocontrol agents – Types, benefits and application. Advantages, social and environmental aspects - Bt crops, golden rice.

**UNIT III:**

Components of Environment: Hydrosphere, lithosphere, atmosphere, and biosphere – definitions with examples. Energy flow in the ecosystem- Carbon, Nitrogen, Sulfur and Phosphorous cycles. Physical factors affecting distribution of microorganisms in various environments. Predisposing factors for Environmental diseases – infectious and control of these diseases.

**UNIT IV:**

Waste management – Solid waste - Types - management - Factors affecting solid waste generation rates. Biological reference standards. Utilization of Solid Waste as Food, Feed and Fuel- Composting, Vermicomposting, Bio manure and Biogas production. E waste management

**UNIT V:**

Degradation of organic matter - lignin, cellulose, hemicellulose, pectin, common pesticides- herbicides (2,4-D) and pesticides (DDT), heavy metals. Biodegradation of Xenobiotics - Recalcitrant Halocarbons, Recalcitrant TNTs, PCBs and Synthetic polymers.

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## SCHOOL OF ARTS AND SCIENCE

### Department of Microbiology

| Composition of Board of Studies 2022-2023 | | | | | |
|---|---|---|---|---|---|
| | Designation | Name | Qualification | Designation & Affiliation | Mail id |
| 1 | Chairperson /HoD | Dr.A.Xavier Fernande | M.Sc., M.Ed M.Phil. Ph.D. | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | a.xavierfernandes@gmail.com |
| 2 | External Expert-Academic | Dr. K.Kavitha | M.Sc., PhD | Assistant Professor, Dept. of Environmental & Herbal Science, Tamil University, Thanjavur | kavikruthiga@gmail.com |
| 3 | External Expert-Industry | Dr.Manjula Kesavan | M.Sc., PhD | Managing Director, Bio Techno Solutions Training and Research Institute Trichy-004 TM | manjulasharmi@gmail.com |
| 4 | Professor | Dr. S. Ramesh | M.Sc.,Ph.D. | Professor, PRIST Deemed to be University, Vallam, Thanjavur | ramesh@prist.ac.in |
| 5 | Associate Professor | Dr.S.Mohanraj | M.Sc.,Ph.D. | Associate Professor, PRIST Deemed to be University, Vallam, Thanjavur | sarala@prist.ac.in |
| 6 | Associate Professor | Dr. T. Umadevi | M.Sc., M.Phil., B. Ed., Ph.D. | Associate Professor, PRIST Deemed to be University, Vallam, Thanjavur | umadevi19@gmail.com |
| 7 | Assistant Professor | Dr.K. Sundar | M.Sc., Ph.D. | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | sundar@gmail.com |
| 8 | Assistant Professor | Dr. R. Sathya | M.Sc., M.Phil., PhD | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | sathyaram1984@gmail.com |
| 9 | Assistant Professor | Dr.A.Xavier Fernande | M.Sc., M.Ed M.Phil. Ph.D. | Assistant Professor, PRIST Deemed to be University, Vallam, Thanjavur | a.xavierfernandes@gmail.com |
| 10 | Special Invitee-Dean | DR. L.Chinnappa | M.Sc., M.Phil., B. Ed., Ph.D. | Dean, School of Arts and Science, PRIST Deemed to be University, Vallam, Thanjavur | deanarts@prist.ac.in |
| 11 | Special Invitee-Alumnus/Alumna | S.Supraja | PG | Research Assistant IL TANBIO R&D Solution, Trichy | tamilselvan20@gmail.com |
| 12 | Special Invitee -Current student - UG or PG | R. KarthickRaja | PG | STUDENT | raja@gmail.com |

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Signature of the Chairman & Members

| | Designation | Name | Qualification |
|---|---|---|---|
| 1 | Chairperson/HoD | Dr.A.Xavier Fernandes | |
| 2 | External Expert-Academic | Dr. K.Kavitha | |
| 3 | External Expert- Industry | Dr Manjula Kesavan | |
| 4 | Professor | Dr. S. Ramesh | |
| 5 | Associate Professor | Dr.S.Mohanraj | |
| 6 | Associate Professor | Dr. T. Vishalini | |
| 7 | Assistant Professor | Dr.K. Sundar | |
| 8 | Assistant Professor | Dr. R. Sathya | |
| 9 | Assistant Professor | Dr.A.Xavier Fernandes | |
| 10 | Special Invitee-Dean | DR. L.Chinnappa | |
| 11 | Special Invitee-Alumnus/Alumna | S.Supraja | |
| 12 | Special Invitee -Current student - UG or PG | R. KarthickRaja | |

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Head of the Department
Department of Microbiology
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Dean

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22116DSC54B | Bioremediation practices | 5 | 0 | 0 | 4 |

**UNIT – I**

Wastes- Classification and Quantification – Solid Waste Management and Disposal: Sources and Generation of Solid Waste – characterization, composition and classification. Hazardous Waste Management: Cyanides, Dioxins, Detergents, Plastics, Nylon and Paper. Waste Minimization approaches – Monitoring and Management strategies. Radioactive Waste: Sources, half life of radioactive elements, modes of decay. Effects on Plants, Animal and Man. Low and High-level Radioactive Waste Management – Waste Minimization and Treatment, Radiation standards.

**UNIT - II**

Recycling of Wastes – Types – sources – composition of waste – recycling of waste for Industrial, Agricultural and Domestic Purposes; Recycling of Metals, Reuse, recovery and reduction of paper and plastics; Recycling in Food Manufacturing, Beverages, Apparel, Leather, Paper, Pulp, Chemical and other industries; Fly Ash utilization. Waste Disposal Methods – composting, incineration, pyrolysis, medical waste disposal strategies.

**UNIT – III**

Microbial Activity in Soil and Ground Water. Lithosphere as Microbial habitat, Microorganisms in rock and minerals, Mineral soil and Organic soil. Biomobilization of silicon, phosphate, nitrogen. Geomicrobiology of fossil fuel, methane, peat, coal and petroleum.

UNIT – IV

Principles of Bioremediation – Rapid growth and Metabolism- Genetic plasticity – Metabolic pathways for the degradation of xenobiotics, hydrocarbons – Microbial site characterization – Quantification of biodegradation; Biocleaning -Chernobyl radioactive contaminated area - Phytoremediation.

**UNIT – V**

Aerobic Bioremediation: Bioremediation of Surface Soils: Fate and transport of contaminants in the Vadose zone – Biodegradation in soil ecosystems – Types of soil treatment systems – Bioreactors. Subsurface Aerobic Bioremediation- Bioremediation in fresh water and marine systems: Bioremediation: Anoxic/Anaerobic Processes –Fermentation, Degradation of xenobiotics – Anoxic/Anaerobic bioremediation of hydrocarbons, Phenols, Heterocyclic Compounds, Cyanide, dyes.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22116DSC54BC | Advanced Immunology | 5 | 0 | 0 | 4 |

**Unit I**

Molecular And Cellular Mechanisms Of Disease Prevention By The Immune System

- Immunity against bacteria.
- Immunity against viruses.
- Vaccines.

**Unit II**

Molecular And Cellular Mechanisms Of Disease Prevention By The Immune System

- Immunity against parasites.
- Immunity against cancer. 1. Tumor Immunology.

**Unit III**

Molecular And Cellular Mechanisms Of Disease Prevention By The Immune System"

- Immunity against cancer. 2. Cancer immunotherapy.

**Unit IV**

Diseases Related With The Immune System

- Organ transplantation and immune rejection.
- Autoimmune diseases.

Unit V

Diseases Related With The Immune System

- Primary Immunodeficiencies.
- AIDS.
- Hypersensitivity reactions. Allergies.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20116DSC54D | Genomics and proteomics | 4 | 1 | 0 | 3 |

**Unit I**

Introduction to protein structure, Chemical properties of proteins. Physical interactions that determine the property of proteins. Short-range interactions, electrostatic forces, Van der Waal interactions, hydrogen bonds, hydrophobic interactions.

**Unit II**

Proteomics: structural, functional, expression, interaction proteomics. Importance of proteomics. Determination of protein sizes (Sedimentation analysis, gel filteration, SDS-PAGE); Native PAGE,

**Unit III**

Protein-protein interactions, gel based proteomic tools e.g. 2D, DIGE, Non-gel based proteomic tools, Gel based proteomics, LC-based proteomics.

**Unit IV**

Protein array, Protein Identification and data evaluation, Identification of post-translational modifications: Phosphorylation, Glycosylation, Acetylation

**Unit V**

Mass Spectrometry-Fundamental parameters: Mass accuracy, Resolution, Sensitivity, Ion sources: Electrospray ionization, Matrix assisted laser desorption and ionization, Peptide mass finger printing, Tandem mass spectrometry

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20116D5C63A | Bioethics | 4 | 1 | 0 | 3 |

**UNIT – I**

General Ethical concerns: the use of nature, Different views of nature, Dynamic nature, interfering with nature, integrity of species, Reducing genetic diversity; Biological warfare; public perception of science.

**UNIT – II**

Medical ethics; History and culture. The Hippocratic tradition. a profession, Philanthropy, Do no harm, adoption to the oath by western medicine. Competing ethical.

Traditions; Retaining the Hippocratic oath.

**UNIT – III**

Status of Human embryo: Human Embryonic development; Ethics through embryo development. Fertilization, the fetus and feeling pain; Scientific Research on Human Embryos: Experimental goals of Human Embryo Research, Human Development; How much Embryo experimentation in ethical?

**UNIT – IV**

Animal Rights: Making new strains of animal: Ethical limits of animal use; Religious views of animal status; Philosophical views of animal status; regulations.

**UNIT –V**

Human Gene therapy: Ethics of somatic cells gene therapy; Efficiency of treatment, safety of transferred genes; protecting human life; Affects on family life; Economic factors.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20116DSC63B | Biomolecules | 5 | 0 | 0 | 4 |

**Unit I**

Carbohydrates: Structure and biological functions of Mono, di and Polysaccharides. Types of polysaccharides: Homo polysaccharides -chitin, fructans, mannans, xylans, and galactans. Structure and biological importance of Hetero polysaccharides- Glycoprotein – bacterial cell wall polysaccharides, marine polysaccharides and Lectins.

**Unit II**

Aminoacids and its general properties. Classification of amino acids. Proteins– classification and general properties. Orders of protein structure, Primary- Secondary structure– the α-helix, β- pleated sheet. Protein sequencing methods.

**Unit III**

Lipids: Definition and classification of lipids. Biological significance of lipids. Types of Fatty acids-Essential, Non essential. Structure and biological functions of phospholipids, sphingolipids, glycolipids. Steroids – structure and functions of cholesterol, bile acids, sex hormones, ergosterol. Structure and biological role of prostaglandins, thromboxanes and leukotrienes.

**Unit IV**

Nucleic acid: Structure of purines, pyrimidines, nucleosides and nucleotides. DNA double helical structure. A, B and Z forms of DNA. Properties of DNA- Density, viscosity, hypochromicity, denaturation and renaturation. DNA sequencing– chemical and enzymatic methods. Chemical synthesis of DNA. RNA- types and biological role- Secondary, tertiary structures of RNA.

Unit V

Vitamins: Definition and Classification - Source, Structure and biological role - Daily requirements and deficiency manifestation of fat soluble vitamins and water soluble vitamins.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20116DSC63C | Medical Microbiology | 5 | 0 | 0 | 4 |

**Unit – I**

Normal microbial flora of human – Host – parasite interaction: The Process of infection. Infective syndromes and diagnositic procedure - Strategy of antimicrobial therapy – Epidemiology and control of community infections.

**Unit – II**

General properties, epidemiology, transmission, pathogenesis, Symptoms, laboratory diagnosis, prevention and Treatment of the following Bacterial diseases:a) Pneumonia, b) Whooping-cough, c) Meningitisd) Diphtheriae) Pulmonary Tuberculosis.f) Leprosy, g) Typhoid. h) Cholera i) Tetanus, j) Syphillis, k) Gonorrhoea, d) Dental carries.

**Unit - III**

Mycobacterium: Mycobacterium tuberculosis, Mycobacterium leprae. Spirochaetes, Mycoplasma, Actinomycetes, Helicobacter, Compylobacter and other miscellaneous bacteria, Rickettsia, Chlamydia.

**Unit – IV**

General properties, epidemiology, transmission, pathogenesis, Symptoms, laboratory diagnosis, prevention and Treatment of the following viral diseases: Small pox, Influenza, Measles, Poliomyelitis, Common cold(Rhino virus), Hepatitis, Encephalitis, Rabies, AIDS.

**Unit – V**

Pathogenic Fungal diseases- Superficial, Subcutaneous and systemic mycoses. **Protozoa**-Amoebiasis, Malaria, **Helminthes**-Liverfluke, Filariosis, **Hospital acquired infections**:Hospital infections Principles of control – Committee – functions. Hospital waste disposal – Ethical committee – functions.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20116DSC63D | Bacterial Genetics | 4 | 1 | 0 | 3 |

**Unit -I**

History and achievements of rDNA technology. Nomenclature, classification of Restriction Endonucleases - ligases, types - gene cloning in prokaryotes - Expression and cloning strategies. Construction of genomic library and cDNA library.

**Unit II**

Restriction enzymes - restriction analysis of genomes- restriction sites- cloning of blunt end DNA, adapters. DNA analysis: labeling of DNA and RNA probes. Southern and fluorescence *in situ* hybridization, DNA fingerprinting, chromosome walking.

**Unit- III**

Gene transfer Techniques - Physical - Biolistic method, Chemical - Calcium chloride and DEAE methods, Biological invitro package method - Screening and selection of recombinants.

**Unit-IV**

Microbial synthesis of commercial products - Insulin, Interferons, Human growth hormone, antibiotics, biopolymers.

**Unit- V**

Transgenic Plants - Ti plasmid, insect resistant plant. Transgenic animal - mice - retroviral method- DNA microinjection method. PCR methods and its applications.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC15A | Immunotechnology | 5 | 0 | 0 | 4 |

**Unit – I**

Introduction: History of immunology – types of immunity – Innate and Acquired – Passive and Active - Humoral and cell Mediated Immunity. Lymphoid organs – autoimmunity, physiology of immune response — Immunohaematology

**Unit - II**

Antigens and Antibodies: Antigens – structure and properties – types – ISO and allo –haptens, adjuvants – antigen specificity, vaccines and toxoids. Immunoglobulins – structure - heterogeneity – types and subtypes – properties (physico – chemical and biological); theories of antibody production - Complement – structure – components - properties and functions of complement components; complement pathways and biological consequences of complement activation

**Unit - III**

Major Histocompatibility complex: Structure and function of MHC and the HLA system. Gene regulation and Ir – genes. HLA tissue and transplantation – tissue typing methods for organ and tissue transplantation in humans; Graft versus host reaction and rejection. Autoimmunity –diseases-mechanism and disease with their diagnosis

**Unit - IV**

Tumor Immunology: tumour antigens – immune response to tumors immunodiagnosis of tumors – detection of tumor markers alphafoetal proteins, carcinoembryonic antigen etc. Immunotherapy of malignancy. Hypersensitivity – monoclonal antibody – production and their applications

**Unit - V**

Immunological techniques and their principles: In vitro of immunological methods – agglutination, precipitation, complement fixation, Immunofluorescence, ELISA, Radio Immuno Assays, Immunodiffusion, Immunoelectrophoresis, isoelectric focusing – cytotoxicity assay – labeled – antibody technique in light and Electron Microscopy and Immunohistochemistry. Techniques of Immunization – use of adjuvants – separation of lymphocytes – and preparation of Rosette forming cells - In vivo methods – skin tests and immune complex tissue demonstrations - Applications of these methods in diagnosis of microbial diseases.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC15B | Aquatic Microbiology | 5 | 0 | 0 | 4 |

**UNIT I**

Aerobiology, Microbial contamination of air, Sources of contamination, Microbial indicators of air pollution, Enumeration of bacteria in air, Air sampling devices. Air sanitation. Effect of Air Pollution on plants and humans.

**UNIT II**

Aquatic microbiology: Microbiology of water , Water pollution and water borne pathogens, Bacteriological examination of water, Indicator organisms, Purification and disinfection of water Microbiology of sewage, Waste water treatment, BOD, COD. Role of microbes in marine fouling

**UNIT III**

Microbial flora of soil and factors affecting them, Key processes and role of microorganisms in Nitrogen, Carbon, Phosphorus, Sulphur and Iron cycles.

**UNIT IV**

Microbial interaction – Plant-microbe, microbe-microbe interactions. Endophytes, PGPR- mechanisms of plant growth promotion by PGPR, Plant Microbiome, Mycorrhiza, Biological Nitrogen fixers-Symbiotic and free living nitrogen fixers- physiology and genetics of nitrogen fixers, Phosphate solubilizers, Phytopathogens – Bacterial , fungal, Viral diseases. (Wilt, Blight, Canker, Mosaic, Rhizome rot of ginger etc.) – Control measures. Biofertilizers, Microbial control of pests and diseases. Bt-toxin- mode of action and applications, Integrated pest management. GM crops and its importance

**UNIT V**

Recycling of liquid and solid wastes – Composting – Biogas – Biodegradation, Bioremediation, Bioleaching, Xenobiotic degradation, Microbial corrosion- Biofilms degradation of petroleum products. Microbes in mineral leaching and metal concentration, Microbial enhanced oil recovery

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC15C | Food Technology | 5 | 0 | 0 | 4 |

**UNIT I**

Principles of fresh food storage: Nature of harvested crop, plant, animal; product storage; effect of cold storage and quality – storage of grains.

**UNIT II**

Processing and preservation by heat: Blanching, pasteurization, sterilization and UHT processing, canning, extrusion cooking, dielectric heating, microwave heating, baking, roasting and frying. Retort processing of Ready to eat (RTE) products. Newer methods of thermal processing – batch and continuous.

**UNIT III**

Processing and preservation by low Temperature: refrigeration, freezing, CA, MA, and dehydrofreezing. Food irradiation, history and mechanism, the electro-magnetic spectrum, forms of radiant energy. Principles of using electromagnetic radiation in food processing, ionizing radiations and non ionizing radiations, advantages and disadvantages. Controlling undesirable changes in food during irradiation.

**UNIT IV**

Processing and preservation by drying, concentration and evaporation: Drying – water activity, microbial spoilage due to moisture. Dehydration of fruits, vegetables, milk, animal products. Various methods employed in production of dehydrated commercial products, selection of methods based on characteristics of foods to be produced, advantages and disadvantages of different methods, sundrying, tray or tunnel drying, spray drying, drum drying, freeze drying, fluidized bed drying. Physical and chemical changes during drying control of chemical changes, desirable and undesirable changes. Packaging and storage of dehydrated products. Food Concentration- methods of food concentration, freeze concentration, Ultra-filtration, reverse osmosis.

**UNIT V**

Processing and preservation by non-thermal methods: High pressure, pulsed electric field, hurdle technology. GRAS and legal aspects for gamma irradiation. Permissible limits for chemical preservatives. Use and application of enzymes and microorganism in processing and preservation of foods; food fermentations, pickling smoking ; Food additives; Definition, types and functions, permissible limits and safety aspects. Chemical Preservatives- type I and type II.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC15D | Modern Industrial Biotechnology | 5 | 0 | 0 | 4 |

**UNIT I**

History of Biotechnology. Traditional and New Biotechnology. Scope & Importance of Biotechnology. Branches of Biotechnology, Present Status of Biotechnology in India and their research Disciplines. Branches of Biotechnology: Red Biotech, White/Grey Biotech, Green Biotech, Blue Biotech.

**UNIT II**

Production of useful compounds: ethanol, lactic acid, citric acid. Production of antibiotics: Penicillin, Streptomycin. Production of enzymes: α-amylase, proteases, lipases. Single cell proteins (SCP) from bacteria, yeast, fungi and algae for human feed and animals feed (as supplements). Fuel (ethanol, biogas) production from cheap, less useful and abundant substrates such as sugarcane bagasse, wood (biofuel & bioenergy).

**UNIT III**

Gene transfer methods in Animals – Microinjection, Embryonic Stem cell, gene transfer. Transgenic Animals – Mice, Cow, Pig, Sheep, Goat, Bird, Insect. Animal propagation – Artificial insemination, Animal Clones. Introduction to Stem Cell Technology and its applications. Genetic modification in Medicine - gene therapy, vectors in gene therapy, molecular engineering, human genetic engineering, problems & ethics. Human Genome Project (HGP) – an overview of the project, goals of the project, major scientific strategies & approaches used in HGP, expected scientific & medical benefits of this project. Principle of DNA fingerprinting and its application.

**UNIT IV**

Plant Tissue Culture applications – micropropagation, from callus to plant, somatic embryogenesis, soma clonal variation, valuable germplasm, chemicals from plants, genetically engineered plants. Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance. Genetic modification in Agriculture – transgenic plants, genetically modified foods, application, future applications, ecological impact of transgenic plants, their future applications.

**UNIT V**

Fundamentals, methods and strategies of application (biostimulation, bioaugmentation) – examples, bioremediation of metals (Cr, As, Se, Hg), radionuclides (U, Te), organic pollutants (PAHs, PCBs, Pesticides, TNT etc.), technological aspects of bioremediation (in situ, ex situ).

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC25A | Clinical research and development | 5 | 0 | 0 | 4 |

**UNIT I:**

Microbiology Laboratory Safety Practices -General Safety Guidelines, Handling of Biological Hazards, Infectious health care waste disposal - Biomedical waste management, Emerging and Re-emerging infections.

**UNIT II:**

Diagnostic procedures - General concept of Clinical specimen collection, transport, storage and general processing in Microbiology laboratory - Specimen acceptance and rejection criteria.

**UNIT III:**

Diagnosis of microbial diseases - Clinical, differential, Microbiological, immunological and molecular diagnosis of microbial diseases. Modern and novel microbial diagnostic methods. Automation in Microbial diagnosis.

**UNIT IV:**

Antibiotic sensitivity tests - Disc diffusion - Stokes and Kirby Bauer methods, E test - Dilution - Agar dilution & broth dilution - MBC/MIC - Quality control for antibiotics and standard strains.

**UNIT V:**

Nosocomial infections – common types, sources, reservoir and mode of transmission, pathogenesis and control measures. Hospital Infection Control Committee (HICC) – Functions.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216D5C25B | Soil and Water Engineering | 5 | 0 | 0 | 4 |

**UNIT I:**

Soil Microbiology– Soil as Microbial Habitat, Soil profile and properties, Soil formation, Diversity, and distribution of major group of microorganisms in soil. Quantification of soil microflora, role of microorganism in soil fertility. Mineralization of Organic & Inorganic Matter in Soil. Biological Nitrogen fixation- Chemistry and Genetics of BNF. Phytopathology and Disease cycle of Plant pathogens - Tikka and Citrus canker. Types of disease symptoms, Structural and Inducible biochemical defenses - Systemic Acquired Resistance (SAR), pathogenesis related (PR) proteins, Plantibodies, Phenolics, Phytoalexins

**UNIT II:**

Microbial Interactions - Mutualism, Commensalism, Amensalism, Synergism, Competition, Rhizosphere- Rhizosphere effect, Mycorrhizae – Types, Endophytes, PGPR- Plant growth promoting bacteria– symbiotic (*Bradyrhizobium, Rhizobium, Frankia*), Non-Symbiotic (*Azospirillum, Azotobacter*, Mycorrhizae, MHBs, Phosphate solubilizers, algae), Novel combination of microbes as biofertilizers, PGPRs. Biofertilizers and Biocontrol agents – Types, benefits and application. Advantages, social and environmental aspects - Bt crops, golden rice.

**UNIT III:**

Components of Environment: Hydrosphere, lithosphere, atmosphere, and biosphere – definitions with examples; Energy flow in the ecosystem- Carbon, Nitrogen, Sulfur and Phosphorous cycles. Physical factors affecting distribution of microorganisms in various environments. Predisposing factors for Environmental diseases – infections (water and air borne) and pollution related, spread and control of these diseases. Treatment and safety of drinking (potable) water, methods to detect potability of water samples. Space microbiology –Microbiological research in space environment.

**UNIT IV:**

Waste management – Solid waste - Types - management - Factors affecting solid waste generation rates. Industrial effluent treatment, primary, secondary, tertiary, and advanced treatment process. Quality assessment of decontaminated matters and other biological effluents. Biological reference standards. Utilization of Solid Waste as Food, Feed and Fuel- Composting, Vermicomposting, Bio manure and Biogas production. E waste management

**UNIT V:**

Degradation of organic matter - lignin, cellulose, hemicellulose, pectin, common pesticides-herbicides (2,4-D) and pesticides (DDT), heavy metals. Biodegradation of Xenobiotics - Recalcitrant Halocarbons, Recalcitrant TNTs, PCBs and Synthetic polymers. Biodegradation of Hydrocarbons. Biodeterioration of Textiles and Leather. Pollution Control Bodies and Environmental laws in India. Environmental impact assessment, EIA guidelines, US Environment protection Agency norms

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC25c | Fungal Immunology | 5 | 0 | 0 | 4 |

**UNIT I FUNGAL PROPERTIES**

Fungi - Structure and cell differentiation- unicellular and multicellular forms. Modes of reproduction -sexual, asexual and para sexual, life cycle patterns. Growth requirements and cultivation. Virulence factors. Detection and recovery of fungi from clinical specimens. Advances in diagnostic mycology. Antifungal agents- type and mode of action, testing methods and quality control. Immunity to fungal infection.

**UNIT II MYCOSES**

Superficial Mycoses- Dermatophytosis, Piedra, Pityriasis versicolor, Tinea nigra. Subcutaneous Mycoses- Mycetoma, Sporotrichosis, Chromoblastomycosis, Phaeohyphomycosis, Rhinosporidiosis. Histoplasmosis, Blastomycosis, Coccidiodomycosis and Paracoccidiodomycosis. Opportunistic mycoses-Candidiasis, Cryptococcosis, Aspergillosis, Zygomycosis, Dimaticaceous fungi.

**UNIT III PROTOZOOLOGY**

Host – parasite relationship, Lab diagnosis of parasitic infections. Pathogenic mechanism, transmission, life cycle, lab diagnosis of Protozoans – Entamoeba, Giardia, Trichomonas, Balantidium.

**UNIT IV HAEMOFLAGELLATES**

Trypanosomes- Leishmania, Trypanosoma and Sporozoites- Plasmodium, Coccidia- Toxoplasma, Cryptosporidium.

**UNIT V HELMINTHOLOGY**

Cestodes - Taenia solium and T. saginata, Echinococcus. Trematodes – Fasciola hepatica, Fasciolopsis buski, Paragonimus, Schistosoma. Nematodes – Ascaris, Ancylostoma, Trichinella, Trichuris, Strongyloides, Enterobius, Filarial worms- Wuchereria, Brugia, Loa Loa, Dracunculus, Onchocerca, and other parasitic infections in immunocompromised hosts and AIDS associated parasites.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC25D | Pollution Research | 5 | 0 | 0 | 4 |

**UNIT I**

Environmental Impact Assessment: Definition, significance and scope of impact assessment, need & objective, types of environmental impacts, methods of environmental assessments.

**UNIT II**

Municipal Solid wastes: - Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

**UNIT III**

Project management and control: - Project cycle, organization, planning, scheduling, monitoring, updating and management system.

**UNIT IV**

Environmental analysis, safety and health, pollution control, surveillance, setting standards and control

**UNIT V**

Legal framework, organisation for control and pollution control laws, acts and bylaws

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC34A | Microalgal Technology | 5 | 0 | 0 | 4 |

**UNIT I:**

Introduction to Algae - General characteristics. Classification of algae according to Fritsch. Salient features of different groups of algae. Distribution - Freshwater, brackish water and marine algae. Identification methods. An overview of applied Phycology. Economically important microalgae.

**UNIT II:**

Cultivation of freshwater and marine microalgae - Growth media. Isolation and enumeration of microalgae. Laboratory cultivation and maintenance. Outdoor cultivation - Photobioreactors - construction, types and operation; raceway ponds - Heterotrophic and mixotrophic cultivation - Harvesting of microalgae biomass.

**UNIT III:**

Microalgae in food and nutraceutical applications - Algal single cell proteins. Cultivation of *Spirulina* and *Dunaliella*. Microalgae as aquatic, poultry and cattle feed. Microalgal biofertilizers. Value-added products from microalgae. Pigments - Production of microalgal carotenoids and their uses. Phycobiliproteins - production and commercial applications. Polyunsaturated fatty acids as active nutraceuticals. Microalgal secondary metabolites - Pharmaceutical and cosmetic applications.

**UNIT IV:**

Microalgae in environmental applications. Phycoremediation - Domestic and industrial waste water treatment. High-rate algal ponds and surface-immobilized systems - Treatment of gaseous wastes by microalgae. Sequestration of carbon dioxide. Scavenging of heavy metals by microalgae. Negative effects of algae. Algal blooms, algicides for algal control.

**UNIT V:**

Microalgae as feed stock for production of biofuels - Carbon-neutral fuels. Lipid-rich algal strains - *Botryococcus braunii*. Drop-in fuels from algae - hydrocarbons and biodiesel, bioethanol, biomethane, biohydrogen and syngas from microalgae biomass. Biocrude synthesis from microalgae. Integrated biorefinery concept. Life cycle analysis of algae biofuels.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC34B | Drug Development Product Management | 5 | 0 | 0 | 4 |

**UNIT I:**

Drug Development Pathway: how to go from molecule to medicine - target product profile - types of compounds (small molecules - biologics - antibody / drug conjugates, vaccines) - different phases in development, approval, and life cycle management - current and future drug development process - success metrics, timelines, costs.

**UNIT II**

Target identification and validation - assay development and screening - animal models of disease - Lead identification, lead optimization and clinical candidate selection

**UNIT III**

Emerging Technologies and approaches in drug development - Use of biomarkers and diagnostics - PHC - Real world data - Use of electronic medical records

**UNIT IV**

History of Regulation - Regulatory requirements in different countries (focus on FDA and EMA) - Regulatory interactions at different phases of development - CTA - IND - NDA - Tools for expedited review and approval - Safety database - Regulatory compliance and post approval commitments - Pediatrics

**UNIT V**

Types of Endpoints in Clinical Trials - Blinding, Randomization, and Stratification - Hypothesis Testing and Error Probabilities - Multiple Testing - Interim Analyses - Sample Size and Trial Duration -Minimum Detectable Difference - Confidence Intervals - P-Values

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC34C | Biomolecules and Polymers | 5 | 0 | 0 | 4 |

**Unit I: Chemistry of Carbohydrates**

Classification of carbohydrates, reducing and non-reducing sugars, biological functions, general properties and reactions of glucose and fructose, their open chain structure, epimers, mutarotation and anomers, reactions of monosaccharides, determination of the configuration of glucose (Fischer proof), the cyclic structure of glucose. Haworth projections. The cyclic structure of fructose. The linkage between monosaccharides: structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.

**Unit II: Nucleosides, Nucleotides and Nucleic Acids**

Components of Nucleic acids: Adenine, guanine, thymine, cytosine and uracil (structure only), other components of nucleic acids, nucleosides and nucleotides (nomenclature), structure of polynucleotides; structure of DNA (Watson-Crick model) and RNA (types of RNA), difference between DNA and RNA, genetic code, biological roles of DNA and RNA: replication, transcription and translation.

**Unit-III: Lipids**

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity. Lipids: Classification. Biological importance of triglycerides and phosphoglycerides and cholesterol; Lipid membrane, Liposomes and their biological functions and underlying applications. Lipoproteins. Properties, functions and biochemical functions of steroid hormones.

Unit IV: Amino acids, Peptides & Proteins

Amino Acids and Peptides -Zwitterion, isoelectric point and electrophoresis. Preparation of amino acids: Strecker synthesis and using Gabriel's phthalimide synthesis. Reactions of amino acids: ester of –COOH group, acetylation of –NH2 group, complexation with Cu2+ ions, ninhydrin test. DISCIPLINE SPECIFIC ELECTIVE COURSE CHEM-DSE 8: Biomolecule-II 33 Determination of the primary structure of peptides by degradation Edman degradation (Nterminal) and C– terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (up to dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis. An Overview of primary, secondary, tertiary and quaternary structure of proteins.

**UNIT V : Enzymes**

Classification of enzymes and their uses (mention ribozymes). Mechanism of enzyme action, factors affecting enzyme action, coenzymes and cofactors and their role in biological reactions, specificity of enzyme action (including stereo-specificity), enzyme inhibitors and their importance, and the phenomenon of inhibition (competitive and non-competitive inhibition including allosteric inhibition). Drug action-receptor theory. Structure – activity relationships of drug molecules, binding role of –OH group, -NH2 group, double bond and aromatic ring.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC34D | Nanotechnology | 5 | 0 | 0 | 4 |

**Unit I: Introduction to bionanotechnology**

Milestones in History – bionanotechnology – concept and future prospects – application in Life Sciences. Terminologies – nanotechnology, bionanotechnology, nanobiomaterials, biocompatibility, nanomedicine, nanowires, quantum Dots, nanocomposite, nanoparticles, nanosensors. Biotechnology to bionanotechnology, natural bionanomachines. Current status of bionanotechnology.

**Unit II: Synthesis of nanoparticles**

Molecular nanotechnology – nanomachines – collagen. Uses of nanoparticles – cancer therapy – manipulation of cell and biomolecules. Cytoskeleton and cell organelles. Types of nanoparticles production – physical, chemical and biological. Microbial synthesis (bacteria, fungi and yeast) of nanoparticles – mechanism of synthesis.

**Unit III: Types of nanoparticles and methods of characterization**

Nanoparticles – types, functions – Silver, Gold and Titanium. Physical and chemical properties of nanoparticles. Characterization of nanoparticles – UV- Vis spectroscopy, particle size analyzer, Electron Microscopy – HRTEM, SEM, AFM, EDS, XRD. Other tools and techniques required for bionanotechnology: rDNA technology, site directed mutagenesis, fusion proteins, X- Ray crystallography, NMR. Bioinformatics: molecular modeling, docking, computer assisted molecular design.

**Unit IV: Applications of bionanotechnology**

Drug and gene delivery – protein mediated and nanoparticle mediated. Uses of nanoparticles in MRI, DNA and Protein Microarrays. Nanotechnology in health sectors. Nanomedicines. Antibacterial activities of nanoparticles. Nanotechnology in agriculture. Toxicology in nanoparticles – Dosimetry.

**Unit V: Merits and demerits of nanoparticles**

Advantages of nanoparticles – drug targeting, protein detection, MRI, development of green chemistry – commercial viability of nanoparticles. Disadvantages – pollution and health risks associated with nanoparticles.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC44A | Molecular Immunology | 5 | 0 | 0 | 4 |

**UNIT I**

History of Immunology-Jenner, Pasteur, Metchnikoff, Kitasato – Types of immunity – Innate immunity- organs involved- Acquired Immunity – Cells involved- Hematopoietic stem cells – Cells of immune system, T and B cell activation and maturation. Antigens-The molecular basis of antigen and antibody interactions. Organs of Immunity- Primary- Bone marrow, Bursa- Thymus- Secondary lymphoid Organs- Lymph nodes, MALTSpleen.

**UNIT II:**

Immunoglobulins- General Structure- Types- IgG, IgA, IgM, IgE, IgDClass switching- Hybridoma technology- Monoclonal antibody production and application. Immunologic messenger molecules- Cytokines, Chemokines, interferons interleukins- Complement system: Classical, Alternate, MBL pathway.

**UNIT III**

Transplantation Immunology- Tissue typing and organ transplantation – MHC gene in human and mouse. MHC class I and class II molecules – Autoimmune diseases: Type-1 Diabetes- Addison's disease and Graves, disease. Immunostimulation and Immunosuppression and their clinical significance.

**UNIT IV**

Immunity against diseases- HIV- Structure- spread and control- Covid19- Stages of infection- spread and control measures- quarantine. Molecular interaction between T cell and Corona virus-2 - Covid19 Vaccines and their effectiveness - booster dose. Cancer and Tumour immunology – Nobel Prize 2020 for discovery of Immunotherapy for Cancer – 2019 Nobel Prize for discovery concerns the impact of Hepatitis C virus and Cancer.

**UNIT V**

Techniques in Immunology: Radio Immuno Assay, ELISA, Western Blotting, Immunofluorescence technique, immunohistochemistry. Vaccines– whole organism vaccine, synthetic peptide vaccine, multivalent subunit-anti idotype vaccine, designer vaccine, edible vaccine, DNA vaccine, recombinant vector vaccine; Abzymes, Current scenario of vaccines and vaccination.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC44B | Metabolic Engineering of Bacteria | 5 | 0 | 0 | 4 |

**Unit I:**

Introduction to Genetics – Great milestones in Genetics; levels of Genetic analysis (Classical, Molecular & Population Genetics); Genetics in Agriculture, Medicine & Society.

**Unit II** Cells & Chromosomes - Basic cell types – structure & evolutionary relationships, Overview of Prokaryotic & Eukaryotic cells, Cellular environment, Chromosomes – where genes are located.

**Unit III** Genetics of Cell Cycle – Key events of the Cell cycle, Genetic analysis of the Cell cycle, Regulation of cell cycle, Checkpoints in the cell cycle.

**Unit IV** Basic principles of Heredity – Segregation of a single gene, the principle & verification of segregation, segregation of two or more genes, test cross with unlinked genes.

**Unit V**Patterns of Inheritance – Autosomal inheritance, Sex chromosomes & Sex-linked inheritance, Cytoplasmic inheritance.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC44C | Toxicology | 5 | 0 | 0 | 4 |

**UNIT I:**

General Introduction - Definition of toxins, different categories of toxins and venoms, recent trends in venom and toxin research.

**UNIT II:**

Bacterial toxins - Bacterial toxins Bacterial toxinogenesis, endotoxins, exotoxins, exotoxins, bacterial protein toxins with special reference to cholera, diphtheria and tetanus toxins, molecular mechanism of action of endotoxins, exotoxins, enterotoxins, neurotoxins and mycotoxins.

**UNIT III:**

Plant toxins & Toxins from snake venom - Natural toxins in plants, Plant toxic proteins, impact of plant toxin on human, natural toxins in food, plants, allelopathy. Toxins from snake venom Snakes and Biological significance of their venoms, composition of snake venom, evolution of venom, 3D structure of some important venom constituents and their mechanism of action (phospholipase A2, cardiotoxin, neurotoxin) three-finger toxins, anti-venom and medicinal plants in treatment of snakebite patients.

**UNIT IV:**

Tools for isolation and characterization of toxins - Multidimensional chromatographic techniques (gel-filtration, ion-exchange reverse-phase HPLC, SDS-PAGE, 2-dimensional gel electrophoresis), toxin mass fingerprinting, N-terminal peptide sequencing, analysis of protein data by using proteomics software.

**UNIT V:**

Medicinal and industrial applications of venoms and toxins. Use of toxin in neurobiology and muscular research, anticancer drugs, diagnosis of haemostatic disorders, antibacterial agents, biopesticides and other industrial applications.

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22216DSC44D | Biomedical Science | 5 | 0 | 0 | 4 |

**UNIT I**

**Human Genetics** - Principles - History and Impact of Genetics in Medicine - Gregor Mendel and the Laws of Inheritance - The Origins of Medical Genetics - Types of Genetic Disorders (single gene disorders, Chromosomal disorders, Polygenic disorders, Somatic cell genetics, mitochondrial disorders) - The Human Genome Project.

**UNIT II**

Molecular Genetics & Cytogenetics: DNA sequence polymorphismsSNPs, VNTRs, Minisatellites, Microsatellites. Mapping and Identifying Genes for Monogenic Disorders - Position-Independent Identification of Human Disease Genes - Positional Cloning. The Human Genome Project and its Applications

**UNIT III**

Population And Mathematical Genetics -Hardy-Weinberg Principle and its Applications - Factors that alter gene frequency- non-random mating, small populations, selection, Mutations., Migration and gene flow. Consanguinity and its consequences - Genetic Polymorphism – Segregation Analysis - Genetic Linkage - Risk Calculation - Probability Theory - Use of Linked Markers -Bayesâ Theorem and Prenatal Screening - Empiric Risks

**UNIT IV**

Genetics in Medicine: Hemoglobin and the Hemoglobinopathies - Disorders of Hemoglobin – alpha, beta and gamma – Clinical Variation of the Hemoglobinopathies - Antenatal and Newborn Hemoglobinopathy - Disorders of Lipid Metabolism – Disorders Affecting Mitochondrial Function. Prenatal Diagnosis of Inborn Errors of Metabolism

**UNIT V**

Clinical Genetics: Epigenetics and Cancer - Diabetes - Crohn Disease -Hypertension - Coronary Artery Disease - Schizophrenia - Alzheimer Disease - Hemochromatosis - Venous Thrombosis - Age-Related Macular Degeneration. Recurrent miscarriage - Xeroderma Pigmentosa - X chromosome inactivation - X-linked mental retardation and Fragile X 3. Single-Gene Disorders -Huntington Disease - Hemophilia . Preimplantation Genetic Diagnosis - Non-Invasive Prenatal Diagnosis. Stem Cell Therapy & Ethical and Legal Issues in Medical Genetics.

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**SCHOOL OF ARTS AND SCIENCE**
**DEPARTMENT OF MICROBIOLOGY**
**B. Sc., MICROBIOLOGY**
**2022-2023 REGULATION**

| SEMESTER I | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| **THEORY** | | | | | |
| 22110AEC1I/<br>22111AEC11/<br>22132AEC11/<br>22135AEC11 | Language-I (Tamil-I/<br>Advanced English-I/<br>Hindi-I/<br>French-I | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22116AEC13 | Fundamentals of Microbiology | 6 | 1 | 0 | 5 |
| 22115AEC14B | Bio Chemistry I | 6 | 1 | 0 | 4 |
| **PRACTICAL** | | | | | |
| 22116AEC15L | Fundamentals of Microbiology Lab | 0 | 0 | 3 | 2 |
| 22115AEC16BL | Bio Chemistry I Lab | 0 | 0 | 3 | 2 |
| | Total | 22 | 2 | 6 | 17 |
| **AUDIT COURSE** | | | | | |
| 221ACLSICN | Indian Constitution | - | - | - | 2 |
| 221ACLSUHV | Universal Human Values | - | - | - | 2 |
| **SEMESTER – II** | | | | | |
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| **THEORY** | | | | | |
| 22110AEC21/<br>22111AEC21/<br>22132AEC21/<br>22135AEC21 | Language-II (Tamil-II/<br>Advanced English-II /<br>Hindi-II/<br>French-II) | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22116AEC23 | Microbial Physiology | 6 | 1 | 0 | 5 |
| 22115AEC24 | Bio Chemistry II | 6 | 1 | 0 | 4 |
| **PRACTICAL** | | | | | |
| 22116AEC25L | Microbial Physiology Lab | 0 | 0 | 3 | 2 |
| 22115AEC26L | Bio Chemistry II Lab | 0 | 0 | 3 | 2 |
| **RESEARCH SKILL BASED** | | | | | |
| | **Total** | **19** | **2** | **6** | **19** |
| 22116RLC27 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **22** | **2** | **6** | **18** |
| **AUDIT COURSES** | | | | | |
| **221ACLSCOS** | Communication Skills | - | - | - | **2** |

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| | | | | | |
|---|---|---|---|---|---|
| 221ACSSBBE | Basic Behavioral Etiquette | - | - | - | 2 |
| | SEMESTER – III | | | | |
| Course Code | Course Title | L | T | P | C |
| | THEORY | | | | |
| 22110AEC31/<br>22111AEC31/<br>22132AEC31/<br>22135AEC31 | Language-III (Tamil-III/<br>Advanced English-III /<br>Hindi-III/<br>French-III) | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22116AEC33 | Immunology | 4 | 1 | 0 | 4 |
| 22116AEC34 | Cell Biology | 4 | 1 | 0 | 5 |
| | PRACTICAL | | | | |
| 22116AEC35L | Immunology Lab | 0 | 0 | 3 | 2 |
| 22116AEC36L | Cell Biology Lab | 0 | 0 | 3 | 2 |
| | RESEARCH SKILL BASED COURSE | | | | |
| 22116RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | 18 | 2 | 6 | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |
| | SEMESTER – IV | | | | |
| Course Code | Course Title | L | T | P | C |
| | THEORY | | | | |
| 22110AEC41/<br>22111AEC41/<br>22132AEC41/<br>22135AEC41 | Language-IV (Tamil-IV/<br>Advanced English-IV/<br>Hindi-IV/<br>French-IV) | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22116AEC43 | Virology | 4 | 1 | 0 | 4 |
| 22116AEC44 | Biostatistics and Bioinformatics | 5 | 1 | 0 | 5 |
| 221ENSTU45 | Environmental studies | 2 | 0 | 0 | 2 |
| | PRACTICAL | | | | |
| 22116AEC46L | Virology Lab | 0 | 0 | 3 | 2 |
| 22116AEC47L | Biostatistics and Bioinformatics Lab | 0 | 0 | 3 | 2 |
| | AUDIT COURSE | | | | |
| 221ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 221ACSSAQA | General Aptitude and Quantitative Ability | - | - | - | 2 |
| | SEMESTER – V | | | | |
| Course Code | Course Title | L | T | P | C |
| | THEORY | | | | |
| 22116AEC51 | Food and Dairy Microbiology | 4 | 1 | 0 | 4 |
| 22116AEC52 | Molecular Biology | 4 | 1 | 0 | 3 |
| 22116AEC53 | Agricultural and Environmental Microbiology | 4 | 1 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 22116DSC54 | Discipline Specific Elective -I | 4 | 1 | 0 | 3 |
| | **PRACTICAL** | | | | |
| 22116AEC55L | Food and Dairy Microbiology and Molecular Biology Lab | 0 | 0 | 3 | 2 |
| 22116AEC56L | Agricultural and Environmental Microbiology Lab | 0 | 0 | 3 | 2 |
| | **RESEARCH SKILL BASED** | | | | |
| 22116BRC57 | Participation in Bounded Research | - | - | - | 1 |
| | **AUDIT COURSE** | | | | |
| 22IACLSPSL | Professional Skills | - | - | - | 2 |
| | **Total** | **16** | **4** | **6** | **19** |
| | **SEMESTER – VI** | | | | |
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| | **THEORY** | | | | |
| 22116AEC61 | Industrial Microbiology | 4 | 1 | 0 | 4 |
| 22116SEC62 | Clinical Microbiology | 4 | 1 | 0 | 5 |
| 22116DSC63 | Discipline Specific Elective - II | 4 | 1 | 0 | 3 |
| 221—OEC | Open Elective | 4 | 0 | 0 | 2 |
| | **PRACTICAL** | | | | |
| 22116AEC64L | Industrial Microbiology Lab | 0 | 0 | 3 | 2 |
| 22116SEC65L | Clinical Microbiology Lab | 0 | 0 | 3 | 2 |
| 22116PRW66 | Project Work | - | - | - | 4 |
| 22116PROEE | Program Exit Examination | - | - | - | 1 |
| | **Total** | **16** | **3** | **6** | **23** |
| | **AUDIT COURSE** | | | | |
| 22IACSSIST | Interview Skills Training and Mock Test | - | - | - | 2 |
| 22IACLSCET | Community Engagement | - | - | - | 1 |
| | **Total Credits -Programme** | | | | **115** |
| | **Total Credits - Audit Courses** | | | | **19** |

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Discipline Specific electives

| Semester | Discipline Specific Elective Courses-I |
|---|---|
| V | a) 22116DSC54A – Bioinoculants<br>b) 22116DSC54B – Bioremediation practices<br>c) 22116DSC54C – Advanced immunology<br>d) 22116DSC54D- Genomics and proteomics |
| | **Discipline Specific Elective Courses-I** |
| VI | a) 22116DSC63A – Bioethics<br>b) 22116DSC63B – Biomolecules<br>c) 22116DSC63C – Medical Microbiology<br>d) 22116DSC64D – Bacterial Genetics |

Open Electives

| Semester | Open Elective Courses |
|---|---|
| VI | a) 221TNOEC-Tamil Ilakkiya Varalaru<br>b) 221ENOEC-Journalism<br>c) 221MAOEC-Development of Mathematical Skills<br>d) 221PHOEC-Instrumentation<br>e) 221CEOEC-Food and Adulteration<br>f) 221CSOEC – E-Learning<br>g) 221CAOEC-Web Technology<br>h) 221CMOEC-Banking service |

Credit Distribution

| Sem | AEC | SEC | DSC | OEC | Research | Others | Total |
|---|---|---|---|---|---|---|---|
| I | 17 | - | - | - | - | - | 17 |
| II | 17 | - | - | - | 1 | - | 18 |
| III | 17 | - | - | - | 2 | - | 19 |
| IV | 17 | - | - | - | - | 2 | 19 |
| V | 15 | - | 3 | - | 1 | - | 19 |
| VI | 6 | 7 | 3 | 2 | 4 | 1 | 23 |
| **Total** | **89** | 7 | **6** | **2** | **8** | **3** | **115** |

HOD
Head of the Department
Department of Microbiology
School of Arts & Science
Prist Deemed to be University, Thanjavur.

DEAN
Dean of Arts & Science
PRIST Deemed to be University
Thanjavur-613 403, Tamilnadu.

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**School of Arts and Science**
**Department of Microbiology**
**M. Sc., Syllabus-Regulation 2022**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **SEMESTER I** | | | | |
| 22216SEC11 | Prokaryotic Microbiology | 6 | 1 | 0 | 5 |
| 22216SEC12 | Eukaryotic Microbiology | 6 | 1 | 0 | 5 |
| 22216SEC13 | Microbial Physiology | 6 | 1 | 0 | 5 |
| 22216SEC14L | Fundamentals of Microbiology Lab | 0 | 0 | 4 | 4 |
| 22216DSC15 | Discipline Specific Elective I | 5 | 0 | 0 | 4 |
| 22216RLC16 | Research Led Seminar | - | - | - | 1 |
| | **Total** | **23** | **3** | **4** | **21** |
| | **SEMESTER II** | | | | |
| 22216SEC21 | Industrial Microbiology | 5 | 1 | 0 | 5 |
| 22216SEC22 | Environmental and Agricultural Microbiology | 5 | 1 | 0 | 5 |
| 22216SEC23 | Clinical Microbiology | 5 | 0 | 0 | 4 |
| 22216SEC24L | Industrial, Clinical and Environmental and Agricultural Microbiology Lab | 0 | 0 | 4 | 2 |
| 22216DSC25 | Discipline Specific Elective II | 5 | 0 | 0 | 4 |
| 22216RMC26 | Research Methodology | 2 | 0 | 0 | 2 |
| 22216BRC27 | Participation in Bounded Research | - | - | - | 2 |
| | **Total** | **23** | **2** | **4** | **24** |
| | **SEMESTER III** | | | | |
| 22216SEC31 | Microbial Genetics | 6 | 1 | 0 | 6 |
| 22216SEC32 | Microbial Biotechnology | 6 | 1 | 0 | 6 |
| 2216SEC33L | Microbial Genetics and Biotechnology Lab | 0 | 0 | 5 | 3 |
| 22216DSC34 | Discipline Specific Elective III | 5 | 0 | 0 | 4 |
| 222_OEC | Open Elective | 4 | 0 | 0 | 4 |
| 22216SRC35 | Design/Socio technical research | - | - | - | 2 |
| | **Total** | **21** | **2** | **5** | **24** |
| | **SEMESTER IV** | | | | |
| 22216SEC41 | Pharmaceutical Microbiology | 6 | 1 | 0 | 6 |
| 22216SEC42 | Biostatistics and Bioinformatics | 6 | 1 | 0 | 6 |
| 22216SEC43L | Pharmaceutical Microbiology Lab | 0 | 0 | 5 | 3 |
| 22216SEC44 | Discipline Specific Elective IV | 5 | 0 | 0 | 4 |
| 22216PRW45 | Project Work | - | - | - | 6 |
| 22216PEE | Programme exit examinations | - | - | - | 2 |
| | **Total** | **17** | **2** | **5** | **27** |
| | **Total Credits for the Program** | | | | **96** |

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**Discipline specific Electives**

| Semester | Discipline specific Elective Courses |
|---|---|
| I | a) 22216DSC15A - Immunotechnology<br>b) 22216DSC15B -Aquatic Microbiology<br>c)22216DSC15C - Food Technology<br>d)22216DSC15D - Modern Industrial Biotechnology |
| | **Discipline specific Elective Courses-II** |
| II | a) 22216DSC25A-Clinical research and development<br>b) 22216 DSC25B- Soil and Water Engineering<br>c) 22216 DSC25C -Fungal Immunology<br>d) 22216 DSC25D -Pollution Research |
| | **Discipline specific Elective Courses-III** |
| III | a) 22216DSC34A-Microbial Technology<br>b) 22216DSC34B-Drug Development Product Management<br>c) 22216DSC34C-Plant Viruses and Phytosis<br>d) 22216DSC34D -Nanotechnology |
| | **Discipline specific Elective Courses-IV** |
| IV | a) 22216DSC44A-Molecular Immunology<br>b) 22216DSC44B-Diagnosis of Viral and Bacterial<br>c) 22216DSC44C - Enzymology<br>d) 22216DSC44D-Environmental Microbiology |

**Open Electives**

| Semester | Open Elective Courses |
|---|---|
| III | a) 222ENOEC-Writing for the media<br>b) 222MAOEC-Applicable Mathematics Techniques<br>c) 222PHOEC-Bio-Medical Instrumentation<br>d) 222CHOEC-Green Chemistry<br>e) 222CSOEC - M-Marketing<br>f) 222CMOEC- Financial Services |

**Credit Distribution:**

| Sem | SEC | DSC | GEC | RSB courses | Others | Total |
|---|---|---|---|---|---|---|
| I | 16 | 4 | - | 1 | - | 21 |
| II | 16 | 4 | - | 4 | - | 24 |
| III | 15 | 4 | 3 | 2 | - | 24 |
| IV | 15 | 4 | - | 6 | 2 | 27 |
| **Total** | **62** | **16** | **3** | **13** | **02** | **96** |

A. Kumar
HOD
Head of the Department
Department of Microbiology
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Priist Deemed to be University, Thanjavur.

DEAN

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# SCHOOL OF ARTS AND SCIENCE

## DEPARTMENT OF MICROBIOLOGY

## Value added course

## ACADEMIC YEAR 2022-2023

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**SCHOOL OF ARTS AND SCIENCE**

**DEPARTMENT OF MICROBIOLOGY**

**Certificate Course in Advanced Techniques in Clinical Microbiology**

**ACADEMIC YEAR 2022-2023**

**Subject Code: 22516ATCM**

**Total: 45 hours**

**Course objectives:**

To learn the basic and advanced techniques in a clinical Laboratory.

**Course Outcomes**

At the end of this course, students will be able to. Understand laboratory safety methods. Understand pathological analysis of clinical specimens. Gain knowledge about automated techniques in Clinical Laboratory Technology.

Unit I Laboratory Safety (9Hr)

Organization of laboratory and safety precautions in laboratory – Personal hygiene and care – General health care – Vaccination Schedule for technicians – Laboratory care and cautions – Do's and Dont's – lab accidents – Cuts and wounds – Fire Accidents (Chemical Gas, Flammable Chemicals, Electrical , Spirit Lamp, Gas) – Chemical burns.

**Unit II Sample Analysis (9Hr)**

Sample collection, processing, preservation and transportation of various clinical pathology samples. Pathological Analysis of clinical specimens.

**Unit III Microscopic Analysis (9Hr)**

Microscopic analysis of clinical specimens – Urine, Stool, Sputum, Pus, Blood, CSF and other body fluids.

**Unit IV Culture Methods(9Hr)**

Culture methods – Culturing and isolation of pathogens from clinical specimens. Culture media – General purpose media – special media – selective media – differential media – transport media. Department of Microbiology Faculty of Science 87

**Unit V Advanced Techniques & Automation (9Hr)**

ELISA – PCR- Fluorescence Microscopy – Automated culture systems – automated Blood culture – Automated Urine culture – Automated Antibiotic Sensitivity testing.

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**Text Books:**


1. Anantha narayanan. R. and Paniker C. K. J. TextBook of Microbiology, 9th Edition Orient Longman, 2013.
2. Chakraborthy, A TextBook of Microbiology 3rd Edn, New Central book Agency (P) Ltd, Kolkata, India, 2005.
3. James cappuccino, Natalie Sherman, Microbiology A Laboratory manual, 7th Edition, 2004. Praful Godkar, Darsan, Text book of Medical Laboratory Technology Vol I & II, Bhalani Publishing House, 2014.


Head of the Department
Department of Microbiology
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**SCHOOL OF ARTS AND SCIENCE**
**DEPARTMENT OF MICROBIOLOGY**
**CERTIFICATE COURSE ON FOOD PROCESSING**
**ACADEMIC YEAR 2022-2023**
**Syllabus**

**Subject Code: 22516FP**
**Value added course: 1** **Total: 45 hours**

**AIM:**

The aim of food processing makes food more edible, palatable and safe, and preserves it so it can be eaten beyond the harvest season. Food processing is also a tool that offers greater variety in foods and therefore increases the consumer's choice.

**Course Objectives:**

CO 1: To get the knowledge about the principles and methods of preservation
CO 2: To know about the freezing and thawing process
CO3: To know about food Drying/Dehydration
CO4: To get the knowledge of Food Concentration
CO 5: To knew about the Membrane Processing

**Course Outcome:**

CO1: Students will understand the basic concepts in food processing and will get knowledge
CO2: They will understand different freezing methods used in food processing.
CO3: They will understand the drying methods and types of dryers.
CO4: They will understand different Food Concentration methods used in food processing
CO5: They will learn different Membrane Processing.

**UNIT 1 (9Hr)**

Food processing and preservation principles, method of preservation: pasteurization (definition, time-temperature combination and equipments) sterilization (definition, time-temperature combination and equipments), blanching (definition, time-temperature combination and equipments, adequacy in blanching), canning (definition, time-temperature combination and equipments), packaging (Introduction, Metal Containers, Glass Containers, Rigid Plastic Containers, Retortable Pouches).

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School of Arts & Science
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**UNIT 2 (9Hr)**

Food Freezing and thawing process: Introduction, freezing point and freezing rate, comparison of Freezing and thawing process; freezing methods: Air freezing, plate freezing, liquid immersion freezing and cryogenic freezing. Freezer selection. Advantages and disadvantages of freezing. Freezing curve. Freezer selection, advantages and disadvantages of freezing and changes in food during freezing storage.

**UNIT 3 (9Hr)**

Food Drying/Dehydration: Definition, free and bound moisture, concept of water activity, factors affecting drying, Drying curve (constant rate period and falling rate period), moisture content (wet basis and dry basis), equilibrium moisture content, Drying methods and equipments: sun/solar drying, Cabinet drying, tunnel dryer, spray dryer, freeze dryer, fluidized bed dryer, Nutritional, physico-chemical changes during drying.

**UNIT 4 (9Hr)**

Food Concentration: Evaporation- Definition, types of evaporator (single effect, double effect and multiple effect evaporatur); Freeze concentration- General principles and applications, basic elements, ice crystal nucleation, growth and crystallization, separation techniques (filtration and wash column).

**UNIT 5 (9Hr)**

Membrane Processing: General principles and advantages, dead end and cross flow, Classification of membrane system: Reverse Osmosis, Nano Filtration, Ultra Filtration, Micro Filtration, Electrodialysis and Pervaporation; Membrane technology comparison chart, Membrane application in the food industries; Membrane performance, and Limitation of membrane processes.

**TEXT BOOKS/ REFERENCES:**

1. Food Processing: Principles and Applications by Ramaswamy H. & Marcotte M. Taylor & Francis.
2. Food Science by Norman N Potter and Joseph H. Hotchkiss, CBS Publishers and Distributors.
3. Novel Food Processing Technologies by Barbosa-Canovas, Tapia & Cano CRC Press, 2004

Head of the Department
Department of Microbiology
School of Arts & Sciences
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# PRIST
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## SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

# BOARD OF STUDIES
# 2022-2023

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PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY (PRIST)

Declared as DEEMED TO BE UNIVERSITY
U/s 3 of UGC Act, 1956

Minutes of the meeting of the Board of Studies (BoS)*

Date: 10.05.2022
Venue: ICT Class
Room Time: 02.30 PM

Members present:

Chair: Prof. Dr. P. Avirajamanjula, Ph.D
HOD/EEE
PRIST

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Prof Dr. M. P. Selvan Ph.D. Associate professor | NIT, Tiruchirappalli, Tamilnadu, India 620015 | Online | |
| 2 | Dr. R. Sambath | AEE/ Distributions, TNEB Mannargudi | Absent | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1. | Prof Dr. P. Avirajamanjula | ELE | Physical | |
| 2. | Prof Dr. V.S. Srinivasan | EEE | Online | |
| 3. | Prof Dr Ahamed Ibrahim S A | EEE | Physical | |
| 4. | Prof D.Hariharan | EEE | Physical | |
| 5. | Prof Mrs.M.R.Geetha | EEE | Physical | |

Head of the Department
Electrical and Electronics Engineering
Ponnaiyah Ramajayam Institute of
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THANJAVUR - 613 403, TAMIL NADU.

DEAN
School of Engineering and Tech.
Ponnaiyah Ramajayam Institute of
Science and Technology (PRIST)
Deemed to be University
Vallam, Thanjavur - 613 403.

Invited Participants

| S.No. | Name/Degree/Designation | Department/Class Institute/Organization/Address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr Ashutosh Das | Civil /PRIST | Physical | |
| 2 | Senthil Kumar | TNEB/ Alumini | Physical | |
| 3 | Mr A Akash | III EEE/PRIST | Physical | |

Agenda:

1. To Confirm the previous Meeting Minutes
2. To discuss the action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feed backs on B. Tech (FT/PT).
4. To scrutinize the stakeholder feed backs on M. Tech- Power System (FT/PT).
5. To recommend the panel of Examiners for B. Tech (FT/PT).
6. To recommend the panel of Examiners for M. Tech- Power System (FT/PT).
7. To Discuss about add open elective New courses for B.Tech (FT) 5th semester and 7th semester
8. To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B. Tech (PT) & M. Tech- Power System (FT/PT).

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MINUTES OF THE MEETING

At the outset, the Chairman BOS welcomed the members for attending the meeting ofthe Board of Studies. In her introductory remarks, she described the agenda items.

| Agendum 1: |
| --- |
| Discussion: To confirm the previous BOS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes. |
| Resolution: The chairman confirmed the previous meeting minutes of BoS and discussed the action taken on the previous BOS Meeting Minutes. |

| Agendum 2: |
| --- |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabi for B.TECH-EEE (Full Time/Part Time) and M.TECH- Power System (FullTime/Part Time). |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabi and the abstract of stakeholders feedback on B.TECH-EEE (Full Time/Part Time) and M.TECH- Power System (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |

| Agendum 3: |
| --- |
| Discussion: To Discuss about add open elective New courses for B.Tech (FT) 5th semester and 7th semester |
| Resolution: The members of the board have unanimously recommended to introduce the new open elective courses with the revised curriculum and syllabi for B.TECH–EEE (FT) |

| Agendum 4: |
| --- |
| Discussion: To accommodate the suggestions revealed by stakeholders and to incorporate them as revised syllabus for B. Tech (PT) & M. Tech- Power System (FT/PT). |
| Resolution: The members of the board have unanimously recommended to introduce the new courses with the revised curriculum and syllabi for B.TECH –EEE(PT) & M.TECH – Power System (FT/PT). |

| Agendum 5: |
| --- |
| Discussion: To recommend the panel of Examiners for B.Tech (FT/PT) and for M. Tech-Power System with (FT/PT). |
| Resolution: The members of the board also scrutinized and updated the panel of examiners and recommended the panel of examiners for the B.TECH –EEE (FT/PT) & M.TECH – Power System (FT/PT), and submitted the same for the Academic Council for its approval. |

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The meeting was concluded with thanks from the Chairman.

Signature: Chair/HoD

Dept.: EEE

Name: Dr. P. Avirajamanjula

Date: 10.05.2022

Signature:Dean:

School: Engineering and Technology

Name:

Date: 10.05.2022

Encl :

1: Annexure – I: B. Tech (FT) – EEE

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B.Tech (FT) EEE [REGULATION 2020]

## Semester I

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20147S11 | Communicative English | 2 | 0 | 0 | 2 |
| 2 | 20148S12 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| 3 | 20149S13 | Engineering Physics | 2 | 1 | 0 | 3 |
| 4 | 20149S14 | Engineering Chemistry | 2 | 1 | 0 | 3 |
| 5 | 20154S15 | Engineering Graphics | 1 | 0 | 4 | 3 |
| 6 | 20150S16 | Problem Solving and Basics of Python programming | 3 | 0 | 0 | 3 |
| | | PRACTICAL | | | | |
| 7 | 20150L17 | Problem Solving and Basics of Python programming Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20149L18 | Physics and Chemistry Laboratory | 0 | 0 | 4 | 2 |
| | | | | | TOTAL CREDITS | 22 |
| | | AUDIT COURSE | | | | |
| | 201AGIT | Induction Training | | | | 2 |

## Semester II

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20147S21 | Technical English | 2 | 0 | 0 | 2 |
| 2 | 20148S22 | Engineering Mathematics –II | 3 | 1 | 0 | 4 |
| 3 | 20149S23B | Physics for Electronics Engineering | 3 | 0 | 0 | 3 |
| 4 | 20149S24A | Environmental Science and Engineering | 3 | 0 | 0 | 3 |
| 5 | 20153S25C | Circuit Theory | 2 | 1 | 0 | 3 |
| 6 | 20154S26C | Basic Civil and Mechanical Engineering | 4 | 0 | 0 | 4 |
| | | PRACTICAL | | | | |
| 7 | 20154L27 | Engineering Practices Laboratory | 1 | 0 | 4 | 3 |
| 8 | 20153L28C | Electric Circuits Laboratory | 0 | 0 | 4 | 2 |
| TOTAL CREDITS | | | | | | 24 |
| | | AUDIT COURSE | | | | |
| | 201AGIC | Indian Constitution | | | | 2 |
| | | SOFT SKILL COURSE | | | | |
| | 201ASBE | Basic Behavioral Etiquette | | | | 2 |

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## Semester III

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20148S31C | Transforms and Partial Differential Equations | 2 | 2 | 0 | 3 |
| 2 | 20153S32 | Digital Logic Circuits | 2 | 2 | 0 | 3 |
| 3 | 20153C33 | Electromagnetic Theory | 2 | 2 | 0 | 3 |
| 4 | 20153C34 | Electrical Machines-I | 3 | 0 | 0 | 3 |
| 5 | 20153C35 | Electron Devices and Circuits | 3 | 0 | 0 | 3 |
| 6 | 20153C36 | Power Plant Engineering | 3 | 0 | 0 | 3 |
| | | PRACTICAL | | | | |
| 7 | 20153L37 | Electronics Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20153L38 | Electrical Machines Laboratory-I | 0 | 0 | 4 | 2 |
| 9 | 201AGGS | Introduction to Gender studies | | | | 2 |
| | | | | | TOTAL CREDITS | 23 |

## Semester IV

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20148S41C | Numerical Methods | 3 | 1 | 0 | 4 |
| 2 | 20153C42 | Electrical Machines –II | 2 | 2 | 0 | 3 |
| 3 | 20153C43 | Transmission and Distribution | 3 | 0 | 0 | 3 |
| 4 | 20153C44 | Measurements and Instrumentation | 3 | 0 | 0 | 3 |
| 5 | 20153C45 | Linear Integrated Circuits and Applications | 3 | 0 | 0 | 3 |
| 6 | 20153C46 | Control Systems | 3 | 2 | 0 | 4 |
| | | PRACTICAL | | | | |
| 7 | 20153L47 | Electrical Machines Laboratory-II | 0 | 0 | 4 | 2 |
| 8 | 20153L48 | Linear and Digital Integrated Circuits Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20153L49 | Technical Seminar | 0 | 0 | 2 | 1 |
| 10 | 201AGCE | Community Engagement | | | | 2 |
| 11 | 201ASGS | Technical, General Aptitude and Skill set Development | | | | 2 |
| | | | | | TOTAL CREDITS | 25 |

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## SEMESTER V

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153C51 | Power System Analysis | 3 | 0 | 0 | 3 |
| 2 | 20153C52 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 3 | 20153C53 | Power Electronics | 3 | 0 | 0 | 3 |
| 4 | 201_OE54_ | OPEN Elective-I | 3 | 0 | 0 | 3 |
| 5 | 20153S55 | Digital Signal Processing | 2 | 2 | 0 | 3 |
| 6 | 20153S56 | Object Oriented Programming | 3 | 0 | 0 | 3 |
| | | PRACTICAL | | | | |
| 7 | 20153L57 | Control and Instrumentation Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20153L58 | Object Oriented Programming Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20153L59 | Professional Communication | 0 | 0 | 2 | 1 |
| | | RESEARCH SKILL DEVELOPMENT(RSD)COURSE | | | | |
| 10 | 201AGIE | Innovation and Entrepreneurship | | | | 2 |
| | | TOTAL CREDITS | | | | 23 |

## SEMESTER –VI

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153C61 | Solid State Drives | 3 | 0 | 0 | 3 |
| 2 | 20153C62 | Protection and Switchgear | 3 | 0 | 0 | 3 |
| 3 | 20153S63 | Embedded Systems | 3 | 0 | 0 | 3 |
| 4 | 20153E64_ | Elective –I | 3 | 0 | 0 | 3 |
| 5 | 20153E65_ | Elective –II | 3 | 0 | 0 | 3 |
| | | PRACTICAL | | | | |
| 6 | 20153L66 | Power Electronics and Drives Laboratory | 0 | 0 | 4 | 2 |
| 7 | 20153L67 | Microprocessors and Microcontrollers | 0 | 0 | 4 | 2 |
| 8 | 20153MP68 | Mini Project | - | - | 4 | 2 |
| 9 | 201ASTT | Technical Training | | | | 2 |
| | | TOTAL CREDITS | | | | 21 |

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## SEMESTER –VII

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153C71 | High Voltage Engineering | 3 | 0 | 0 | 3 |
| 2 | 20153C72 | Power System Operation and Control | 3 | 0 | 0 | 3 |
| 3 | 20153C73 | Renewable Energy Systems | 3 | 0 | 0 | 3 |
| 4 | 201__OE74_ | OPEN Elective –II | 3 | 0 | 0 | 3 |
| 5 | 20153E75_ | Elective –III | 3 | 0 | 0 | 3 |
| 6 | 20153E76_ | Elective –IV | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 7 | 20153L77 | Power System Simulation Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20153L78 | Renewable Energy Systems Laboratory | 0 | 0 | 4 | 2 |
| TOTAL CREDITS | | | | | | 22 |

## SEMESTER –VIII

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153E81_ | Elective –V | 3 | 0 | 0 | 3 |
| 2. | 20153E82_ | Elective –VI | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 3. | 20153P83 | Project Work | 0 | 0 | 12 | 6 |
| 4. | 201AGPE | Professional Ethics and Human Values | | | | 2 |
| 5. | 201ASIM | Interview Skills Training and Mock Test | | | | 2 |
| TOTAL CREDITS | | | | | | 12 |
| TOTAL NO.OF CREDITS=172 | | | | | | |

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# LIST OF ELECTIVES

## ELECTIVE –I (VI SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20153E64A | Design of Electrical Apparatus | 3 | 0 | 0 | 3 |
| 2. | 20153E64B | Power Systems Stability | 3 | 0 | 0 | 3 |
| 3. | 20153E64C | Modern Power Converters | 3 | 0 | 0 | 3 |
| 4. | 20153E64D | Intellectual Property Rights | 3 | 0 | 0 | 3 |
| 5. | 20153E64E | Non conventional energy system & Applications | 3 | 0 | 0 | 3 |

## ELECTIVE–II (VI SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20153E65A | Principles of Robotics | 3 | 0 | 0 | 3 |
| 2. | 20153E65B | Special Electrical Machines | 3 | 0 | 0 | 3 |
| 3. | 20153E65C | Power Quality | 3 | 0 | 0 | 3 |
| 4. | 20153E65D | EHVAC Transmission | 3 | 0 | 0 | 3 |
| 5. | 20153E65E | LT & HT Distribution System | 3 | 0 | 0 | 3 |

## ELECTIVE –III(VII SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153E75A | Disaster Management | 3 | 0 | 0 | 3 |
| 2 | 20153E75B | Human Rights | 3 | 0 | 0 | 3 |
| 3 | 20153E75C | Operations Research | 3 | 0 | 0 | 3 |
| 4 | 20153E75D | Probability and Statistics | 3 | 0 | 0 | 3 |
| 5. | 20153E75E | Advanced DC-AC Power conversion | 3 | 0 | 0 | 3 |

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## ELECTIVE –IV(VII SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20153E76A | System Identification and Adaptive Control | 3 | 0 | 0 | 3 |
| 2. | 20153E76B | Control of Electrical Drives | 3 | 0 | 0 | 3 |
| 3. | 20153E76C | Power Systems Transients | 3 | 0 | 0 | 3 |
| 4. | 20153E76D | Total Quality Management | 3 | 0 | 0 | 3 |
| 5. | 20153E76E | Switched Mode Power supplies | 3 | 0 | 0 | 3 |

## ELECTIVE –V(VIII SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20153E81A | Flexible AC Transmission Systems | 3 | 0 | 0 | 3 |
| 2. | 20153E81B | Soft Computing Techniques | 3 | 0 | 0 | 3 |
| 3. | 20153E81C | SMPS and UPS | 3 | 0 | 0 | 3 |
| 4. | 20153E81D | Electric Energy Generation, Utilization and | 3 | 0 | 0 | 3 |
| 5. | 20153E81E | Electrical system Design for Buildings | 3 | 0 | 0 | 3 |

## ELECTIVE –VI(VIII SEMESTER)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 20153E82A | Energy Management and Auditing | 3 | 0 | 0 | 3 |
| 2. | 20153E82B | High Voltage Direct Current Transmission | 3 | 0 | 0 | 3 |
| 3. | 20153E82C | Smart Grid | 3 | 0 | 0 | 3 |
| 4. | 20153E82D | Biomedical Instrumentation | 3 | 0 | 0 | 3 |
| 5. | 20153E82E | Power System Dynamics | 3 | 0 | 0 | 3 |

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## OPEN ELECTIVE (V SEM)

| S.No | DEPT | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | CSE | 20150OE54A | Database Management System | 3 | 0 | 0 | 3 |
| 2 | | 20150OE54B | Cloud Computing | 3 | 0 | 0 | 3 |
| 3 | | 20150OE54C | Software architecture | 3 | 0 | 0 | 3 |
| 4 | ECE | 20152OE54A | Basics of Bio medical Instrumentation | 3 | 0 | 0 | 3 |
| 5 | | 20152OE54B | Sensors and Transducers | 3 | 0 | 0 | 3 |
| | | 201520OE54C | Microprocessor and microcontroller | 3 | 0 | 0 | 3 |
| 5 | MECH | 20154OE54A | Renewable Energy Sources | 3 | 0 | 0 | 3 |
| 6 | | 20154OE54B | Automatic System | 3 | 0 | 0 | 3 |
| | | 20154OE54C | Electronics And Microprocessors | 3 | 0 | 0 | 3 |
| 7 | CIVIL | 20155OE54A | Air Pollution and Control Engineering | 3 | 0 | 0 | 3 |
| 8 | | 20155OE54B | Geographic Information System | 3 | 0 | 0 | 3 |
| | | 20155FE54C | Drinking water supply and treatment | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE (VII SEM)

| S.No | DEPT | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | CSE | 20150OE74A | Introduction to C Programming | 3 | 0 | 0 | 3 |
| 2 | | 20150OE74B | Data structures and Algorithms | 3 | 0 | 0 | 3 |
| | | 20150OE74C | Web technology | 3 | 0 | 0 | 3 |
| 3 | ECE | 20152OE74A | Robotics | 3 | 0 | 0 | 3 |
| 4 | | 20152OE74B | Electronic Devices | 3 | 0 | 0 | 3 |
| | | 201520OE74C | Wireless communication | 3 | 0 | 0 | 3 |
| 5 | MECH | 20154OE74A | Industrial Safety | 3 | 0 | 0 | 3 |
| 6 | | 20154OE74B | Testing of Materials | 3 | 0 | 0 | 3 |
| | | 20154OE74C | Nuclear engineering | 3 | 0 | 0 | 3 |
| 7 | CIVIL | 20155OE74A | Green Building Designs | 3 | 0 | 0 | 3 |
| 8 | | 20155OE74B | Waste water Treatment | 3 | 0 | 0 | 3 |
| | | 20155FE74C | Fundamentals of aeronautical engineering | 3 | 0 | 0 | 3 |

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## 20153FE74C- POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

L T P C

3 0 0 3

OBJECTIVES:

- To Provide knowledge about the stand alone and grid connected renewable energy systems.
- To equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
- To analyse and comprehend the various operating modes of wind electrical generators and solar energy systems.
- To design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.
- To develop maximum power point tracking algorithms.

**UNIT I INTRODUCTION** 9

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

**UNIT II ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION** 9

Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

**UNIT III POWER CONVERTERS** 9

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing Wind: Three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

**UNIT IV ANALYSIS OF WIND AND PV SYSTEMS** 9

Stand alone operation of fixed and variable speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

**UNIT V HYBRID RENEWABLE ENERGY SYSTEMS** 9

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

**TOTAL : 45 PERIODS**

OUTCOMES:

- Ability to understand and analyze power system operation, stability, control and protection.
- Ability to handle the engineering aspects of electrical energy generation and utilization.

TEXT BOOK:


1. S. N. Bhadra, D.Kastha, S.Banerjee, "Wind Electrical Systems", Oxford University Press, 2005.
2. B.H.Khan Non-conventional Energy sources Tata McGraw-hill Publishing Company, New Delhi,2009.


REFERENCES:


1. Rashid .M. H "power electronics Hand book", Academic press, 2001.
2. Ion Boldea, "Variable speed generators", Taylor & Francis group, 2006.
3. Rai. G.D, "Non conventional energy sources", Khanna publishes, 1993.
4. Gray, L. Johnson, "Wind energy system", prentice hall linc, 1995.
5. Andrzej M. Trzynadlowski, 'Introduction to Modern Power Electronics', Second edition, wiley India Pvt. Ltd, 2012.



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20153FE54C COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS LT P C

3 0 0 3

OBJECTIVES:To introduce the importance of computer aided design method.

- To provide basic electromagnetic field equations and the problem formulation for CAD applications.
- To get familiarized with Finite Element Method as applicable for Electrical Engineering.
- To introduce the organization of a typical CAD package.
- To introduce Finite Element Method for the design of different Electrical apparatus.

UNIT I INTRODUCTION 9

Conventional design procedures – Limitations – Need for field analysis based design – Review of Basic principles of energy conversion – Development of Torque/Force.

UNIT II MATHEMATICAL FORMULATION OF FIELD PROBLEMS 9

Electromagnetic Field Equations – Magnetic Vector/Scalar potential – Electrical vector /Scalar potential – Stored energy in Electric and Magnetic fields – Capacitance - Inductance- Laplace and Poisson's Equations – Energy functional.

UNIT III PHILOSOPHY OF FEM 9

Mathematical models – Differential/Integral equations – Finite Difference method – Finite element method – Energy minimization – Variational method- 2D field problems – Discretisation – Shape functions – Stiffness matrix – Solution techniques.

UNIT IV CAD PACKAGES 9

Elements of a CAD System –Pre-processing – Modelling – Meshing – Material properties- Boundary Conditions – Setting up solution – Post processing.

UNIT V DESIGN APPLICATIONS 9

Voltage Stress in Insulators – Capacitance calculation - Design of Solenoid Actuator – Inductance and force calculation – Torque calculation in Switched Reluctance Motor.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to model and analyze electrical apparatus and their application to power system.

TEXT BOOKS:


1. S.J Salon, 'Finite Element Analysis of Electrical Machines', Springer, YesDEE publishers, Indian reprint, 2007.
2. Nicola Bianchi, 'Electrical Machine Analysis using Finite Elements', CRC Taylor & Francis, 2005.


REFERENCES:


1. Joao Pedro, A. Bastos and Nelson Sadowski, 'Electromagnetic Modeling by Finite Element Methods', Marcell Dekker Inc., 2003.
2. P.P.Silvester and Ferrari, 'Finite Elements for Electrical Engineers', Cambridge University Press, 1983.
3. D.A.Lowther and P.P Silvester, 'Computer Aided Design in Magnetics', Springer Verlag, New York, 1986.
4. S.R.H.Hoole, 'Computer Aided Analysis and Design of Electromagnetic Devices', Elsevier, New York, 1989.
5. User Manuals of MAGNET, MAXWELL & ANSYS Softwares.


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# 1.2.1
# NEW COURSES INTRODUCED IN 2022-2023

| S.No | Programme Name | Year Of Introduction | Course Code | Course Name |
|---|---|---|---|---|
| 1. | B.Tech -PT | 2022 | 22153C13P | Circuit Theory |
| 2. | B.Tech -PT | 2022 | 22153C22P | Optimization Techniques |
| 3. | B.Tech –PT | 2022 | 22153C32P | Linear Integrated Circuits and Applications |
| 4. | B.Tech –PT | 2022 | 22153L35P | DC and AC Electrical Machines Laboratory |
| 5. | B.Tech –PT | 2022 | 22153L45P | Control and Instrumentation Laboratory |
| 6. | B.Tech –PT | 2022 | 22153E44AP | Electromagnetic Theory |
| 7. | B.Tech –PT | 2022 | 22153E54CP | VLSI Design |
| 8. | B.Tech –PT | 2022 | 22153E64BP | Micro Electro Mechanical Systems |
| 9. | B.Tech –PT | 2022 | 22153E74CP | Fundamentals of Nanoscience |
| 10. | B.Tech –PT | 2022 | 22153E44CP | Deep learning |
| 11. | B.Tech –PT | 2022 | 22153E44EP | Electronics equipment integration and prototype building |
| 12. | B.Tech –PT | 2022 | 22153E54DP | Micro sensor |
| 13. | B.Tech –PT | 2022 | 22153E54EP | Fundamentals of Power Electronics |
| 14. | B.Tech –PT | 2022 | 22153E64DP | Control engineering |
| 15. | B.Tech –PT | 2022 | 22153E64EP | Linear dynamic systems |
| 16. | B.Tech –PT | 2022 | 22153E74EP | Microwave integrated circuits |
| 17. | M.Tech -FT | 2022 | 22272E32C | Foundation of wavelets and multirate digital signal processing |
| 18. | M.Tech -FT | 2022 | 22272E34C | Power management integrated circuits |
| 19. | M.Tech -FT | 2022 | 22272E34D | RF and microwave networks |
| 20. | M.Tech -FT | 2022 | 22272E32D | Fuzzy sets, logic and systems and application |
| 21. | M.Tech -FT | 2022 | 22272E25D | Power quality improvement techniques |
| 22. | M.Tech -FT | 2022 | 22272E25C | Sensors and actuators |
| 23. | M.Tech -FT | 2022 | 22272E24D | Design of power electronic converters |
| 24. | M.Tech -FT | 2022 | 22272E24E | Design and analysis of VLSI subsystems |
| 25. | M.Tech -FT | 2022 | 22272C13 | Advanced Power System Analysis |
| 26. | M.Tech –FT | 2022 | 22272C15 | HVDC and FACTS |
| 27. | M.Tech –PT | 2022 | 22272L17 | Power System Simulation Laboratory |
| 28. | M.Tech –PT | 2022 | 22272C23 | Advanced Power System Protection |
| 29. | M.Tech –PT | 2022 | 22272E33D | Principles of EHV Transmission |
| 30. | M.Tech –PT | 2022 | 22272E53DP | Medical image analysis |
| 31. | M.Tech –PT | 2022 | 22272E53CP | Optical wireless communication |
| 32. | M.Tech –PT | 2022 | 22275E52CP | Physics of nanoscale devices |
| 33. | M.Tech –PT | 2022 | 22272E51DP | Introduction to information theory |
| 34. | M.Tech –PT | 2022 | 22272E51CP | IC design for wireless system |
| 35. | M.Tech –PT | 2022 | 22272E43DP | Facts devices |
| 36. | M.Tech –PT | 2022 | 22272E43CP | VLSI physical design with timing analysis |

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| | | | | |
|---|---|---|---|---|
| 37. | M.Tech –PT | 2022 | 22272C22P | Advanced Power System Protection |
| 38. | M.Tech –PT | 2022 | 22272C32P | HVDC and FACTS |
| 39. | M.Tech –PT | 2022 | 22272L34P | Advanced Power System Simulation Laboratory |
| 40. | M.Tech –PT | 2022 | 22272E23DP | Analysis and computation of Electromagnetic Transients in Power Systems |
| 41. | M.Tech –PT | 2022 | 22272E33DP | Design and analysis of VLSI subsystems |

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## 22153C13P- CIRCUIT THEORY

3 1 0 3

SEMESTER-1

AIM

To know about basic analysis and synthesis techniques used in electronics and communications.

OBJECTIVES

To introduce electric circuits and its analysis
To impart knowledge on solving circuits using network theorems
To introduce the phenomenon of resonance in coupled circuits.
To educate on obtaining the transient response of circuits.
To Phasor diagrams and analysis of three phase circuits

**UNIT-I BASIC CIRCUITS ANALYSIS** (9) Ohm's Law – Kirchoffs laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power, Power Factor and Energy.

**UNIT-II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS** (9) Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem –Reciprocity Theorem..

**UNIT-III RESONANCE AND COUPLED CIRCUITS** (9)

Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self andmutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

**UNIT-IV TRANSIENT RESPONSE FOR DC CIRCUITS** (9hrs)

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input – Characterization of two port networks in terms of Z,Y and h parameters.

**UNIT-V THREE PHASE CIRCUITS** (9hrs)

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and
4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

**TOTAL 45**

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## 22153C22P - OPTIMISATION TECHNIQUES

3 0 0 3
SEMESTER II

**AIM:**
To understand the architecture of different optimization techniques and its applications
**OBJECTIVES:**
To provide a clear understanding of

To introduce the basic concepts of linear programming
To educate on the advancements in Linear programming techniques
To introduce non-linear programming techniques
To introduce the interior point methods of solving problems
To introduce the dynamic programming method

**UNIT I LINEAR PROGRAMMING** 9
Introduction - formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method

**UNIT II ADVANCES IN LPP** 9
Dualit theory- Dual simplex method - Sensitivity analysis–Transportation problems–Assignment problems-Traveling sales man problem -Data Envelopment Analysis..

**UNIT III NON LINEAR PROGRAMMING** 9
Classification of Non Linear programming – Lagrange multipiler method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

**UNIT IV INTERIOR POINT METHODS** 9
Karmarkar's algorithm–Projection Scaling method–Dual affine algorithm–Primal affine algorithm Barrier algorithm.

**UNIT V DYNAMIC PROGRAMMING** 9
Formulation of Multi stage decision problem–Characteristics–Concept of sub-optimization and the principle of optimality–Formulation of Dynamic programming–Backward and Forward recursion– Computational procedure–Conversion offinal value problem in to Initial value problem.

TOTAL: 45 PERIODS

**COURSE OUTCOMES**

To understand ethical issues, environmental impact and acquire management skills.

**TEXT BOOKS:**
1. Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.
2. R.Panneerselvam, "Operations Research", PHI, 2006.
3. Hamdy ATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

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REFERENCES:
1. Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
2. Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

Semester III

## 22153C32P- LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

3 1 0 4

**AIM**

To introduce the concepts for realizing functional building blocks in ICs, fabrications & application of ICs.

**OBJECTIVES**

To study the IC fabrication procedure.
To study characteristics; realize circuits; design for signal analysis using
To study the applications of Op-amp.
To study internal functional blocks and the applications of special ICs like circuits, regulator Circuits, ADCs.

**UNIT I: IC FABRICATION** 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance and FETs.

**UNIT II: CHARACTERISTICS OF OPAMP** 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics,, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers-V/I & I/V converters ,summer, differentiator and integrator.

**UNIT III: APPLICATIONS OF OPAMP** 9

Instrumentation amplifier, Log and Antilog Amplifiers, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

**UNIT IV: SPECIAL ICs** 9

Functional block, characteristics & application circuits with 555 Timer Ic-566 voltage controlled oscillator Ic; 565-phase lock loop Ic ,Analog multiplier ICs.

**UNIT V: APPLICATION ICs** 9

IC voltage regulators –LM78XX,79XX Fixed voltage regulators - LM317, 723 Variable voltage regulators, switching regulator- SMPS- LM 380 power amplifier, ICL 8038 function generator IC.

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**COURSE OUTCOMES**
**TOTAL = 45**

Ability to understand and analyse, linear and digital electronic circuits.

**TEXT BOOKS**

1. David A.Bell, 'Op-amp & Linear ICs', Oxford, 2013.
2. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age,
2003.
3. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition,
Pearson Education, 2003 / PHI. 2000.

**REFERENCE BOOKS**

1. Fiore,"Opamps & Linear Integrated Circuits Concepts & Applications",Cengage,2010.
2. Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.
3. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system',Tata McGraw Hill, 2003.
4. Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', PHI Learning,

## 22153L45P CONTROL AND INSTRUMENTATION LABORATORY

Semester IV

**AIM**

To provide knowledge on analysis and design of control and instrumentation

**LIST OF EXPERIMENTS**

**CONTROLSYSTEMS:**

1. P, PI and PID controllers
2. Stability Analysis
3. Modeling of Systems – Machines, Sensors and Transducers
4. Design of Lag, Lead and Lag-Lead Compensators
5. Position Control Systems
6. Synchro-Transmitter- Receiver and Characteristics
7. Simulation of Control Systems by Mathematical development tools.

**INSTRUMENTATION:**

8. Bridge Networks –AC and DC Bridges
9. Design of Sensors/Transducers

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Connecting wires (3/20)
4. CRO 30MHz – 1 No.
2MHz Function Generator – 1No.
5. Position Control Systems Kit (with manual) – 1 No., Tacho Generator Coupling set
6. AC Synchro transmitter& receiver – 1No.
Digital multi meters

**INSTRUMENTATION:**
7. R, L, C Bridge kit (with manual)
8. a) Electric heater – 1No.
Thermometer – 1No.Thermistor (silicon type) RTD nickel type – 1No.

b) 30 psi Pressure chamber (complete set) – 1No. Current generator (0 – 20mA)
Air foot pump – 1 No. (with necessary connecting tubes)
c) LVDT20mm core length movable type – 1No. CRO 30MHz – 1No. d)
Optical sensor – 1 No. Light source
e) Strain Gauge Kit with Handy lever beam – 1No.
100gm weights – 10 nos
f) Flow measurement Trainer kit – 1 No.
(1/2 HP Motor, Water tank, Digital Milliammeter, complete set)
9. Single phase Auto transformer – 1No.
Watthour meter (energy meter) – 1No.
Ammeter Voltmeter Rheostat Stop watch
Connecting wires (3/20)
10. IC Transistor kit – 1No.

22153E44AP- ELECTROMAGNETIC THEORY

**AIM**
To expose the students to the fundamentals of electromagnetic fields and their applications in Electrical Engineering.

**OBJECTIVES:**
To introduce the basic mathematical concepts related to electromagnetic vector fields
To impart knowledge on the concepts of electrostatics, electrical potential, energy density and their applications.
To Impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
To impart knowledge on the concepts of Faraday's law, induced Emf and Maxwell's equations
To impart knowledge on the concepts of Concepts of electromagnetic waves and Pointing vector.

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Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.

**TEXT BOOKS**

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 4 th Edition ,Oxford University Press Inc, First India edition, 2009.
2. Ashutosh Pramanik, 'Electromagnetism – Theory and Applications', PHI Learning Private Limited, New Delhi, Second Edition-2009.
3. K.A. Gangadhar, P.M. Ramanthan ' Electromagnetic Field Theory (including Antennaes and wave propagation', 16th Edition, Khanna Publications, 2007..

**REFERENCE BOOKS**

1. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition Schaum's Outline Series), Tata McGraw Hill, 2010.
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', Tata McGraw Hill 8th Revised edition, 2011.

## VLSI DESIGN 4105

**AIM**

To understand the basic concepts of VLSI and CMOS design.

**OBJECTIVES**

- To give clear idea about the basics of VLSI design and its importance
- To know about the operating principles of MOS transistor
- To study about construction of NMOS, CMOS and Bi-CMOS based logic gates.
- To analyze the CMOS circuits by layout Design.
- To understand the functioning of programmable and Reprogrammable devices.
- To learn about the programming of Programmable devices using Hardware
- description Language.

**UNIT I : BASIC CMOS CIRCUIT TECHNIQUES, CONTINUOUS TIME AND LOWVOLTAGE SIGNAL PROCESSING 9**

Mixed-Signal VLSI Chips-Basic CMOS Circuits-Basic Gain Stage-Gain Boosting Techniques-Super MOS Transistor-Primitive Analog Cells-Linear Voltage-Current Converters-MOS Multipliers and Resistors-CMOS, Bipolar and Low-Voltage Bi-CMOS Op-Amp Design-Instrumentation Amplifier Design-Low Voltage Filters.

**UNIT II : BASIC BICMOS CIRCUIT TECHNIQUES, CURRENT -MODE SIGNAL PROCESSING AND NEURAL INFORMATION PROCESSING 9**

Continuous-Time Signal Processing-Sampled-Data Signal Processing-Switched-Current Data Converters- Practical Considerations in SI Circuits Biologically-Inspired Neural Networks - Floating - Gate, Low-Power Neural Networks-CMOS Technology and Models-Design Methodology-Networks-Contrast Sensitive Silicon Retina.

**UNIT III :SAMPLED-DATA ANALOG FILTERS, OVER SAMPLED A/D CONVERTERS AND ANALOG INTEGRATED SENSORS 9**

First-order and Second SC Circuits-Bilinear Transformation - Cascade Design-Switched-Capacitor Ladder Filter-Synthesis of Switched-Current Filter- Nyquist rate A/D Converters-Modulators for Over sampled A/D Conversion-First and Second Order and Multibit Sigma-Delta Modulators-Interpolative Modulators –Cascaded Architecture-Decimation Filters-Mechanical, Thermal, Humidity and Magnetic Sensors-Sensor Interfaces.

**UNIT IV : DESIGN FOR TESTABILITY AND ANALOG VLSI INTERCONNECTS 9**

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Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields – Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications

**UNIT II: ELECTROSTATICS – II** 12

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

**UNIT III: MAGNETOSTATICS** 12

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications

**UNIT IV: ELECTRODYNAMIC FIELDS** 12

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications

**UNIT V: ELECTROMAGNETIC WAVES** 12

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction applcations.

**TOTAL = 45**

**COURSE OUTCOMES**

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Fault modeling and Simulation - Testability-Analysis Technique-Ad Hoc Methods and General Guidelines-Scan Techniques-Boundary Scan-Built-in Self Test-Analog Test Buses-Design for Electron -Beam Testablity-Physics of Interconnects in VLSI-Scaling of Interconnects-A Model for Estimating Wiring Density-A Configurable Architecture for Prototyping analog Circuits.

**UNIT V : STATISTICAL MODELING AND SIMULATION, ANALOG COMPUTER-AIDED DESIGN AND ANALOG AND MIXED ANALOG-DIGITAL LAYOUT 9**

Review of Statistical Concepts - Statistical Device Modeling- Statistical Circuit Simulation-Automation Analog Circuit Design-automatic Analog Layout-CMOS Transistor Layout-Resistor Layout-Capacitor Layout-Analog Cell Layout-Mixed Analog -Digital Layout.

**TOTAL 45**

**TEXT BOOKS:**

1. Mohammed Ismail, Terri Fiez, "Analog VLSI signal and Information Processing ", McGraw-Hill International Editons, 1994.

**REFERENCES:**

1. Malcom R. Haskard, Lan C.May, "Analog VLSI Design - NMOS and CMOS "., Prentice Hall, 1998.
2. Randall L Geiger, Phillip E. Allen, " Noel K.Strader, VLSI Design Techniques for Analog and Digital Circuits ", Mc Graw Hill International Company, 1990.
3. Jose E.France, Yannis Tsividis, "Design of Analog-Digital VLSI Circuits for Telecommunication and signal processing ", Prentice Hall, 1994.

Micro Electro Mechanical Systems

Course Outcomes (Cos

CO1: To provide knowledge of semiconductors and solid mechanics to fabricate MEMS devices.
CO2:To educate on the rudiments of Micro fabrication techniques
CO3: To introduce various sensors and actuators
CO4: To introduce different materials used for MEMS
CO5: To educate on the applications of MEMS to disciplines beyond Electrical and mechanical engineering

UNIT I INTRODUCTION 9 Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication – Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I 9 Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors – Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph – Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys.

UNIT III SENSORS AND ACTUATORS-II 9 Piezo resistive sensors – Piezo resistive sensor materials – Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMANUFACTURING 9 Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case Studies –

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Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Stiction and Antistriction methods – LIGA Process – Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS 9 Polymers in MEMS– Polimide – SU-8 – Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon – Application to Acceleration, Pressure, Flow and Tactile sensorsOptical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

## FUNDAMENTALS OF NANOSCIENCE

L T P C
3 0 0 3

**OBJECTIVES:**
To learn about basis of nanomaterial science, preparation method, types and application

**UNIT I INTRODUCTION** 8
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering- Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties Introduction to properties and motivation for study (qualitative only).

**UNIT II GENERAL METHODS OF PREPARATION** 9
Bottom-up Synthesis-Top-down Approach. Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

**UNIT III NANOMATERIALS** 12
Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

**UNIT IV CHARACTERIZATION TECHNIQUES** 9
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging. Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation.

**UNIT V APPLICATIONS** 7
NanoInfoTech: information storage- nanocomputer, molecular switch, super chip, nanocrystal, Nanobiotechlogy. nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

**TOTAL : 45 PERIODS**

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**OUTCOMES:**

- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

**TEXT BOOKS :**

1. A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, "Nanoscale Charecterisation of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

**REFERENCES:**

1. G Timp, "Nanotechnology", AIP press/Springer, 1999.
2. Akhlesh Lakhtakia,"The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

## 22153E54DP Micro Sensors

Course Objectives

At the end of the course, the student will be able to:

1. Acquire knowledge about the principles and analysis of sensors.
2. Emphasis on characteristics and response of micro sensors
3. Acquire adequate knowledge of different transducers and Actuators.
4. Learn about the Micro sensors and Micro actuators.
5. Selection of sensor materials for fabrication for different applications.

Unit 1. FUNDAMENTALS AND TEMPERATURE SENSORS Difference between sensor, transducer and Actuators- Classification of sensors: Proprioceptive and Exteroceptive – Active and Passive– Contact and Non-contact, selection and characteristics: Range, resolution, Sensitivity, error, repeatability, linearity and accuracy, Primary sensing elements. Temperature sensors: Principle of operation, construction details, characteristics and applications of Bimetallic thermometer, Resistance thermometer, Thermistor, Thermocouples and Total radiation Pyrometers

Unit 2. STRAIN, FORCE, TORQUE AND PRESSURE SENSORS Strain gauges, strain gauge beam force sensor, piezoelectric force sensor, load cell, torque sensor, Piezoresistive and capacitive pressure sensor, Manometer, vacuum sensors, Pirani gauge

Unit 3. DISPLACEMENT, LEVEL AND FLOW SENSORS Displacement Sensors: LVDT, RVDT, eddy current, transverse inductive, Hall Effect, magneto resistive, magnetostrictive sensors. Liquid level sensor: Fabry Perot sensor, ultrasonic sensor, capacitive liquid level sensor. Flow sensors: pressure gradient technique, ultrasonic, electromagnetic sensors and Hot wire anemometer. Micro flow sensor, Coriolis mass flow and drag flow sensor

Unit 4. MICRO MACHINING TECHNOLOGIES Overview of silicon processes techniques: Photolithography, Oxidation, and Diffusion, Chemical Vapor Deposition, Physical vapor Deposition, Epitaxy, Etching, Micromachining, Surface Micromachining, LIGA and other techniques.

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Unit. 5. ACTUATORS Definition, types and selection of Actuators; linear, rotary; Logical and Continuous Actuators, Pneumatic actuator, Hydraulic actuator - Control valves and cylinders Electrical actuating systems: Solenoids, Electric Motors- D.C motors - AC motors - Three Phase Induction Motor, Stepper motors -Piezoelectric Actuator

**22153E54EP FUNDAMENTALS OF POWER ELECTRONICS**

| L | T | P | C |
|---|---|---|---|
| 4 | 0 | 0 | 4 |

**OBJECTIVES:**

To impart knowledge on the following Topics

- Different types of power semiconductor devices and their switching
- Operation, characteristics and performance parameters of controlled rectifiers
- Operation, switching techniques and basics topologies of DC-DC switching regulators
- Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods
- Operation of AC voltage controller and various configurations



**UNIT I POWER SEMI-CONDUCTOR DEVICES** 9

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

**UNIT II PHASE-CONTROLLED CONVERTERS** 9

2-pulse, 3-pulse and 6-pulseconverters– performance parameters –Effect of source inductance— Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

**UNIT III DC TO DC CONVERTERS** 9

Step-down and step-up chopper-control strategy- Introduction to types of choppers-A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.

**UNIT IV INVERTERS** 9

Single phase and three phase voltage source inverters (both $120^0$ mode and $180^0$ mode)– Voltage& harmonic control–PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM Introduction to space vector modulation –Current source inverter, Applications-Induction heating, UPS.

**UNIT V AC TO AC CONVERTERS** 9

Single phase and Three phase AC voltage controllers–Control strategy- Power Factor Control – Multistage sequence control -single phase and three phase cyclo converters – Introduction to Matrix converters, Applications -welding.

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- Ability to analyse AC-AC and DC-DC and DC-AC converters.
- Ability to choose the converters for real time applications.

**TEXT BOOKS:**

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi, 2004.
2. P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.
3. Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint, 2003.

**REFERENCES**


1. Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.
2. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.
4. Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.
5. S.Rama Reddy, 'Fundamentals of Power Electronics', Narosa Publications, 2014.
6. M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, 2013.
7. JP Agarwal," Power Electronic Systems: Theory and Design" 1e, Pearson Education.


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ANNEXURE-I:

## B.TECH (EEE) – Part Time

**ITEM 1:** The board members suggested to redesign the course of 22153C13P- Circuit Theory with updating the all 5 units of 19153C13P Circuit Analysis and Networks subject in I semester.

**ITEM 2:** The course "22153C22P-Optimization Techniques" is included in Isemester to acquire the basic knowledge of different optimization methods instead of the course 19153C22P Computer Architecture.

**ITEM 3:** The board members proposed that the new course 22153C32P Linear Integrated Circuits and Applications can be added in the syllabus instead of 19153C32P Analog Integrated Circuits which enhance the student knowledge about the function and application of digital and analog ICs.

**ITEM 4:** The board members suggested to introduce a lab course 22153L35P DC and AC Electrical Machines Laboratory, and it is revised to understand the operation and characteristics of DC and AC electrical machines.

**ITEM 5:** A lab course "22153L45P Control and Instrumentation Laboratory" is introduced instead of "19153L45P Control System & Measurements Lab" according to the board members recommendation.

**ITEM 6:** The board members suggested to introduce a course "22153E44AP- Electromagnetic Theory" instead of "19153E44_P Field Theory", to obtain a better knowledge in the electromagnetic fields area.

**ITEM 7:** The board members recommended a course 22153E54CP VLSI Design to include in the elective subjects instead of 19153E54CP Communication Engineering to gain knowledge of VLSI design.

**ITEM 8:** It is proposed by board members that 22153E64BP Micro Electro Mechanical Systems-this new course is introduced instead of 19153E64BP Professional Ethics to obtain knowledge in micro electro mechanical systems.

**ITEM 9:** The members proposed that a new course "22153E74CP Fundamentals of Nanoscience" to be introduced instead of "19153E74CP-Fiber Optics and Laser Instruments" to understand the basics of nandscience and its applications.



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B. Tech (PT) EEE R 2022

Semester I

| Sl. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S11P | Transforms and Partial Differential Equations | 3 | 1 | 0 | 4 |
| 2 | 22153C12P | Control System | 3 | 1 | 0 | 4 |
| 3 | 22153C13P | Circuit Theory | 3 | 1 | 0 | 3 |
| 4 | 22153C14P | Electronic circuits | 3 | 0 | 0 | 3 |
| 5 | 22153C15P | Electrical Machines-I | 4 | 0 | 0 | 4 |
| Total No of Credits | | | | | | 22 |

Semester II

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S21P | Numerical Methods | 3 | 1 | 0 | 4 |
| 2 | 22153C22P | Optimization Techniques | 3 | 0 | 0 | 3 |
| 3 | 22153C23P | Electrical Machines-II | 3 | 1 | 0 | 4 |
| 4 | 22153C24P | Digital Electronics | 3 | 1 | 0 | 4 |
| 5 | 22153C25P | Transmission and Distribution | 4 | 0 | 0 | 4 |
| Total No of Credits | | | | | | 22 |

Semester III

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22148S31CP | Probability and Statistics | 3 | 1 | 0 | 4 |
| 2 | 22153C32P | Linear Integrated Circuits and Applications | 3 | 1 | 0 | 4 |
| 3 | 22153C33P | Power Electronics | 4 | 0 | 0 | 4 |
| 4 | 22153C34P | Measurements and Instrumentation | 4 | 0 | 0 | 4 |
| 5 | 22153L35P | DC and AC Electrical Machines Laboratory | 0 | 0 | 3 | 2 |
| Total No of Credits | | | | | | 18 |

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Semester IV

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153C41P | Protection and switchgear | 4 | 0 | 0 | 4 |
| 2 | 22153C42P | High Voltage DC Transmission | 3 | 1 | 0 | 4 |
| 3 | 22153C43P | Solid State Drives | 3 | 1 | 0 | 4 |
| 4 | 22153E44_P | Elective –I | 4 | 0 | 0 | 4 |
| 5 | 22153L45P | Control and Instrumentation Laboratory | 0 | 0 | 3 | 2 |
| Total No of Credits | | | | | | 18 |

Semester V

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153C51P | Power System Analysis | 3 | 1 | 0 | 4 |
| 2 | 22153C52P | Enc: | 3 | 1 | 0 | 4 |
| 3 | 22153C53P | Special Electrical | 4 | 0 | 0 | 4 |
| 4 | 22153E54_P | Elective – II | 4 | 0 | 0 | 4 |
| 5 | 20153FE54C | Elective – V | 3 | 0 | 0 | 3 |
| 6 | 22153L55P | Power Electronics and Drives Lab | 0 | 0 | 3 | 2 |
| Total No of Credits | | | | | | 18 |

Semester VI

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153C61P | Utilization of Electrical Energy | 3 | 1 | 0 | 4 |
| 2 | 22153C62P | Solid State Relays | 4 | 0 | 0 | 4 |
| 3 | 22153C63P | Power System Operation and Control | 4 | 0 | 0 | 4 |
| 4 | 22153E64_P | Elective – III | 4 | 0 | 0 | 4 |
| 5 | 22153L65P | Power Systems Lab | 0 | 0 | 3 | 2 |
| Total No of Credits | | | | | | 18 |

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Semester VII

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22160S71P | Total Quality | 3 | 0 | 0 | 3 |
| 2 | 22153C72P | Electrical Machine | 3 | 1 | 0 | 4 |
| 3 | 22153C73P | Power Plant Engineering | 4 | 0 | 0 | 4 |
| 4 | 22153E74_P | Elective – IV | 3 | 0 | 0 | 3 |
| 5 | 20153EE74C | Elective – VII | 3 | 0 | 0 | 3 |
| 6 | 22153P75P | Project Work | 0 | 0 | 12 | 6 |
| Total No of Credits | | | | | | 20 |

List of electives

ELECTIVE –I ( IV SEMESTER )

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153E44AP | Electromagnetic Theory | 4 | 0 | 0 | 4 |
| 2 | 22153E44BP | Fuzzy Logic and its applications | 4 | 0 | 0 | 4 |
| 3 | 22153E44CP | Bio Medical Instrumentation | 4 | 0 | 0 | 4 |
| 4 | 22153E44DP | Modeling and Simulation of Solar Energy Systems | 4 | 0 | 0 | 4 |
| 5 | 22153E44EP | Non conventional energy system & Applications | 4 | 0 | 0 | 4 |

ELECTIVE –II ( V SEMESTER )

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153E54AP | Environmental Science and Engineering | 4 | 0 | 0 | 4 |
| 2 | 22153E54BP | Artificial Neural Networks | 4 | 0 | 0 | 4 |
| 3 | 22153E54CP | VLSI Design | 4 | 0 | 0 | 4 |
| 4 | 22153E54DP | Robotics | 4 | 0 | 0 | 4 |
| 5 | 22153E54EP | LT & HT Distribution System | 4 | 0 | 0 | 4 |

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## ELECTIVE –III ( VI SEMESTER )

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153E64AP | Principles of Management | 4 | 0 | 0 | 4 |
| 2 | 22153E64BP | Micro Electro Mechanical Systems | 4 | 0 | 0 | 4 |
| 3 | 22153E64CP | Integrated opto-Electronic Devices | 4 | 0 | 0 | 4 |
| 4 | 22153E64DP | Computer Aided Design of Electrical Apparatus | 4 | 0 | 0 | 4 |
| 5 | 22153E64EP | Advanced DC-AC Power conversion | 4 | 0 | 0 | 4 |

## ELECTIVE –IV ( VII SEMESTER )

| S. No | Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| 1 | 22153E74AP | Power system transients | 3 | 0 | 0 | 3 |
| 2 | 22153E74BP | EHV AC and DC Transmission systems | 3 | 0 | 0 | 3 |
| 3 | 22153E74CP | Fundamentals of Nanoscience | 3 | 0 | 0 | 3 |
| 4 | 22153E74DP | Advanced Control systems | 3 | 0 | 0 | 3 |
| 5 | 22153E74EP | Switched Mode Power supplies | 3 | 0 | 0 | 3 |

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B.TECH (PART TIME) – EEE – R-2022

COURSE STRUCTURE AND CREDITS DISTRIBUTION

| Sem. | Core Courses | | | | Elective Courses | | Total Credits |
|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 05 | 19 | - | - | - | - | 19 |
| II | 05 | 19 | - | - | - | - | 19 |
| III | 04 | 16 | 01 | 02 | - | - | 18 |
| IV | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| V | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| VI | 03 | 12 | 01 | 02 | 01 | 04 | 18 |
| VII | 03 | 11 | 01 | 06 | 01 | 03 | 20 |
| | | | | | | Total Credits | 130 |

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## SEMESTER V

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153C51 | Power System Analysis | 3 | 0 | 0 | 3 |
| 2 | 20153C52 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 3 | 20153C53 | Power Electronics | 3 | 0 | 0 | 3 |
| 4 | 201__OE54_ | OPEN Elective-I | 3 | 0 | 0 | 3 |
| 5 | 20153S55 | Digital Signal Processing | 2 | 2 | 0 | 3 |
| 6 | 20153S56 | Object Oriented Programming | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 7 | 20153L57 | Control and Instrumentation Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20153L58 | Object Oriented Programming Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20153L59 | Professional Communication | 0 | 0 | 2 | 1 |
| RESEARCH SKILL DEVELOPMENT(RSD)COURSE | | | | | | |
| 10 | 201AGIE | Innovation and Entrepreneurship | | | | 2 |
| | | | | | TOTAL CREDITS | 23 |

## SEMESTEVII

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20153C71 | High Voltage Engineering | 3 | 0 | 0 | 3 |
| 2 | 20153C72 | Power System Operation and Control | 3 | 0 | 0 | 3 |
| 3 | 20153C73 | Renewable Energy Systems | 3 | 0 | 0 | 3 |
| 4 | 201__OE74_ | OPEN Elective –II | 3 | 0 | 0 | 3 |
| 5 | 20153E75_ | Elective –III | 3 | 0 | 0 | 3 |
| 6 | 20153E76_ | Elective –IV | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 7 | 20153L77 | Power System Simulation Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20153L78 | Renewable Energy Systems Laboratory | 0 | 0 | 4 | 2 |
| | | | | | TOTAL CREDITS | 22 |

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## M.TECH(Power Systems)-Full Time

**ITEM 1:** The course title "19248S11D Applied Mathematics for Electrical &Electronics Engineering" is modified as "22248S11D-Applied Mathematics for Power System Engineering" from the existing 2019 curriculum in the semester I.

**ITEM 2:** The board members suggested that a new course "22272C13 Advanced Power System Analysis" is to be included instead of "19272C13 Power System Modeling and Analysis" which may develop the knowledge about the power system faults and its solution techniques.

**ITEM 3:** The board members suggested to rename the course title "22272C14 Economic Operations of Power Systems" instead of "19272C14 Economic Operations of Power Systems-I" from the existing 2019 curriculum.

**ITEM 4:** The course "19272C15-High Voltage Direct Current Transmission System is modified as "22272C15 HVDC and FACTS" with including the concept of FACT devices based on the board members suggestion in I semester.

**ITEM 5:** The board members suggested to introduce a lab course 22272L17 Power System Simulation Laboratory instead of 19272L17 Power System Simulation Lab-I in semester I with addition of new experiments.

**ITEM 6:** The course "19272C22 Economic Operations of Power Systems-II is retitled as "22272C22 Power System Control" with board members recommendation.

**ITEM 7:** The board members suggested that a new course "22272C23 Advanced Power System Protection" is to be introduced with the revision of course content "19272C23 Power System Protection" in the same semester.

**ITEM 8:** The board members suggested to introduce a lab course "22272L26 Advanced Power System Simulation Laboratory" instead of "19272L26 Power System Simulation Lab-II".

**ITEM 9:** The board members are suggested a new course "22272E16D Analysis and Computation of Electromagnetic Transients in Power Systems" instead of "19272E16D Design of Substation Grounding" to gain knowledge about the impact of transients in the power system.

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ITEM 10: The course title "19272E33B Power System restructuring and deregulation" has been r renamed as "22272E33B Deregulated PowcSystem" fromthe existing 2019 curriculum.



ITEM 11: A new course "22272E33D Principles of EHV Transmission is introduced instead of 19272E33D Advanced Digital Signal Processing with the recommendations of board members.

ITEM 12: A few research and boundary Courses "19272CRS-Research Led Seminar, 19272CRM-Research, Methodology, 19272CBR-Participation in Bounded Research and 9272CSR-Design / Socio Technical Project" areeliminated from the existing 2019 syllabus with the suggestion of board members in the semester I, II and III respectiv

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## M.TECH(Power Systems)-Full Time

### SEMESTER – I

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | 22248S11DP | Applied Mathematics For Power System Engineering | 3 | 1 | 0 | 4 |
| | 22272C12P | System Theory | 3 | 1 | 0 | 4 |
| | 22272C13P | Advanced Power System Analysis | 3 | 1 | 0 | 4 |
| | 22272L14P | Power System Simulation Laboratory | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 15 |

### SEMESTER – II

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272C21P | EHV power transmission. | 3 | 1 | 0 | 4 |
| 2 | 22272C22P | Advanced Power System Protection | 3 | 1 | 0 | 4 |
| 3 | 22272E23_P | Elective-I | 3 | 0 | 0 | 3 |
| 4 | 222TECWRP | Technical Writing/Seminars | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 14 |

### SEMESTER – III

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272C31P | Economic Operations of Power Systems | 3 | 1 | 0 | 4 |
| 2 | 22272C32P | HVDC and FACTS | 3 | 1 | 0 | 4 |
| 3 | 22272E33_P | Elective –II | 3 | 0 | 0 | 3 |
| 4 | 22272L34P | Advanced Power System Simulation Laboratory | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 14 |

### SEMESTER – IV

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| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272P41 | Project work Phase-II | 0 | 0 | 15 | 15 |

Total Credits = 88

Elective –I

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E16A | Analysis of Inverters | 3 | 0 | 0 | 3 |
| 2. | 22272E16B | Modeling and Analysis of Electrical Machines | 3 | 0 | 0 | 3 |
| 3. | 22272E16C | Advanced Power System Dynamics | 3 | 0 | 0 | 3 |
| 4. | 22272E16D | Analysis and Computation of Electromagnetic Transients in Power Systems | 3 | 0 | 0 | 3 |

Elective –II

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E33AP | Smart Grid | 3 | 0 | 0 | 3 |
| 2. | 22272E33BP | Solar and Energy Storage Systems | 3 | 0 | 0 | 3 |
| 3. | 22272E33CP | Power System Reliability | 3 | 0 | 0 | 3 |
| 4. | 22272E33DP | Distributed Generation and Microgrid | 3 | 0 | 0 | 3 |

Elective –III

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E43AP | Wind Energy conversion systems | 3 | 0 | 0 | 3 |
| 2. | 22272E43BP | AI Techniques to Power Systems | 3 | 0 | 0 | 3 |
| 3. | 22272E43CP | Electrical Distribution System | 3 | 0 | 0 | 3 |
| 4. | 22272E43DP | Energy Management and Auditing | 3 | 0 | 0 | 3 |

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Elective –IV

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E51AP | Power Electronics applications in Power systems | 3 | 0 | 0 | 3 |
| 2. | 22272E51BP | Power system Dynamics | 3 | 0 | 0 | 3 |
| 3. | 22272E51CP | Electric Vehicles and Power Management | 3 | 0 | 0 | 3 |
| 4. | 22272E51DP | Electromagnetic Interference and Compatibility | 3 | 0 | 0 | 3 |

Elective –V

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22275E52AP | Power Conditioning | 3 | 0 | 0 | 3 |
| 2. | 22275E52BP | Deregulated Power System | 3 | 0 | 0 | 3 |
| 3. | 22275E52CP | Control System Design for Power Electronics | 3 | 0 | 0 | 3 |
| 4. | 22275E52DP | Principles of EHV Transmission | 3 | 0 | 0 | 3 |

Elective –VI

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E53AP | Software for Control system Design | 3 | 0 | 0 | 3 |
| 2. | 22272E53BP | Industrial Power system analysis and design | 3 | 0 | 0 | 3 |
| 3. | 22272E53CP | Soft Computing Techniques | 3 | 0 | 0 | 3 |
| 4. | 22272E53DP | Restructured Power System | 3 | 0 | 0 | 3 |

OPEN ELECTIVE (V SEM)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20150FE54A | Database Management System | 3 | 0 | 0 | 3 |
| 2 | 20152FE54A | Basics of Biomedical Instrumentation | 3 | 0 | 0 | 3 |
| 3 | 20154FE54A | Renewable Energy Sources | 3 | 0 | 0 | 3 |
| 4 | 20155FE54A | Air Pollution and Control Engineering | 3 | 0 | 0 | 3 |
| 5 | 20150FE54B | Cloud computing | 3 | 0 | 0 | 3 |
| 6 | 20152FE54B | Sensors and Transducers | 3 | 0 | 0 | 3 |
| 7 | 20154FE54B | Automatic System | 3 | 0 | 0 | 3 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 20155FE54B | Geographic Information System | 3 | 0 | 0 | 3 |
| 9 | 20153FE54C | Computer Aided Design of Electrical Apparatus | | | | |

## OPEN ELECTIVE (VII SEM)

| S.No | Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20150FE74A | Introduction to C Programming | 3 | 0 | 0 | 3 |
| 2 | 20152FE74A | Robotics | 3 | 0 | 0 | 3 |
| 3 | 20154FE74A | Industrial safety | 3 | 0 | 0 | 3 |
| 4 | 20155FE74A | Green Building Design | 3 | 0 | 0 | 3 |
| 5 | 20150FE74B | Datastructures and Algorithms | 3 | 0 | 0 | 3 |
| 6 | 20152FE74B | Electronic Devices | 3 | 0 | 0 | 3 |
| 7 | 20154FE74B | Testing of Materials | 3 | 0 | 0 | 3 |
| 8 | 20155FE74B | Waste water Treatment | 3 | 0 | 0 | 3 |
| 9. | 20153FE74C | Power Electronics for Renewable Energy Systems | | | | |

## M.TECH (PART TIME)

### COURSE STRUCTURE AND CREDITS DISTRIBUTION

| Sem. | Core Courses | | | | Elective Courses | | Total Credits |
|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 04 | 16 | 01 | 03 | 01 | 03 | 26 |
| II | 03 | 12 | 02 | 06 | 02 | 06 | 24 |
| III | 01 | 04 | - | - | 03 | 09 | 23 |
| IV | - | - | - | - | - | - | 15 |
| | | | | | | Total Credits | 88 |

## M.TECH (PART TIME)

**ITEM 1:** The course title "19248S11DP Applied Mathematics for Electrical &Electronics Engineering" is modified as "22248S11DP-Applied Mathematics for Power System Engineering" from the existing 2019 curriculum in the semester I.

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**ITEM 2:** The board members suggested that a new course "22272C13P-AdvancedPower System Analysis" is to be included instead of "19272C13P Power System Modeling and Analysis" which may develop the knowledge about the power system faults and its solution techniques.

**ITEM 3:** The board members suggested to introduce a lab course 22272L14P Power System Simulation Laboratory instead of 19272L14P Power System Simulation Lab-I in semester I with addition of new experiments.

**ITEM 4:** The board members suggested that a new course "22272C22P Advanced Power System Protection" is to be introduced with the revision of course content "19272C22P Power System Protection" in the same semester.

**ITEM 5:** The board members suggested to rename the course title "22272C31P- Economic Operations of Power Systems" instead of "19272C31P-Economic Operations of Power Systems-I" from the existing 2019 curriculum.

**ITEM 6:** The course "19272C32P-High Voltage Direct Current TransmissionSystem is modified as "22272C32P-HVDC and FACTS" with including the concept of FACT devices based on the board members suggestion in I semester.

**ITEM 7:** The board members suggested to introduce a lab course "22272L34P- Advanced Power System Simulation Laboratory" instead of "19272L26-Power System Simulation Lab-II".

**ITEM 8:** The course "19272C41P-Economic Operations of Power Systems-II is retitled as "22272C41P-Power System Control" with board members recommendation.

**ITEM 9:** The board members are suggested a new course "22272E23DP-Analysis and Computation of Electromagnetic Transients in Power Systems" instead of "19272E23DP-Design of Substations' to acquire the deep knowledge about the impact of transients in the power system network.

**ITEM 10:** The course title "19275E52BP-Power System restructuring and deregulation" has been renamed as "22275E52BP-Deregulated Power System"from the existing 2019 curriculum.

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**ITEM 11:** A new course "22275E52DP-Principles of Electric Power Transmission is introduced instead of 19275E52DP-Advanced Digital Signal Processing with the recommendations of board members.

**ITEM 12:** A few research and boundary Courses "19272CRSP-Research Led Seminar,

19272CRMP-Research Methodology, 19272CBRP-Participation in Bounded Research,

19272CSRP-Design/ Socio Technical Project" are eliminated from the existing 2019 syllabus with the suggestion of board members in the semester I, II, and III respectively.

**SEMESTER – I**

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | 22248S11DP | Applied Mathematics For Power System Engineering | 3 | 1 | 0 | 4 |
| | 22272C12P | System Theory | 3 | 1 | 0 | 4 |
| | 22272C13P | Advanced Power System Analysis | 3 | 1 | 0 | 4 |
| | 22272L14P | Power System Simulation Laboratory | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 15 |

**SEMESTER – II**

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272C21P | EHV power transmission. | 3 | 1 | 0 | 4 |
| 2 | 22272C22P | Advanced Power System Protection | 3 | 1 | 0 | 4 |
| 3 | 22272E23_P | Elective-I | 3 | 0 | 0 | 3 |
| 4 | 222TECWRP | Technical Writing/Seminars | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 14 |

**SEMESTER – III**

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272C31P | Economic Operations of Power Systems | 3 | 1 | 0 | 4 |
| 2 | 22272C32P | HVDC and FACTS | 3 | 1 | 0 | 4 |
| 3 | 22272E33_P | Elective –II | 3 | 0 | 0 | 3 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 22272L34P | Advanced Power System Simulation Laboratory | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 14 |

SEMESTER – IV

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 22272E43_P | Elective –III | 3 | 0 | 0 | 3 |
| 4 | 22272P44P | Project work Phase -I | 0 | 0 | 10 | 10 |
| | | TOTAL | | | | 21 |

SEMESTER – V

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | 22272E51_P | Elective –IV | 3 | 0 | 0 | 3 |
| | 22272E52_P | Elective –V | 3 | 0 | 0 | 3 |
| | 22272E53_P | Elective –VI | 3 | 0 | 0 | 3 |
| | | TOTAL | | | | 9 |

SEMESTER – VI

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| | 22272P61P | Project work Phase -II | 0 | 0 | 15 | 15 |

Total Credits = 88

Elective –I

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22272E23AP | Analysis and Design of Power Converters | 3 | 0 | 0 | 3 |
| 2. | 22272E23BP | Modeling and Analysis of Electrical Machines | 3 | 0 | 0 | 3 |
| 3. | 22272E23CP | Advanced Power System Dynamics | 3 | 0 | 0 | 3 |
| 4. | 22272E23DP | Analysis and computation of Electromagnetic Transients in Power Systems | 3 | 0 | 0 | 3 |

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| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E33AP | Smart Grid | 3 | 0 | 0 | 3 |
| 2. | 22272E33BP | Solar and Energy Storage Systems | 3 | 0 | 0 | 3 |
| 3. | 22272E33CP | Power System Reliability | 3 | 0 | 0 | 3 |
| 4. | 22272E33DP | Distributed Generation and Microgrid | 3 | 0 | 0 | 3 |

E

Elective – II

–

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272C41P | Power System Control | 3 | 1 | 0 | 4 |
| 2 | 22272C42P | Electrical Transients in power systems | 3 | 1 | 0 | 4 |

1

1

Elective –III

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E43AP | Wind Energy conversion systems | 3 | 0 | 0 | 3 |
| 2. | 22272E43BP | AI Techniques to Power Systems | 3 | 0 | 0 | 3 |
| 3. | 22272E43CP | Electrical Distribution System | 3 | 0 | 0 | 3 |
| 4. | 22272E43DP | Energy Management and Auditing | 3 | 0 | 0 | 3 |

Elective –IV

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E51AP | Power Electronics applications in Power systems | 3 | 0 | 0 | 3 |
| 2. | 22272E51BP | Power system Dynamics | 3 | 0 | 0 | 3 |
| 3. | 22272E51CP | Electric Vehicles and Power Management | 3 | 0 | 0 | 3 |
| 4. | 22272E51DP | Electromagnetic Interference and Compatibility | 3 | 0 | 0 | 3 |

Elective –V

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22275E52AP | Power Conditioning | 3 | 0 | 0 | 3 |
| 2. | 22275E52BP | Deregulated Power System | 3 | 0 | 0 | 3 |
| 3. | 22275E52CP | Control System Design for Power Electronics | 3 | 0 | 0 | 3 |
| 4. | 22275E52DP | Principles of EHV Transmission | 3 | 0 | 0 | 3 |

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Elective –VI

| SL.NO. | SUBJECT CODE | SUBJECT | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22272E53AP | Software for Control system Design | 3 | 0 | 0 | 3 |
| 2. | 22272E53BP | Industrial Power system analysis and design | 3 | 0 | 0 | 3 |
| 3. | 22272E53CP | Soft Computing Techniques | 3 | 0 | 0 | 3 |
| 4. | 22272E53DP | Restructured Power System | 3 | 0 | 0 | 3 |

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## Credit Distribution

| Sem. | Core Courses | | | | Elective Courses | | Total Credits |
|---|---|---|---|---|---|---|---|
| | Theory Courses | | Practical Courses | | | | |
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 02 | 08 | 01 | 03 | - | - | 15 |
| II | 02 | 08 | 01 | 03 | 01 | 03 | 14 |
| III | 02 | 08 | 01 | 03 | 01 | 03 | 14 |
| IV | 02 | 08 | 01 | 10 | 01 | 03 | 21 |
| V | - | - | - | - | 03 | 09 | 09 |
| VI | - | - | 01 | 15 | - | - | 15 |
| | | | | | | Total Credits | 88 |

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COURSE DURATION : 45 Hrs

## 225153LAB- LABVIEW FOR INDUSTRIAL APPLICATIONS

**Level-1:IntroductionLabVIEW**

What Exactly is LabVIEW-What can LabVIEW do for you- How doesLabVIEWwork-EvolutionofLabVIEW-WhatisDAQ-CommunicationusingSerialPort-LabVIEWaddontoolkits-LabVIEWRealTime,FPGA,PDA,andEmbedded.

**Level-2:LabVIEWEnvironment**

Front panel, control and indicator- Block Diagram, Nodes , Wires, Data FlowProgramming-LabVIEWProjects,ProjectExplorerwindow,projectExplorerToolbars-BuildingApplication-Installers-FloatingPallets-

**Level-3:LabVIEWFoundation**

Creating VI- Basic Controls- Indicators- Booleans- String- Paths- Decorations-CustomControlsandIndicators-Automaticwirerouting-AutomaticWiring-WiringComplicated Objects- Bad Wires – Wiring Tips- adding Constants- Controls and Indicators -Keyboard Shortcuts-Cloning and object.

**Level-4:EmbeddedcombiningwithLabVIEW**

VISA concept-Baudrate Calculation-Measurement and Automation Explorer-Serial Communication with Microcontrollers.

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Software Tools in the Course

1. Micro Vision Cell
2. LabVIEW
3. Measurement & automation Explorer
4. Proteus Simulator
5. Proload

Duration : 45 Hrs

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## 225153FA -FAULT ANALYSIS IN HOME APPLIANCES

**Course objective:**

1. To understand the key elements of electrical and electronics appliances.
2. To understand the domestic wiring and layout.
3. To understand the Basic safety practices.
4. To understand the various principles of domestic equipment's.
5. To predict the goodness or age estimation of domestic equipment's.

**Unit: I**

Safety Practices, Fires in electrical Circuits & Precautions, Fire Extinguishers & its types, General Safety of Tools & equipment, Rescue of person who is in contact with live wire, Treat a person for electric shock/ injury,Protective clothing: leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap and shoulder covers, ear defenders/plugs, safety boots, glasses/goggles/visors.

**Unit: II**

General idea on Various Electrical Measuring Instruments/ Components Types, Multimeter ( Digital/ Analog),Energy meter (Digital/analog), Insulation Tester (Megger), Earth tester. Ammeter, voltmeter, Different types of switches, fuse, thermostat, heating elements, registers, conductors, insulators, capacitors, wires and cables (for up to 15 amp) symbol of various components.

**Unit: III**

Demonstration of Heating and Magnetic Appliances Demonstration of Heating Appliances and their applications. ( Heating Appliances –type, Working Principle, Uses.) Demonstration of Magnetic Appliances and their applications (Magnetic Appliances- Type, working principle, uses.)

**Unit: IV**

Maintenance and Repair of heating and motorised appliances Identification, working and specification of each part. Repairing for some common problems, replacement of coil, insulators, thermostat etc, for the following:

(a) Repair & maintenance of room heater. (b) Repair & maintenance of electric iron. (c) Repair & maintenance of electric stove (Induction), electric kettle. (d) Repair & maintenance of ceiling and table fan. (e) Repair &maintenance of domestic pump motor. (f) Repair & maintenance of water cooler (g) Repair & maintenance of washing machine.

**Unit: V**

Assemble of Some Appliances Assemble different type of inverters circuit & its measurements. Assemble battery charger circuit used in inverter with protection circuit. Assemble Online/Offline UPS & its

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measurements. Test, faultfinding & repair of given power supply. (DC to AC converter. Types of inverter, its
different blocks &amp: oscillators circuits Battery chargers &amp: its protection circuit. UPS working principles of- line
&amp. On line UPS circuit used in UPS.

**COURSE DURATION : 45 HRS**

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## 225153PCDA -REWINDING OF INDUCTION MOTOR

COURSE OBJECTIVES:

- **Rewinding techniques:** Describe the steps involved in rewinding an induction motor, including winding removal, preparation, insertion, and insulation application.
- **Testing and troubleshooting:** Understand the methods used to test the performance of rewound motors and troubleshoot common issues.

### 1. Introduction to Induction Motors

- Basic principles of operation
- Types of induction motors (squirrel-cage, wound-rotor)
- Construction features
- Applications

### 2. Understanding Stator Windings

- Types of winding patterns (single-phase, three-phase)
- Coil pitch and pole pitch
- Winding factors
- Connection diagrams

### 3. Rotor Windings

- Wound rotor construction
- Slip rings and brushes
- Rotor winding connections

### 4. Failure Analysis of Induction Motors

- Common causes of motor failures (burnout, insulation breakdown, mechanical damage)
- Fault diagnosis techniques (electrical tests, visual inspection)

### 5. Rewinding Techniques

- Preparation for rewinding (disassembly, cleaning)
- Removal of old windings
- Insertion of new windings
- Insulation application
- Testing and verification

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6. Winding Materials and Tools

- Types of winding wire (copper, aluminum)
- Insulation materials (varnish, mica tape)
- Rewinding tools (slot wedge, winding machine

COURSE DURATION : 45 HR

## 225153SE - SOLAR ENERGY AND ITS APPLICATIONS

**Course objectives:**

- **Photovoltaic technology:** Describe the principles, types, and characteristics of photovoltaic cells and modules.
- **Solar energy storage:** Understand the need for energy storage in solar systems and various storage technologies.

**Unit 1: Introduction to Solar Energy**

- Definition of solar energy
- Types of solar energy (thermal, photovoltaic)
- History and development of solar energy
- Advantages and disadvantages of solar energy

**Unit 2: Solar Radiation**

- Solar spectrum and its components
- Solar irradiance and its measurement
- Factors affecting solar radiation (angle of incidence, atmospheric conditions)
- Solar resource maps and databases

**Unit 3: Solar Thermal Energy**

- Principles of solar thermal energy conversion
- Types of solar thermal collectors (flat plate, concentrating)
- Solar water heating systems
- Solar cookers and dryers
- Solar power plants (CSP, parabolic trough, central receiver)



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**Unit 4: Photovoltaic Energy**

- Principles of photovoltaic energy conversion
- Types of solar cells (crystalline, thin-film)
- Solar cell characteristics (I-V curve)
- Solar modules and arrays
- Solar inverters and grid integration
- Off-grid and grid-tied solar systems

**Unit 5: Solar Energy Storage And Applications**

- Need for energy storage in solar systems
- Types of energy storage (batteries, thermal, pumped hydro)
- Energy storage technologies and their applications
- Residential solar systems

- Commercial and industrial solar systems
- Utility-scale solar power plants
- Solar-powered transportation (electric vehicles, solar-powered

COURSE

22515IOT - Introduction to IOT

COURSE OBJECTIVES :

- **IoT devices and sensors:** Identify different types of IoT devices and applications, and data acquisition methods.

- **IoT communication protocols:** Understand various communication systems and their characteristics.

**Unit 1: Introduction to the Internet of Things (IoT)**

- Definition and concepts of IoT
- Components of an IoT system (devices, connectivity, data analytics)
- IoT applications across various domains (smart homes, smart cities, agriculture)
- Benefits and challenges of IoT

**Unit 2: IoT Devices and Sensors**

P. Anuj

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Vallam

**Unit 4: Photovoltaic Energy**

- Principles of photovoltaic energy conversion
- Types of solar cells (crystalline, thin-film)
- Solar cell characteristics (I-V curve)
- Solar modules and arrays
- Solar inverters and grid integration
- Off-grid and grid-tied solar systems

**Unit 5: Solar Energy Storage And Applications**

- Need for energy storage in solar systems
- Types of energy storage (batteries, thermal, pumped hydro)
- Energy storage technologies and their applications
- Residential solar systems

- Commercial and industrial solar systems
- Utility-scale solar power plants
- Solar-powered transportation (electric vehicles, solar-powered boats)

**COURSE DURATION : 45 HRS**

## 225153IOT - Introduction to IOT applications

**COURSE OBJECTIVES :**

- **IoT devices and sensors:** Identify different types of IoT devices and sensors, their applications, and data acquisition methods.

- **IoT communication protocols:** Understand various communication protocols used in IoT systems and their characteristics.

**Unit 1: Introduction to the Internet of Things (IoT)**

- Definition and concepts of IoT
- Components of an IoT system (devices, connectivity, data analytics)
- IoT applications across various domains (smart homes, smart cities, healthcare, agriculture)
- Benefits and challenges of IoT

**Unit 2: IoT Devices and Sensors**



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- Types of IoT devices (microcontrollers, sensors, actuators)
- Sensor technologies (temperature, humidity, light, motion, pressure)
- Data acquisition and processing techniques
- Device connectivity options (Wi-Fi, Bluetooth, cellular, LoRa)

**Unit 3: IoT Communication Protocols**

- Internet protocols (TCP/IP, HTTP)
- IoT-specific protocols (MQTT, CoAP, LWM2M)
- Protocol comparison and selection
- Cloud platforms for IoT (AWS IoT, Azure IoT, Google Cloud IoT)

**Unit 4: IoT Data Management and Analytics**

- Data collection and storage (time series databases, data lakes)
- Data cleaning and preprocessing
- Data analytics techniques (statistical analysis, machine learning, data visualization)
- IoT platforms and tools for data management

**Unit 5: IoT Security and Privacy**

- Security threats in IoT (malware, hacking, privacy breaches)
- Security measures (authentication, authorization, encryption)
- Privacy concerns and regulations (GDPR, CCPA)
- Secure IoT development practices

COURSE DURATION : 45 HRS

## 225153PCA - POWER CONVERTER ANALYSIS AND DESIGN

**COURSE OBJECTIVES:**

- **Fundamental principles:** Understand the basic principles and operation of power converters, including rectifiers, inverters, choppers, and cycloconverters.
- **Power electronic devices:** Demonstrate knowledge of power electronic devices such as diodes, thyristors, MOSFETs, and IGBTs.
- **Circuit analysis:** Apply circuit analysis techniques to analyze power converter circuits, including steady-state and transient analysis.

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**Unit 1: Introduction to Power Converters**

- Definition and classification of power converters
- Basic principles of operation
- Applications of power converters in various fields

**Unit 2: Power Electronic Devices**

- Semiconductor devices (diodes, thyristors, MOSFETs, IGBTs)
- Characteristics and ratings of power electronic devices
- Switching behavior and losses
- Gate drive circuits

**Unit 3: Rectifiers**

- Single-phase half-wave and full-wave rectifiers
- Three-phase half-wave and full-wave rectifiers
- Controlled rectifiers (single-phase and three-phase)
- Filter circuits for rectifiers

**Unit 4: Inverters**

- Voltage source inverters (VSI)
- Current source inverters (CSI)
- PWM techniques for inverters (sine-PWM, space vector modulation)
- Multilevel inverters

**Unit 5: DC-DC Converters (Choppers) & AC-DC Converters**

- Buck, boost, buck-boost, and Cuk converters
- Continuous conduction mode (CCM) and discontinuous conduction mode (DCM)
- Control strategies for DC-DC converters

**AC-DC Converters**

- Single-phase and three-phase cycloconverters
- Operation and control of cycloconverters
- Applications of cycloconverters

**COURSE DURATION : 45 HRS**

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## DEPARTMENT OF CHEMISTRY

## MEETING OF BOARD OF STUDIES IN DEPARTMENT OF CHEMISTRY MINUTES OF THE MEETING

The Meeting of Board of Studies in the department of Chemistry was held on 05.05.2022 at 10.30 am under the Chairmanship of Prof.Dr.L.Chinnappa Dean, School of Arts and Science.

The following members were present

1. Dr.L.Chinappa, Dean PRIST Deemed to be University,Chairman.
2. Dr. S. Gomathi (Academic Expert)- Professor of Chemistry, Periyar Maniyammai,TN.
3. Mrs. Devi (Industrial Expert) AGM- QC, J,Gujarat
4. Dr. P. Parthiban Professor
5. Dr. M. Jerome Rozario Professor
6. Dr. D. Senthilnathan Associate professor
7. Dr. J.S. Nirmalram Associate professor
8. Dr. R Manikandan Associate professor
9. Dr. D. Chinnaraja Assistant Professor, Member
10. Dr. M. Surendra Varma Assistant Professor, Member
11. Dr. A. Jenif d'souza Assistant Professor, Member
12. Dr. N.V.Prabhu Assistant Professor. Member
13. Dr. J. Thulasidhasan Assistant Professor, Member
14. Dr. C.R. Shanthi Assistant Professor, Member
15. Dr. R. Shopna Assistant Professor, Member
16. Ms. V.Abarna Assistant Professor, Member

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LIST OF MEMBERS

| S.NO | NAME OF THE MEMBERS | DESIGNATION | SIGNATURE |
|---|---|---|---|
| 1 | Dr. S. Gomathi | PROFESSOR /ACADAMIC EXPERT | |
| 2 | Mrs. Devi | INDUSTRIAL EXPERT | |
| 3 | Dr.L.CHINNAPPA | DEAN OF ARTS AND SCIENCE | |
| 4 | Dr. P. PARTHIBAN | PROFESSOR | |
| 5 | Dr. M. JEROME ROZARIO | PROFESSOR | |
| 6 | Dr. D. SENTHILNATHAN | ASSOCIATE PROFESSOR | |
| 7 | Dr. J.S. NIRMALRAM | ASSOCIATE PROFESSOR | |
| 8 | Dr. R MANIKANDAN | ASSISTANT PROFESSOR | |
| 9 | Dr. D. CHINNARAJA | ASSISTANT PROFESSOR | |
| 10 | Dr. M. SURENDRA VARMA | ASSISTANT PROFESSOR | |
| 11 | Dr. A. JENIF D'SOUZA | ASSISTANT PROFESSOR | |
| 12 | Dr. K.V.PRABHU | ASSISTANT PROFESSOR | |
| 13 | Dr. J. THULASIDHASAN | ASSISTANT PROFESSOR | |
| 14 | Dr. C.R. SHANTHI | ASSISTANT PROFESSOR | |
| 15 | Dr. R. SHOPNA | ASSISTANT PROFESSOR | |
| 15 | Ms. V.ABARNA | ASSISTANT PROFESSOR | |

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The chairman of the board of studies welcomed the members.

The members of the Board scrutinized the existing syllabi for B.Sc Chemistry & M.Phil Chemistry programme and based on the Stakeholders feedback revision in the following Courses have been carried out.

1. It has been proposed to introduce Audit Courses in the B.Sc.(Chemistry) programme curriculum with effect from 2021-22 Based on the following courses are proposed to introduce during various semesters

   In Semester I: Universal Human Values
   In Semester II : Communication Skills
   In Semester III. Office automation-
   In Semester IV: Leadership and Management Skills
   In Semester V: Professional Skills

   The board resolved to approve the syllabus for the above mentioned Audit Courses

2. Based on feedback from the Alumni it has been proposed to introduce the following Audit Courses on Soft Skills in the B.Sc.(Chemistry) programme curriculum with effect from 2022-23

   Year I: Basic Behavioral Etiquette
   Year II : General Aptitude and Quantitative Ability
   Year III: Interview Skills Training and Mock Test

   The board further resolved to approve the syllabus of the above mentioned Audit Courses on Soft Skills.

3. There is a Plan of introducing Audit Course on "Community Engagement" in the 3rd year of B.Sc.(Chemistry) programme curriculum with effect from 2022-23

4. The board decided to drop the courses on Communicative English Laboratories.

5. The board decided to drop the courses on Skill Based Elective Courses- Package laboratories

6. The board decided to drop Course on Extension Activities from the existing curriculum

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of B.Sc.(Chemistry) programme with effect from 2022-23.

7. It is proposed to introduce a course on "Research and Publication Ethics" with 2 credits in the M.Phil.(Chemistry) programme curriculum with effect from 2022-23.

8. It was suggested to introduce phytochemical concepts in the syllabus of Phamacuetical Chemistry in 6th Semester of B.Sc (Chemistry)

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The members of the Board scrutinized the existing syllabi for B.Sc Chemistry & M.Sc Chemistry programme and based on the Stakeholders feedback revision in the following new Courses have been introduced.

The committee recommended introduction of Quantum Chemistry(20114DSC56B), Stereochemistry and Reaction Mechanism (20114DSC56C), Molecular Spectroscopy (20114DSC56D), Mathematical and Computational Methods in Chemistry (20114DSC56E), Spectroscopic Methods of Analysis(20114DSC66B), Bioinorganic Chemistry(20114DSC66C), Methods in Organic Synthesis(20114DSC66D), Chemical Thermodynamics(20114DSC66E), Environmental Chemistry, Basic Concepts of Quantum Chemistry (20214DSC16B), Chemical Kinetics(20214DSC16C), Organometallic Chemistry(20214DSC16D), Aromaticity(20214DSC16E), Special Topics in Chemistry, Molecular Modelling and Drug Design (20214DSC26B), Pericyclic Reactions(20214DSC26C), Inorganic Materials of Industrial Importance(20214DSC26D), Application of Computers in Chemistry(20214DSC26E), Green Organic Synthesis: Principles and Applications(20214DSC35B), Macromolecules as Engineering Materials(20214DSC35C), Pharmaceutical Inorganic Chemistry(20214DSC35D), Industrial Pharmacy(20214DSC35E), Material Chemistry(20214DSC43B), Pharmacology(20114DSC43C), Herbal Drug Technology (20214DSC43D)

The members of the board also scrutinized and updated the panel of examinersfor the B.Sc Chemistry & M.Sc Chemistry and submitted the same for the Academic Council for its approval.

Expert members accepted to introduce the courses as listed above.

Furthermore, the individual members offered their viewpoints.

The meeting was concluded with thanks from the chairman.

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9. The committee recommended introduction of Green Chemistry in the Elective Course.

10. The members of the board also scrutinized and updated the panel of examiners for the B.Sc Chemistry & M.Sc Chemistry and submitted the same for the Academic Council for its approval.

Expert members accepted to introduce the courses as listed above.

Furthermore, the individual members offered their viewpoints.

The meeting was concluded with thanks from the chairman.

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# SCHOOL OF ARTS OF SCIENCE

## DEPARTMENT OF CHEMISTRY

## B.Sc CHEMISTRY CURRICULUM

## REGULATION 2020

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**SCHOOL OF ARTS AND SCIENCE**

**DEPARTMENT OF CHEMISTRY**

**B.Sc CURRICULUM – REGULATION 2020**
**ACADAMIC YEAR 2022-2023**

## B.Sc. Graduate Attributes

- Domain knowledge
- Critical thinking
- Effective Communication
- Reflective learning
- Critical thinking

## B.Sc Programme Educational Objectives – PEO

- PE01- Acquired the knowledge with facts and figures related to various subjects in pure sciences.
- PE02- Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
- PE03- Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.
- PE04- The skills of observations and drawing logical inferences from the scientific experiments.
- PE05- Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.
- PE06- Been able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems. PE07-Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments. PE08- Developed scientific outlook not only with respect to science subjects but also in all aspects related to life.
- PE09- Realized that knowledge of subjects in other faculties such as humanities, performing arts, social sciences etc.
- PE10- Can have greatly and effectively influence which inspires in evolving new scientific theories and inventions.
- PE11- Imbibed ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
- PE12- Developed various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.
- PE13- Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and

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## B.Sc Programme Outcome – PO

- PO1- To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop interest in the study of chemistry as a discipline.
- PO2- To develop the ability to apply the principles of Chemistry.
- PO3- To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society. To develop problem solving skills.
- PO4- To be familiarised with the emerging areas of Chemistry and their applications in various spheres of Chemical sciences and to apprise the students of its relevance in future studies.
- PO5- To develop skills in the proper handling of apparatus and chemicals.
- PO6- To be exposed to the different processes used in industries and their applications.

## B.Sc. Course – C

- C1- General Chemistry – I
- C2- Volumetric Analysis Lab
- C3- Mathematics – I
- C4- Mathematics – II
- C5- General Chemistry – II
- C6- Organic Analysis Lab
- C7- Mathematics - III
- C8- Mathematics – IV
- C9- Research Last Seminar
- C10- General Chemistry – III
- C11- Physical Chemistry Lab – I
- C12- Physics - I & II
- C13- Physics Lab – I & II
- C14- Research Methodology
- C15- General Chemistry - IV
- C16- Physical Chemistry Lab – II
- C17- Inorganic Chemistry – I
- C18- Organic Chemistry – I
- C19- Physical Chemistry – I
- C20- Inorganic Qualitative Analysis Lab
- C21- Gravimetric Analysis Lab
- C22-Participation in Bounded Research
- C23- Inorganic Chemistry – II
- C24- Organic Chemistry – II

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- C25- Physical Chemistry – II
- C26- Project Work
- C27- Package Lab I to VI
- C28- Communication Lab I to VI

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B.Sc Curriculum Mapping

Programme Educational Objectives Vs Programme Outcome

| Programme Outcome-PO<br>Programme Educational Outcome - PEO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| PE01 | | | | | | |
| PE02 | | | | | | |
| PE03 | | | | | | |
| PE04 | | | | | | |
| PE05 | | | | | | |
| PE06 | | | | | | |
| PE07 | | | | | | |
| PE08 | | | | | | |
| PE09 | | | | | | |
| PE10 | | | | | | |
| PE11 | | | | | | |
| PE12 | | | | | | |
| PE13 | | | | | | |

B.Sc Curriculum Mapping

Programme Outcome vs Courses Outcome

| Programme Outcome-PO<br>Courses Outcome-CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | | | * | * | | * |
| CO2 | | * | | * | * | * |
| CO3 | * | * | | * | * | * |
| CO4 | | | * | * | | * |
| CO5 | | | * | * | | * |
| CO6 | | * | | * | * | |
| CO7 | * | * | | | * | |
| CO8 | * | * | * | | * | |
| CO9 | | * | | | * | * |
| CO10 | | * | * | * | * | * |
| CO11 | | * | | * | | |
| CO12 | * | * | | * | * | |
| CO13 | | * | * | * | * | |
| CO14 | | * | * | * | * | * |

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| | | | | | | |
|---|---|---|---|---|---|---|
| CO15 | * | | * | | * | |
| CO16 | | * | | * | | * |
| CO17 | * | * | * | * | * | |
| CO18 | | * | | * | * | |
| CO19 | * | | | * | * | * |
| CO20 | | | * | * | | |
| CO21 | * | | * | | | * |

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| | | | | | | |
|---|---|---|---|---|---|---|
| CO22 | * | * | | * | | * |
| CO23 | * | * | * | * | * | * |
| CO24 | * | * | * | * | * | * |
| CO25 | * | * | | * | * | |
| CO26 | * | * | | * | * | |
| CO27 | | * | * | | | |
| CO28 | | | | | | |



# PRIST
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UNIVERSITY
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THANJAVUR – 613403 - TAMIL NADU

## SCHOOL OF ARTS AND SCIENCE

### DEPARTMENT OF CHEMISTRY

### B.Sc CHEMISTRY – REGULATION 2020

### COURSE STRUCTURE

| SEMESTER – I | | | | | |
|---|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | L | T | P | C |
| 20110AEC11/ 20111AEC11/ 20132AEC11/ 20135AEC11 | Tamil – I / Advanced English – I / Hindi – I / French-I | 4 | 0 | 0 | 2 |
| 20111AEC12 | English – I | 4 | 0 | 0 | 2 |
| 20114AEC13 | General Chemistry – I | 6 | 0 | 0 | 4 |
| 20114AEC14L | Volumetric Analysis Lab | 0 | 0 | 3 | 2 |
| 20112AEC15A (OR) 20114AEC17 | Calculus and Fourier Series / General and Applied Botany – I | 5 | 0 | 0 | 4 |
| 20112AEC16A (OR) 20114AEC18L | Algebra and Trigonometry / General Botany Lab – I | 6 | 0 | 0 | 6 |
| 20IINDCONS | Indian Constitution | 4 | 0 | 0 | 3 |
| | Universal Human Values | 0 | 0 | 3 | 2 |
| | | 0 | 0 | 0 | 0 |
| | | - | - | - | 2 |
| | **Total** | **29** | **0** | **06** | **19** |

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| SEMESTER – II | | | | | |
|---|---|---|---|---|---|
| 20110AEC21<br>/<br>20111AEC21<br>/ | Tamil – II /<br>Advanced English – II /<br>Hindi – II /<br>French-II | 4 | 0 | 0 | 2 |
| 20131AEC21 | English – II | 4 | 0 | 0 | 2 |
| /<br>20135AEC21<br>20111AEC22<br>20114AEC23 | General Chemistry – II | 6 | 0 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 20114AEC24L | Organic Analysis Lab | 0 | 0 | 3 | 2 |
| 20112AEC25A (OR) 20114AEC29A | ODE, PDE and Laplace Transform | 5 | 0 | 0 | 4 |
| | General and Applied Botany –II | 6 | 0 | 0 | 6 |
| 20112AEC26A | Analytical Geometry in Vector Calculus | 4 | 0 | 0 | 3 |
| 20114AEC20L | General Botany Lab –II | 0 | 0 | 3 | 2 |
| 20114RLC27 | Research Led Seminar | – | – | – | 1 |
| | Communication Skills | - | - | - | 2 |
| | Basic Behavioral Etiquette | - | - | - | 2 |
| | **Total** | **29** | **0** | **06** | **22** |
| **SEMESTER – III** | | | | | |
| 20110AEC31/ 20111AEC31/ 20131AEC31/ 20135AEC31 | Tamil – III / Advanced English – II I / Hindi – III / French-III | 4 | 0 | 0 | 2 |
| 20111AEC32 | English – III | 4 | 0 | 0 | 2 |
| 20114AEC33 | General Chemistry – III | 5 | 0 | 0 | 4 |
| 20114AEC34L | Physical Chemistry – Non – Electrical Practical | 0 | 0 | 3 | 2 |
| 20113AEC35 | Physics – I | 6 | 0 | 0 | 5 |
| 20113AEC36L | Physics Lab – I | 0 | 0 | 3 | 2 |
| 20114RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Office automation | - | - | - | 2 |
| | Total | 21 | 0 | 06 | 21 |
| **SEMESTER – IV** | | | | | |
| 20110AEC41/ 20111AEC41/ 20131AEC41/ 20135AEC41 | Tamil – IV / Advanced English – IV / Hindi – IV / French-IV | 4 | 0 | 0 | 2 |
| 20111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 20114AEC43 | General Chemistry – IV | 5 | 0 | 0 | 4 |
| 20114AEC44L | Physical Chemistry – Electrical Practical | 0 | 0 | 3 | 2 |
| 20113AEC45 | Physics – II | 6 | 0 | 0 | 5 |
| 20113AEC46L | Physics Lab – II | 0 | 0 | 3 | 2 |
| 201ENVTSTU | Environmental Studies | 2 | - | - | 2 |
| | Leadership and Management Skills | - | - | - | 2 |

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| | | | | | |
|---|---|---|---|---|---|
| | General Aptitude and Quantitative Ability | - | - | - | 2 |
| | **Total** | **21** | **0** | **06** | **23** |
| **SEMESTER – V** | | | | | |
| 20114AEC51 | Inorganic Chemistry – I | 5 | 0 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 20114AEC52 | Organic Chemistry – I | 4 | 1 | 0 | 3 |
| 20114AEC53 | Physical Chemistry | 4 | 1 | 0 | 4 |
| 20114AEC54L | Inorganic Qualitative Analysis Lab | 0 | 0 | 3 | 2 |
| 20114AEC55L | Gravimetric Analysis Lab | 0 | 0 | 3 | 2 |
| 20114DSC56_ | Discipline Specific Elective –I | 5 | 0 | 0 | 3 |
| 20114BRC57 | Participation in Bounded Research | - | - | - | 1 |
| | Professional Skills | - | - | - | 2 |
| | Interview Skills Training and Mock Test | - | - | - | 2 |
| | **Total** | **18** | **02** | **06** | **23** |

**SEMESTER – VI**

| | | | | | |
|---|---|---|---|---|---|
| 20114AEC61 | Inorganic Chemistry – II | 4 | 1 | 0 | 4 |
| 20114AEC62 | Organic Chemistry – II | 5 | 0 | 0 | 5 |
| 20114AEC63L | Industrial Chemistry Practical | 0 | 0 | 3 | 2 |
| 20114AEC64L | Domestic Products Preparation - Practical | 0 | 0 | 3 | 2 |
| 20114DSC66_ | Discipline Specific Elective – II | 5 | 0 | 0 | 3 |
| 201_ _OEC66_ | Open Elective | 4 | 0 | 0 | 2 |
| 20114PRW67 | Project Work | 0 | 0 | 0 | 4 |
| 20114PEE | Community Engagement | - | - | - | 1 |
| | Programme Exit Examination | 0 | 0 | 0 | 1 |
| | **Total** | **18** | **01** | **06** | **24** |
| | **Total Credits of the Program** | | | | **132** |

**DISCIPLINE SPECIFIC ELECTIVE COURSES – I & II**

| Semester | Elective No. | Course Code | Course Title |
|---|---|---|---|
| V | I | 20114DSC56A | A) Pharmaceutical Chemistry |
| | | 20114DSC56B | B) Agricultural Chemistry |
| VI | II | 20114DSC65A | A) Polymer Chemistry |
| | | 20114DSC65B | B) Nano Science |

**OPEN ELECTIVE COURSES**

| Semester | Course code | Course Title |
|---|---|---|
| | 20110OEC | Tamil Ilakkiya Varalaru |

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| | | |
|---|---|---|
| VI | 201110EC | Journalism |
| | 201120EC | Development of Mathematical Skills |
| | 201130EC | Instrumentation |
| | 201160EC | Wildlife Conservation |
| | 201200EC | E-Learning |
| | 201200EC | Web Technology |
| | 201610EC | Banking Service |

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Vallam - 613 403, Thanjavur

## RESEARCH BASED COURSES

| Semester | Course Code | Course Title |
|---|---|---|
| II | 20114RLC27 | Research Led Seminar |
| III | 20114RMC37 | Research Methodology |
| IV | 20114BRC57 | Participation in Bounded Research |

## AUDIT COURSES

| Semester | Course Code | Course Title |
|---|---|---|
| I | | Universal Human Values |
| II | | Communication Skills |
| II | | Basic Behavioral Etiquette |
| III | | Office automation |
| IV | | Leadership and Management Skills |
| IV | | General Aptitude and Quantitative Ability |
| V | | Professional Skills |
| V | | Interview Skills Training and Mock Test |
| VI | | Community Engagement |

## CREDIT DISTRIBUTION

| SEMESTER | AEC | DSC | OEC | RESEARCH | OTHERS | TOTAL |
|---|---|---|---|---|---|---|
| I | 17 | - | - | - | 02 | 19 |
| II | 17 | - | - | 01 | 04 | 22 |
| III | 17 | - | - | 02 | 02 | 21 |
| IV | 17 | - | - | - | 06 | 23 |
| V | 15 | 03 | - | 01 | 04 | 23 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| VI | 13 | 03 | 02 | 04 | 02 | 24 |
| TOTAL | 96 | 06 | 02 | 08 | 20 | 132 |

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Dean of Faculty
PRIST Deemed to be University
Thanjavur-613 403, Tamilnadu

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LIST OF MEMBERS

| S.NO | NAME OF THE MEMBERS | DESIGNATION | SIGNATURE |
|---|---|---|---|
| 1 | Dr. S. Gomati | PROFESSOR /ACADAMIC EXPERT | |
| 2 | Mrs. Devi | INDUSTRIAL EXPERT | |
| 3 | Dr.L.CHINNAPPA | DEAN OF ARTS AND SCIENCE | |
| 4 | Dr. P. PARTHIBAN | PROFESSOR | |
| 5 | Dr. M. JEROME ROZARIO | PROFESSOR | |
| 6 | Dr. D. SENTHILNATHAN | ASSOCIATE PROFESSOR | |
| 7 | Dr. J.S. NIRMALRAM | ASSOCIATE PROFESSOR | |
| 8 | Dr. R MANIKANDAN | ASSISTANT PROFESSOR | |
| 9 | Dr. D. CHINNARAJA | ASSISTANT PROFESSOR | |
| 10 | Dr. M. SURENDRA VARMA | ASSISTANT PROFESSOR | |
| 11 | Dr. A. JENIF D'SOUZA | ASSISTANT PROFESSOR | |
| 12 | Dr. N.V.PRABHU | ASSISTANT PROFESSOR | |
| 13 | Dr. J. THULASIDHASAN | ASSISTANT PROFESSOR | |
| 14 | Dr. C.R. SHANTHI | ASSISTANT PROFESSOR | |
| 15 | Dr. R. SHOPNA | ASSISTANT PROFESSOR | |
| 15 | Ms. V.ABARNA | ASSISTANT PROFESSOR | |

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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc CHEMISTRY – REGULATION 2020

COURSE STRUCTURE

**ACADAMIC YEAR 2022-2023**

M.Sc. Graduate Attributes

- Domain knowledge
- Investigative
- Critical thinking
- Resourceful and Responsible
- Effective Communication
- Ethical and Moral values

M.Sc. Programme Educational Objective – PEO

- PEO1-To demonstrate broad knowledge of descriptive Chemistry.
- PEO2-To impart the basic analytical and technical skills to work effectively in the various fields of chemistry.
- PEO3- To motivate critical thinking and analysis skills to solve complex chemical problems,
- e.g., analysis of data, synthetic logic, spectroscopy, structure and modeling, team-based
- problem solving, etc.
- PEO4-To demonstrate an ability to conduct experiments in the above sub-disciplines with mastery of appropriate techniques and proficiency using core chemical instrumentation and
- modern lab methods.
- PEO5-To demonstrate the ability to perform accurate quantitative measurements with an
- understanding of the theory and use of contemporary chemical instrumentation.

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experimental results, perform calculations on these results and draw reasonable, c conclusions.

PEO6-To develop skills in quantitative modeling of static and dynamic chemical sy

PEO7-To develop laboratory competence in relating chemical structure to spectro phenomena.

PEO8-To demonstrate the ability to synthesize, separate and characterize compou published reactions, protocols, standard laboratory equipment, and modern instru

M.Sc Programme Outcome –PO

- PO1-Think critically and analyze chemical problems.
- PO2-Present scientific and technical information resulting from laboratory experiment both written and oral formats.
- PO3-Work effectively and safely in a laboratory environment.
- PO4-Use technologies/instrumentation to gather and analyze data.
- PO5-Work in teams as well as independently.
- PO6-Apply modern methods of analysis to chemical systems in a laboratory setting.

M.Sc Course -C

C1-Organic Chemistry-I

C2-Inorganic Chemistry-I

C3-Physical Chemistry-I

C4-Research Led Seminar

C5-Organic Chemistry-II

C6-Inorganic Chemistry-II

C7-Physical Chemistry-II

C8-Research Methodology

C9-Participation in Bounded Research

C10-Organic Chemistry-III

C11-Inorganic Chemistry-III

C12-Physical Chemistry-III

C13- Participation in Scaffold Research

C14-Project Work

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PRIST Deemed University
Thanjavur - 613 403

M.Sc Curriculum Mapping

Programme Educational Objectives Vs Programme Outcome

| Programme Outcome-PO<br>Programme Educational Outcome - PEO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| PE01 | ✓ | | | | | |
| PE02 | | | | | | |
| PE03 | | ✓ | | | | |
| PE04 | | | ✓ | | | |
| PE05 | | | | | | |
| PE06 | | | | | ✓ | |
| PE07 | | | | ✓ | | |
| PE08 | | | | | | ✓ |

M.Sc Curriculum Mapping

Programme Outcome vs Courses Outcome

| Programme Outcome-PO<br>Courses Outcome-CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | | | * | * | | * |
| CO2 | | * | | * | * | * |

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| | | | | | | |
|---|---|---|---|---|---|---|
| CO3 | * | * | | | * | |
| CO4 | | | * | * | | * |
| CO5 | | | * | * | | * |
| CO6 | | * | | * | * | * |
| CO7 | * | * | | | * | |
| CO8 | | * | * | | * | |
| CO9 | * | * | | | * | * |
| CO10 | | * | * | * | | * |
| CO11 | | * | | * | * | |
| CO12 | * | * | | * | * | |
| CO13 | | * | * | * | * | |
| CO14 | | * | * | * | * | * |

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SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF CHEMISTRY
M.Sc CHEMISTRY – REGULATION 2020
COURSE STRUCTURE
**ACADAMIC YEAR 2022-2023**

| SEMESTER - I | | | | | |
|---|---|---|---|---|---|
| COURSE CODE | COURSE TITLE | L | T | P | C |
| 20214SEC11 | Organic Chemistry-I | 5 | 0 | 0 | 4 |
| 20214SEC12 | Inorganic Chemistry-I | 5 | 0 | 0 | 4 |
| 20214SEC13 | Physical Chemistry-I | 5 | 0 | 0 | 4 |
| 20214SEC14L | Organic Chemistry Lab-I | 0 | 0 | 5 | 2 |
| 20214SEC15L | Inorganic Chemistry Lab-I | 0 | 0 | 5 | 2 |
| 20214DSC16L | Discipline Specific Elective-I | 5 | 0 | 0 | 4 |
| 20214RLC17 | Research Led Seminar | - | - | - | 1 |
| | Total | 20 | - | 10 | 21 |

| SEMESTER - II | | | | | |
|---|---|---|---|---|---|
| 20214SEC21 | Organic Chemistry-II | 4 | 0 | 0 | 4 |
| 20214SEC22 | Inorganic Chemistry-II | 4 | 0 | 0 | 4 |
| 20214SEC23 | Physical Chemistry-II | 4 | 0 | 0 | 4 |
| 20214SEC24L | Organic Chemistry Lab-II | 0 | 0 | 5 | 2 |
| 20214SEC25L | Inorganic Chemistry Lab-II | 0 | 0 | 5 | 2 |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20114DSC56A | | 0 | 0 | 4 | 4 |
| | **PHARMACEUTICAL CHEMISTRY** | | | | |
| **Course Outline** | **UNIT-I: Physical properties in Pharmaceuticals:** Physical properties of drug molecule: physical properties.Refractive index- Definition, explanation, formula, importance, determination, specific & molar refraction. Optical activity\rotation- monochromatic & polychromatic light, optical activity, angle of rotation, specific rotation examples, measurement of optical activity. Dielectric constant & Induced Polarization- Dielectric constant explanation & determination.Rheology of pharmaceutical systems: Introduction, Definition, Applications, concept of viscosity, Newton's law offlow, Kinematic, Relative, Specific, Reduced & Intrinsic viscosity. Newtonian system, non-Newtonian system- Plastic flow, Pseudoplastic flow, Dilatent flow. Viscosity measurements- selection of viscometer for Newtonian and non-Newtonian system. | | | | |
| | **UNIT-II:Isotopic Dilution analysis:** principle andapplications, Neutron activation analysis: Principle, advantages and limitations,Scintilation counters.Body scanning.Introduction to radiopharmaceuticals.Properties of various types of radiopharmaceuticals, Radiopharmaceuticals as diagnostics, as therapeutics, for research and sterilization Physico Chemical Properties and drug action. Physico chemical properties of drugs (a) Partition coefficient, (b) solubility (c) surface activity, (d) degree of ionization. | | | | |
| | **UNIT-III: Drug dosage and product development:** Introduction to drug dosage Forms & Drug Delivery system – Definition of terms. Drug Regulation and control,pharmacopoeias, formularies, sources of drug, drug nomenclature, routes of administration of drugs products, need for a dosage form, classification of dosage forms. Drug dosage and product development. Introduction to drug dosage Forms & Drug Delivery system – Definition of terms. Drug Regulation and control,pharmacopoeias, formularies, sources of drug, drug nomenclature, routes of administration of drugs products, need for a dosage form, classification of dosage forms. | | | | |

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Dean (Academic Affairs)
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| | | |
|---|---|---|
| | **UNIT-IV:Development of new drugs:** Introduction,procedure followed in drug design, theresearch for lead compounds, molecular modification of lead compounds. Structure-Activity Relationship (SAR): Factorseffecting bioactivity, resonance, inductive effect,soterism, bioisosterism, spatial considerations,biological properties of simple functional groups,theories of drug activity, occupancy theory, ratetheory, induced-fit theory.4.3Quantitative structure activity relationship(QSAR): Development of QSAR, drug receptor interactions, the additivity of group contributions, physico-chemical parameters, lipophilicity parameters, electronic parameter, ionizationconstants, steric parameters, chelation parameters, redox potential, indicator-variables. | |
| | **UNIT-V:Computers in Pharmaceutical Chemistry:** Need of computers for chemistry. Computers for Analytical Chemists-Introduction to computers: Organization of computers. CPU, Computer memory, I/Odevices, information storage, software components. Application of computers in chemistry: Programming in high level language (C+) to handle various numerical methods in chemistry – least square fit, solution to simultaneous equations, [illegible] data smoothing, differentiation andintegrations. | |
| Extended Professional Component (is a part of internal component only. Not to be included in the external examination question paper) | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved<br>(To be discussed during the Tutorial hours) | |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills. | |

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| | | |
|---|---|---|
| **Recommended Text** | 1. Physical Chemistry- Bahl and Tuli.<br>2. Text Book of Physical Pharmaceutics, IInd edition, Vallabh Prakashan-.C.V.S. Subramanyam.<br>3. Medicinal Chemistry (Organic Pharmaceutical Chemistry), G.R Chatwal, Himalaya Publishing house.<br>4. Instrumental method of Analysis: Hubert H, Willard,7th edition.<br>5. Textbook of Pharmaceutical Chemistry by,Jayshree Ghosh, S. Chand & company Ltd.Pharmaceutical Chemistry by Dr. S. Lakshmi, Sultanchand & Sons. | |
| **Reference Books** | 1. Computers in chemistry, K.V. Raman, Tata Mc.Graw-Hill, 1993<br>2. Computers for Chemists, S.K Pundir, Anshu bansal, A pragate prakashan., 2 nd edition, New age international (P) limited, New Delhi.<br>3. Physical Pharmacy and Pharmaceutical Sciences by Martins, Patrick J. Sinko, Lippincott. William and Wilkins.<br>4. Cooper and Gunn's Tutorial Pharmacy ,6th edition by S.J. Carter, CBS Publisher Ltd.<br>5. Ansels pharmaceutical Dosage forms and Drug Delivery System by Allen Popvich and Ansel, Indian edition-B.I. Publication Pvt. Ltd. | |
| Website and e-learnieg source | https://www.ncbi.nlm.nih.gov/books/NBK482447/<br>https://training.seer.cancer.gov/treatment/chemotherapy/types.html | |

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| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | | | | | |

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| | | | | | |
|---|---|---|---|---|---|
| 20114DSC56B | Phytochemistry | 4 | 1 | 0 | 3 |
| Course Outline | **UNIT-I:Pharmacognosy and Standardization of Herbal drugs:** Introduction, definition, development classification and Source of Drugs: Biological, mineral, marine,and plant tissue cultures. Study of pharmacognosticof a crude drug. Biosynthesis: Shikimic acid pathway and acetate pathway. Systematic analysis of Crude drugs. Standardization of Herbal drugs WHO guidelines, Sampling of crude drug, Methods of drug evaluation. Determination of foreign matter, moisture Ash value. Phytochemical investigations-General chemical tests. | | | | |
| | **UNIT-II:Extraction Techniques:** General methods of extraction, types – maceration, Decoction, percolation, Immersion and soxhlet extraction.<br><br>Advanced techniques- counter current, distillation, supercritical gases, sonication, Micro waves assisted extraction. Factors affecting the choice of extraction process. | | | | |

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PRIST Deemed to be University
Vallam, Thanjavur - 613 403

Dean of Arts & Science
PRIST Deemed to be University
Thanjavur - 613 403, Tamilnadu

| | | |
|---|---|---|
| | **UNIT-III:Drugs containing Terpenoids and volatile oils:** Terpenoids: Classification, Isoprene rule, Isolation and separation techniques, General properties Camphor, Menthol, Eucalyptol. Volatile Oils or Essential Oils: Method of Preparations, Classifications of Volatile oils, Camphor oil, Geranium oil, Citral- Structure uses. Pentacyclic triterpenoids: amyrines, taraxasterol: Structure and pharmacological applications. | |
| | **UNIT-IV:Drugs containing alkaloids:** Occurrence,function of alkaloids in plants, pharmaceutical applications. Isolation, Preliminary Qualitative tests and general properties. General methods of structural elucidation. Morphine, Reserpine, papaverine - chemical properties,structure and uses. papaverine-structure, chemical properties and uses. | |
| | **UNIT-V:Plant Glycosides and Marine drugs:** Glycosides: Basic ring system, classification, isolation, properties, qualitative analysis. Pharmacological activity of Senna glycosides. Cardiacglycosides-Digoxin, digitoxin, Steroidal saponins glycosides-Diosgenin, hecogenin. Plant pigments: Occurrence and general methods of structure determination, isolation and synthesis of quercetin and cyanidin chloride.Marine drugs -Selected Drug Molecules. Cardiovascular active substances, Cytotoxic compounds, antimicrobial compounds, antibiotic compounds, Anti-inflammatory agents. Marine toxins. | |

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| | | |
|---|---|---|
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours) | |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills. | |
| **Recommended Text** | 1. Gurdeep R Chatwal (2016), Organic chemistry of Natural products, Volume I&II, 5th edition, Himalaya publishing House.<br>2. S.V.Bhat, B.A. Nagasampagi, M.Sivakumar (2014), Chemistry of Natural Products, Revised edition, Narosa Publishers. 1. Jeffrey B. Harborne (2012), Phytochemical methods: A Guide to Modern Techniques of Plant Analysis, 4th Vol. Joseph Kadi (2007), Pharmacognosy Sharma publications, 2nd edition, New age international (P) limited, New Delhi. | |
| Reference Books | | |

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 20114DSC56C | /Green Chemistry | 0 | 0 | 4 | 4 |

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| | | |
|---|---|---|
| Course Outline | **UNIT-I:Introduction to receptors:** Introduction, targets, Agonist, antagonist, partial agonist,Receptors, Receptor types, Theories of Drug – receptor Interaction, Drug synergism, Drug resistance, physicochemical factors influencing drug action. | |
| | **UNIT-II:Antibiotics:**Introduction, Targets of antibiotics action, classification of antibiotics, enzyme-based mechanism of action, SAR of penicillins and tetracyclins, clinical application of penicillins, cephalosporin.Current trends in antibiotic therapy. | |
| | **UNIT-III:Antihypertensive agents and diuretics:** Classification of cardiovascular agents, introduction to hypertension, etiology, types, classification of antihypertensive agents, classification and mechanism of action of diuretics, Furosemide, Hydrochlorothiazide, Amiloride. | |
| | **UNIT-IV:Antihypertensive agents and diuretics:** Classification of cardiovascular agents, introduction to hypertension, etiology, types, classification of antihypertensive agents, classification and mechanism of action of diuretics, Furosemide, Hydrochlorothiazide, Amiloride. | |
| | **UNIT-V: Analgesics, Antipyretics and Anti-inflammatory Drugs:** Introduction, Mechanism of inflammation, classification and mechanism of action and paracetamol, Ibuprofen, Diclofenac, naproxen, indomethacin, phenylbutazone and meperidine. Medicinal Chemistry of Antidiabetic Agents Introduction, Types of diabetics, Drugs used for the treatment, chemical classification, Mechanism of action, Treatment of diabetic mellitus. Chemistry of insulin, sulfonyl urea. | |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours) | |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills. | |

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| | |
|---|---|
| **Recommended Text** | 1. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry.<br>2. Wilson, Charles Owens: Beale, John Marlowe; Block, John H, Lipincott William, 12th edition, 2011.<br>3. Graham L. Patrick, An Introduction to Medicinal Chemistry, 5th edition, Oxford University Press, 2013.<br>JayashreeGhosh,AtextbookofPharmaceuticalChemistry,S.ChandandCo.Ltd,1999,1999 edn.<br>4. O.LeRoy,Natural andsyntheticorganicmedicinal compounds,Ealemi,1976.<br>5.S.AshutoshKar,MedicinalChemistry, WileyEasternLimited, NewDelhi,1993,New edn. |
| **Reference Books** | 1. Foye's Princles of Medicinal Chemistry, Lipincott Williams, Seventh Edition, 2012<br>2. Burger's Medicinal Chemistry, Drug Discovery and Development, Donald J. Abraham, David P. Rotella, Alfred Burger, Academic press, 2010.<br>3. WilsonandGisvold'sTextbookofOrganicMedicinalandPharmaceuticalChemistry,John M.BealeJrandJohnM. Block, Wolters Kluwer, 2011,12thedn.<br>4. P.Parimoo,ATextbookofMedicalChemistry,NewDelhi;CBSPublishers,1995.<br>5. S.Ramakrishnan,<br>K.G.PrasannanandR.Rajan,TextbookofMedicalBiochemistry,Hyderabad: OrientLongman 3rd edition,2001. |
| **Website and e-learning source** | 1. https://www.ncbi.nlm.nih.gov/books/NBK482447/<br>2. https://training.seer.cancer.gov/treatment/chemotherapy/types.html<br>3. https://www.classcentral.com/course/swayam-medicinal-chemistry-12908 |

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## SCHOOL OF ARTS AND SCIENCE
## DEPARTMENT OF CHEMISTRY

VALUE ADDED COURSE

**Academic year: 2022-2023**

Diploma Course on Water Resources, Management, and Water Pollution & Health

Aim; To provide an idea on Water Resources, Management, and Water

Pollution & Health

**Course learning outcomes:**

- The participants will learn about the importance of water resources.
- The participants will get insight into the water cycle.
- They will learn and understand the water pollution problem and its gravity.

**UNIT -1**

- Water cycle and water chemistry
- The water cycle, Properties of water.
- Tetrahedral chemistry of water.
- Physical Physico chemical characteristics water bodies.

**UNIT -2**

- Water resources and treatment
- Types of ware resources
- National drinking water policy.
- Drinking water treatment plants and various disinfection processes.
- Household treatment, Drinking water standards.

**UNIT -3**

- Water pollution
- Causes effect and control measures of water pollution.
- Pollution control standards, WHO standards of drinking water.
- Waterborne diseases. Microbial contamination of water types, sources, threats.

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- Microbial standards of drinking water, MPN.

**UNIT -4**

- Water conservation and water pollution acts in India.
- Water conservation: Ice stupa artificial glacier by Sonam Wangchuk.

**UNIT -5**

- Rainwater harvesting.
- Watershed Management: Classification, Objective ,Advantages and Disadvantages.

**References**

1) Water Q&A: Why is water the "universal solvent"?". Water Science School. United States Geological Survey, U.S. Department of the Interior. 20 June 2019. Archived from the original on 6 February 2021. Retrieved 15 January 2021.

2) 10.2: Hybrid Orbitals in Water". Chemistry LibreTexts. 18 March 2020. Archived from the original on 30 July 2022. Retrieved 11 April 2021.

3) Environmental Health Education Program. Cambridge, MA: Harvard T.H. Chan School of Public Health. July 23, 2013. Archived from the original on September 18, 2021. Retrieved September 18, 2021.

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## SCHOOL OF ARTS AND SCIENCE
## DEPARTMENT OF CHEMISTRY

| Branch name | Year | Course offered |
|---|---|---|
| Chemistry | III BSc | Crystallization and Chromatography Techniques |

### VALUE ADDED COURSE
Academic year: 2022-2023

Diploma Course on Crystallization and chromatography techniques

**Aim:**

To introduce students to Crystallization and chromatography techniques.

**Objectives:**

To inculcate concepts of thin layer and column identification and validation.

To understand techniques in Phenotypic screening and target deconvolution.

To increase the employability of the students.

To educate about then-layer column Chromatographic techniques of novel biologically active compounds.

**Course Outcomes**

At the end of the course, students will be able to turn

to understand methods of crystallization

Explain the principles and techniques of column and thin-layer chromatography techniques.

Purify the compounds by crystallization technique.

Analyse and detect the sample thin-lawyer chromatography

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Separate the isomers of a compound by column chromatography technique **Unit –**

**Crystallization**

Principle, Methods of recrystallization Melt crystallization, Suspension crystallization; solvents for recrystallization, Precipitation, Nucleation, Supersaturation, Common challenges in crystallization. Processes involved in crystallization, and applications.

**Unit-II**

**Chromatography Techniques**

Chromatography – Adsorption, Partition chromatography. Column Chromatography - Principle, Adsorbants, developers, solvents, columns, packing of the columns, elution, eluting solvent selection-polar and non-polar; Applications.

Thin Layer chromatography – Principle, Rf, preparation of chromatophores application of sample on the chromatophores choice of adsorbents, selection of solvent, locating reagents, developing chamber, development of chromatogram and Applications.

**Unit-III Practical**

**Crystallization of simple compounds**

Zinc oxide, Copper sulfate, Sodium acetate, Sodium Chloride, Potash alum, Phthalic acid, Benzoic acid, Acetyl salicylic acid, Urea ,and Sugar

**Unit – IV Practical**

**Thin Layer Chromatography**

Separation of Mixture of benzophenone and naphthalene

Separation of Mixture of 2-nitrophenol and 4-nitrophenol

Separation of Mixture of Diphenylamine, Benzophenone and Naphthalene Separation of Mixture of Azobenzene, Hydroxyazobenzene and p-aminoazobenzene

**Unit – V Practical**

**Column Chromatography**

Separation of KMnO4 and K2Cr2O7 Isolation of 2-nitrophenol and 4-nitrophenol

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## SCHOOL OF ARTS AND SCIENCE
## DEPARTMENT OF CHEMISTRY

VALUE ADDED COURSE

**Academic year: 2022-2023**

Diploma Course on Molecular Structure Drawing Tool

**Aim:**

- To introduce students to molecular structure and biological evaluation of novel biologically active compounds.

**Objectives:**

To inculcate concepts of molecular structure target identification and validation.

To understand techniques in Phenotypic screening and target convolution.

To increase employability of the students.

To educate about role of molecular structure of novel biologically active compounds

**Course Outcomes:**

At the end of this unit, you will be able to:

- Understand the software used in chemistry
- Perform the Manipulations of Selected Objects
- Apply the chemdraw software to draw the different systems
- Generate the IUPAC and physical properties of organic compounds

Predict resonance spectral data of chemical structures.

**UNIT-I: Molecular Structure Drawing Tool**

ChemDraw - Introduction, Installation, Drawing molecular structures - structuretypes, drawing the framework of a structure, Drawing Bonds of Different Types Changing Bond Types, Introducing Atom Labels.

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**UNIT-II: Manipulations with Selected Objects**

Manipulations with Selected Objects- Select Objects, Move Objects, Copy Objects, Rotate and Mirror Objects, Stretch/Shrink/Scale Objects, Structure Perspective, Join Objects.

**UNIT-III: ChemDraw-Practical I**
**Drawing of molecules - acyclic, cyclic, heterocyclic and bicyclic systems**

- Analysis of molecules - formula, exact mass and elemental analysis
- Graphical representation of reaction scheme

UNIT-IV: ChemDraw-Practical II

- Chemical structures to IUPAC names
- IUPAC naming to chemical structures
- 2D structures into 3D structures
- Prediction of boiling point, melting point, critical temperature, critical pressure, critical volume and heat of formation.

**UNIT-V: ChemDraw-Practical III**

**Prediction of 1H NMR & 13C NMR of following compounds:**

Ethanol, Ethyl methyl ketone, Cycloheptonone, Pyridine and α-napthol

**Text Books:**

Dr. Stefan Bienz Short Manual to the Chemical Drawing Program ChemDraw University of Zurich I-V

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# DEPARTMENT OF CHEMISTRY

## VALUE ADDED COURSE

SOIL AND WATER CHEMISTRY

**Course Outcomes:**

At the end of the course students will be able to
CO1: Understand the composition of soils
CO2: Infer the optimal growth conditions for plants
CO3: Analyze the soil quality
CO4: Categorize the types of water and sources of water pollution
CO5: Interpret the quality of water

**UNIT-I**

**Properties of Soil**
Soil- definition, composition, types. Soil pH- importance of soil pH on plant growth, saline, alkaline and acidic soils, reclamation of acidic and alkaline soils. Fertilizer – definition, classification, role of fertilizers on plant growth, adverse effects. Soil for banana, cotton, ground nut, sugar cane, paddy and maize cultivation.

**UNIT-II**

Water: types of water- hard and soft water, types of hardness-temporary and permanent, softening of water, water pollution-causes and remedial measures. Water quality parameters-hardness, pH of water, electrical conductivity, turbidity, TDS, DO, BOD, COD- standards and limits (WHO and BIS)

**UNIT-III**

**Soil Testing Practical -I**
Determination of soil pH, electrical conductance and turbidity by soil analyzer kit

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**UNIT-IV**

**Soil Testing Practical -II**

Determination of Na, K and Ca in soil by flame photometer

**UNIT-V**

**Water Quality Analysis -Practical**

Determination of water pH, electrical conductivity, turbidity, TDS and DO. Preparation of a comparative report of standard values (WHO & BIS) and experimental values.

**Text Books:**

| S. No | Author | Book | Edition | Publisher Details | Year | Units Covered |
|---|---|---|---|---|---|---|
| 1. | L. Bhattacharya | Text Book of Soil Chemistry | 1th Edition | Discovery Publishing House, New Delhi | 2019 | I, III & IV |
| 2. | R L Arya And Khalil Khan | Fundamentals of Soil Science | 1th Edition | Scientific Publishers, Jodhpur | 2020 | I, III & IV |
| 3. | James Edzwald | Water Quality and Treatment | 4th Edition | McGraw Hill Inc, New York | 1990 | II & V |

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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF CHEMISTRY

| Branch name | Year | Course offered |
|---|---|---|
| BSC / PHYSICS 22416NH | III BSc | Mathematical Tools and use of Application Software in Chemistry |

## Mathematical Tools and use of Application Software in Chemistry

Course Objectives:

The course aims to impart analytical, numerical, computational and technical skills on the relevant field of Chemistry for facilitating employability in academia and industries

**Unit 1**

Mathematical Tools: Coordinate geometry: Cartesian and polar coordinate systems and their interconversion.

Preliminary idea about complex number and complex variable.

Vectors and Matrices: Vectors, preliminary idea of vector space, matrix algebra, matrix inversion, matrix eigenvalue and eigenvector, solution of simultaneous algebraic equation with more than two unknowns.

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Elementary analytical methods to solve differential equations.

Functional Series and Integral Transforms: Fourier transform, Laplace transform,

Power series method for differential equations (Hermite, Legendre, Laguerre differential equations)

**Unit 2**

Mathematica and Matlab: Introduction to Mathematica and Matlab for symbolic computation

of simple algebra and numerical mathematics.

Evaluating and plotting mathematical functions, solving algebraic equations, solving simultaneous equations, differentation, integration, integral transform, series, solving differential equations (ODE & PDE), performing matrix algebra, curve fitting.

**Unit 3**

LATEX: Introduction of LATEX, downloading and installing TeXstudio or TeXmaker, writing

equations, making tables, inserting figures and references.

BibTeX: Managing and citing references in LATEX typesetting system.

Course learning outcome: After the completion of the course, the students should be able

to

1. Perform analytical calculations of the mathematics involved in the elementary physical

chemistry.

2. Use Mathematica and Matlabsoftwares to perform algebraic and numerical calculation

and visualize mathematical functions by plotting graphs relevant to the topics of physical

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chemistry like chemical kinetics, thermodynamics, quantum chemistry etc.

3. Write scientific documents using the typesetting platform LATEX.

**Unit 4**

Origin and SciDAVis: Introduction of origin and SciDAVis, GNU plot, drawing various 2D &

3D plots, data analysis, statistics, signal processing, curve fitting, peak analysis, conversion of

graph to various file format like JPEG,GIF,EPS.

**Unit 5**

ChemDraw and ChemSketch: Introduction of ChemDraw, chemical name to structure

conversion, chemical structure to name conversion, mass spectrum simulation, NMR spectrum

simulation (both 1H NMR &13C NMR), structure clean up, 3D chemical structure, export to

SVG,PDF, TIFF.

Introduction to ChemSketch, molecular modelling, creating and modifying images of chemical

structures, writing and performing chemical equations and diagrams.

**Course learning outcome:**

After the completion of the course, the students should be able to

1. Use of software relevant to chemistry, scientific graph plotting and data analysis.
2. Apply ChemDraw and ChemSketchsoftware for molecular modelling, writing structures

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and chemical equations.

3. Operate various Quantum Chemical and Docking software, analyze and interpret the results obtained by calculation to rationalize experimental outcomes or even making testable prediction.

4. Understand the crystal structure and bonding in molecule. They would learn to organize
references in an article.

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1) **Quantum Chemistry(20114DSC56B),**

UNIT-I Quantum Chemistry-I Quantum mechanical operators, Postulates of quantum mechanics, Schrödinger equation and its application to particle in one-dimensional box (complete solution) - quantization of energy levels, zero-point energy, normalization of wave functions, probability distribution functions, nodal properties.

UNIT-II Extension to three-dimensional boxes, separation of variables, degeneracy. Qualitative treatment of simple harmonic oscillator model of vibrational motion: Setting up of Schrödinger equation and discussion of solution and wave functions. Vibrational energy of diatomic molecules and zero-point energy. Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

UNIT-III Rigid rotator model of rotation of diatomic molecule: Schrödinger equation, transformation to spherical polar coordinates. Separation of variables (Preliminary treatment). Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration.

UNIT-IV Chemical Bonding Chemical bonding: Covalent bonding, valence bond and molecular orbital approaches, LCAOMO treatment of H2 + . Bonding and antibonding orbitals. Qualitative extension to H2. Comparison of LCAO-MO and VB treatments of H2 (only wave functions, detailed solution not required) and their limitations. Localized and non-localized molecular orbitals treatment of triatomic (BeH2, H2O) molecules. Qualitative MO theory and its application to AH2 type molecules.

UNIT-V Spectroscopy-I Interaction of electromagnetic radiation with molecules and various types of spectra; BornOppenheimer approximation. Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

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2) Stereochemistry and Reaction Mechanism (20114DSC56C),

Course Content:

UNIT – I Stereochemistry 20 L Chirality: Stereogenic unit: Center of chirality, axis of chirality, plane of chirality and helicity. Stereochemistry of - allenes, spirans, biphenyls, cyclophanes, ansa compounds, trans-cyclooctene, helicenes, benzphenanthrenes. Configurational nomenclature; Stereochemistry of compounds containing nitrogen, sulphur and phosphorus.

UNIT – II

Topicity and Prochirality: Topicity of ligands and faces. Diastereotopic ligands and NMR spectroscopy. Chemical reactivity of heterotropic ligands and faces with chiral and achiral reagents. Resolution of racemates. Stereoselectivity and stereospecificity: Kinetic and thermodynamic controls, asymmetric induction, chiral auxiliary, diasterectopic induction, Principles of asymmetric synthesis, Cram's rule, Felkin's model, Prelog's rule. Conformational analysis of cycloalkanes: Cyclohexane, mono-substituted cyclohexanes; disubstituted cyclohexanes, effect of conformation on reactivity. Decalins. Conformational analysis of sugars. Anomeric effect.

UNIT – III Reaction Mechanism 25 L Structure and reactivity: Ambident electrophiles and nucleophiles; Hard and soft concept. Acidity and basicity: Different concepts. Controlling structural factors, Methods of determining reaction mechanism: Kinetic and non-kinetic methods, Hammet and Taft equations. Reactive intermediates: Nonclassical carbocations; Carbenes, nitrenes, – Generation, structure, reactons Nucleophilic substitution reactons: Recapitulation of SN1, SN2 ,SNI reactions with stereochemistry.

UNIT – IV SNcA and SN' reactions, Nucleophilic substitutions at sp2 hybridized carbon and aromatic ring, including vicarious substitution. Factors affecting reactivity. Neighbouring group participation Elimination reactions: E1, E2 and E1cB mechanisms. Orientation in elimination reactions; Reactivity

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UNIT – V Effect of substrate, base, leaving group, medium. Pyrolytic elimination reactions. Addition to carbon–carbon multiple bonds. Additions involving electrophiles and free radicals: Mechanism, reactivity, orientation and stereochemistry, regio- and chemo-selectivity.

Course outcome:

To be able to predict, identify and distinguish between various types of stereogenic units present in the molecules.

Gains preliminary knowledge of NMR spectroscopic technique.

To be able to predict major/minor stereoisomers in a given asymmetric reaction.

At the end of the course, the student should be able to propose/write a mechanism for a given organic reaction.

To be able to design experiments to determine reaction intermediates/mechanisms.

3) **Molecular Spectroscopy (20114DSC56D),**

Course Objectives: To provide basic knowledge of molecular spectroscopy, partition function, ionic atmosphere and collision theory.

Unit I

Molecular Spectroscopy (M=14) Molecular spectroscopy: Introduction, elementary idea about spectroscopic instrumentation, spectral broadening. Electromagnetic spectrum and molecular processes associated with the regions.

Unit II

Rotational spectra of polyatomic molecules: classification of molecules into spherical, symmetric and asymmetric tops; linear triatomic molecules. Non-rigid rotor. Elementary idea of Stark effect. Anharmonic oscillator and dissociation.

Unit III

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Elementary idea of Born-Oppenheimer approximation. Vibration rotation spectra for diatomic molecule. Rotationalvibrational coupling. Raman spectra: classical theory of Raman scattering, concept of polarizability ellipsoid.

Unit IV

Statistical mechanics- I (M = 12) Probability, thermodynamic probability and entropy, Maxwell-Boltzman statistics, Partition function; translational (for ideal gas - concept of thermal wavelength), rotational, vibrational and electronic partition functions (diatomic molecule); molecular and molar partition function, Qualitative idea of Quantum statistics (Bose-Einstein, Fermi-Dirac statistics);

Unit V

Thermodynamic probability and distribution formula (without derivation), comparison with classical statistics - distinguishability and indistinguishability of identical particles. Application: Theory of specific heat of solids – Einstein's and Debye's pictures

4) **Mathematical and Computational Methods in Chemistry (20U14DSC56E),**

Unit I Mathematical Review of Classical Mechanics: Lagrangian Formulation, Hamiltonian Formulation: Poisson Brackets and Canonical Transformations Classical approach to Ensembles:

Unit II Ensembles and Phase Space, Liouville's Theorem, Equilibrium Statistical Mechanics and it's ensembles Partition Function: Review of rotational, vibrational and translational partition functions.

Application of partition functions to specific heat of solids and chemical equilibrium. Real gases.

Unit III Elementary Probability Theory: Distributions and Averages, Cumulants

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and Fluctuations, The Central Limit Theorem Distributions & Fluctuations: Theory of Ensembles, Classical and Quantum, Equivalence of Ensembles, Fluctuations of Macroscopic Observable

Unit IV Basic Thermodynamics: Review of Concepts, The Laws of Thermodynamics, Legendre Transforms, The Maxwell Relations, The GibbsDuhem Equation and Extensive Functions, Intensive Function

Unit V Bose-Einstein distribution: Einstein condensation, Thermodynamic properties of ideal BE gas. Fermi-Dirac distribution: Degenerate Fermi gas. Electron in metals. Magnetic susceptibility.

Transactional Modes: Lecture;

Tutorial; Problem solving; Self-learning. Suggested Readings

1. K. Haung (2008). Statistical Mechanics, Wiley.
2. R. K. Pathria and P. D. Beale, (2011). Statistical mechanics, Elsevier.
3. D. A. Mcquarrie, (2018). Statistical Mechanics, Viva Books.
4. D. Chandler, (1987). Introduction to Statistical Mechanics, Oxford University Press.
5) Spectroscopic MethodsAnalysis(2011)DSC668).

Learning Outcomes:

At the end of the course, the students will be able to: gain the knowledge about various spectroscopic techniques, such as, electronic, microwave, vibrational, raman, nuclear magnetic resonance, and laser spectroscopy understand, how spectroscopic transitions come into picture in molecular quantum mechanics learn various spectroscopic selection rules and their applications Course Content

Unit I

Atomic Spectra: Revision of quantum numbers, electron configuration, Hund's rule etc. origin of spectral lines, LS & JJ coupling , selection rules, Spectrum of hydrogen,

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helium and alkali atoms, X-ray spectra, fine spectra, hyperfine structure, Width of spectrum lines.

Unit II 11 hours Molecular Spectra: Molecular potential, Separation of electronic and nuclear wave functions, Born-Oppenheimer approximation, Electronic, Vibrational and rotational spectrum of diatomic molecules, Selection rules, FrankCondon principle.

Unit III

Molecular Spectroscopy: Microwave and Infrared spectroscopy of di- and polyatomic molecules, normal coordinates and their symmetry ($CO_2$), FT-IR instrumentation

Unit IV

Raman Effect, rotational and rotation- vibrational Raman transitions, nuclear spin effects, polarization of Raman lines. Vibrational spectroscopy of diatomic molecules, Franck-Condon factor, rotational fine structure.

Transactional Modes: Lecture; Tutorial; Problem solving; Self-learning. Suggested Readings

1) J. M. Hollas, (2004) Modern Spectroscopy, John Wiley & Sons, Ltd.,
2) G. M. Barrow, (1962) Introduction to Molecular Spectroscopy, McGraw-Hill.
3) C. N. Banwell and E.M. Mc Cash, (1994) Fundamentals of Molecular Spectroscopy, Tata McGraw Hill, New Delhi.
4) L.R. Lakowicz, (2006) Principle of Fluorescence Spectroscopy 3rd Edition, Springer.
5) A. Carrington and A. D. Mc Lachlan, (1979) Introduction to Magnetic Resonance Chapman and Hall, London.
6) R. K. Harris, (1986) Nuclear Magnetic Resonance Spectroscopy, Addison Wesley, Longman Ltd, London.
7) C.J. Foot, (2005) Atomic Physics (Oxford University Press, Oxford, U. K.

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6) **Bioinorganic of Chemistry (20114DSC66C),**

1) UNIT 1 : Bioinorganic chemistry: general introduction and prospects. Metals in biology: Natures selection
2) UNIT 2 : Design principles used in chemical biology: some noteworthy examples
3) UNIT 3 : Life with oxygen
4) UNIT 4 : Metals in medicine
5) UNIT 5 : significantly in recent years and lies at a natural juncture between chemistry, biology, and medicine. This rapidly expanding field probes fascinating questions about the uses of metal ions in nature.

**Books and references**

1. Bioinorganic Chemistry by Bertini, Gray, Lippard and Valentine •
2. Principles of Bioinorganic Chemistry by Lippard and Berg •
3. Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life by Kaim and Schwederski •
4. Biological Inorganic Chemistry by R. R. Crichton

7) Methods in Organic Synthesis (20114DSC66D),

Course/Paper - : Methods in Organic Synthesis

UNIT - I Aromatic substitution reactions - electrophilic, nucleophilic and through benzynes - radical substitution of arenes - orientation of nucleophilic substitution at a saturated carbon, SN1, SN2, SNi reactions -effect of structure, nucleophile, leaving group, solvent. Additions involving electrophiles, nucleophiles and free radicals. , Elimination reactions - E1, - E1CB, E2 reactions – elimination versus substitution reactions.
UNIT - II Mechanism of some name reactions: Aldol, Perkin, Benzoin, Cannizaro, Wittig, Grignard, Reformatsky - Meerwein, Hoffmann Claisen and Favorsky rearrangements. Hydroboration - oppenauer oxidation, clemmensen reduction - Meerwein - Pondorf and verley and Birch reductions. Stork enamine reactions, Michael addition, Mannich Reaction, Diels - Alder reaction, Ene - reaction, Bayer - Villiger Reaction.
UNIT - III Spectra and structure - application of organic spectroscopy UV, IR, 1

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HNMR and Mass spectral data.

UNIT - IV Isolation, structure elucidation and synthesis of alkaloids; atropine, nicotine, and quinine. Purines - Caffeine configuration and ring structures of glucose and fructose, anomeric effects.

Text books:

1) Organic Chemistry Vol. I (Sixth Edn.) and Vol. II (Fifth Ed.,) by IL finar ELBS.
2) Organic Chemistry (fifth Edn.,.) by Morrison and Boyd, PHI, India.
3) Organic Chemistry (fifth edition)by Francis A. Carey Tata Mc Graw Hill publishing company Limited, New Delhi.
4) Reaction Mechanism in Organic Chemistry by Mukherjee Sirigh, NTemitarr, Indiar
5) A guide book to mechanism in Organic Chemistry by Peter Sykes, ELBS.

Chemical Thermodynamics (20114DSC66E),

UNIT-I

Thermodynamics and the Chemical Industry

UNIT-II

Equilibrium and Extrema in work

UNIT-III

Heat-Work Interconversion Device

UNIT-IV

Chemical potentials in gas and condensed phases

UNIT-V

Liquid-liquid equilibria/ Reaction Equilibria

TEXT BOOKS

1) Smith, J.M. and Van Ness, H.C., ' Introduction to Chemical Engineering Thermodynamics', McGraw Hill (1975). This is the most comprehensive book. The subsequent editions of this book (6th and 7th) have an additional

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author,M.M.Abbott and some additional topics, that are not normally part of an undergraduate course.

2) Denbigh,K., 'The Principles of Chemical Equilibria with Applications in Chemistry and Chemical Engineering', Cambridge University Press (1968). This book has the best exposition of concepts. It has no explicit treatment of open systems

8) Environmental Chemistry, Basic Concepts of Quantum Chemistry (20214DSC16B),

UNIT-I

The Multidisciplinary nature of environmental studies Definition, scope and importance. (2 lectures) Need for public awareness

UNIT-II

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

UNIT-III

Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers Energy flow in the ecosystem Ecological succession.

UNIT-IV

Biodiversity and its conservation Introduction – Definition : Genetic, species and ecosystem diversity Biogeographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values

UNIT-V

Environmental Pollution Definition Causes, effects and control measures of : a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Noise pollution f. Thermal Pollution g. Nuclear hazards

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.

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2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad
-
380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment
&
Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History
Society,
Bombay (R)

9) Chemical Kinetics(20214DSC16C).

Unit -1: Solutions

- Raoult's law.
- Colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass.
- Solutions, Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions.
Van't Hoff factor.

Unit -2: Electrochemistry

- Redox reactions, EMF of a cell, standard electrode potential
- Nernst equation and its application to chemical cells
- Relation between Gibbs energy change and EMF of a cell

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- Kohlrausch's Law
- Electrolysis and law of electrolysis (elementary idea)
- Dry cell-electrolytic cells and Galvanic cells
- Conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration.
- Lead accumulator
- Fuel cells

Unit -3: Chemical Kinetics

- Rate of a reaction (Average and instantaneous)
- Rate law and specific rate constant
- Integrated rate equations and half-life (only for zerfirst-order order reactions)
- Concept of collision theory (elementary idea, no mathematical treatment)

Unit -4: Chemical Kinetics-2

- Factors affecting rate of reaction: concentration, temperature, catalyst;
- Order and molecularity of a reaction
- Activation energy
- Arrhenius equation

- Lanthanoids- Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.
  Actinoids- Electronic configuration, oxidation states and comparison with lanthanoids
  General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first-row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, color, catalytic property, magnetic properties, interstitial compounds, alloy formation, preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$.
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10) Organometallic Chemistry(20214DSC16D),

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UNIT 1 Organometallics, catalysis and spectroscopy

UNIT 2 Photochemistry, Pericyclics and Rearrangements

UNIT 3 Quantum Chemistry and Molecular Spectroscopy

UNIT 4 Physical methods in Chemistry

UNIT 5 Advanced Physical Chemistry Laboratory

11) Aromaticity(20214DSC16E),

of UNIT-I Advanced Stereochemistry: Configuration - conformation cycloalkanes, conformation and reactivity -stereochemistry of allenes, spiranes, biphenyls, molecules with chiral planes, Topicity stereoselective and stereospecific reactions - enantioselective reactions - double stereo differentiation,asymmetric synthesis, chiral auxiliaries, chiral catalysts and reagents.

UNIT-II Introductory physical organic chemistry: Thermodynamic stability – general relationship between thermodynamic stability and reaction rates – electronic substituent effects on reaction

UNIT-III intermediates – kinetic isotope effects – linear free energy relationships – principles of microscopic reversibility – substituent effects – solvent and solvent effects – methods of determination of reaction mechanism.
UNIT- IV Aromaticity: Criteria of aromaticity - Craig's rule – non-benzenoid aromatic compounds – anti-aromaticity, homo aromaticity – fused-ring systems – hetero aromatic systems. Nucleophilic aromatic substitution reactions – VNS - transition metal-catalyzed aromatic substitution reactions – aromatic substitution reactions involving radical intermediates.

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UNIT- V Advanced Heterocycles: Nomenclature, heterocyclics with two hetero atoms – fused five and six membered heterocyclics – preparation and reactions of indole, quinoline, isoquinoline and carbozole.

Prescribed books:

a. Nasipuri, D., Stereochemistry of Organic Compounds: Principles and Applications, 4 th edition, New Academic Science Publisher, 2012.
b. Eliel, E. L., and Wilen, S. H. Stereochemistry of Organic Compounds, Wiley, 1994.
c. F.A.Carey and R.J.Sundberg, Advanced Organic Chemistry, Part A: Structure and Mechanisms, 5thedition, 2007.
d. Heterocyclic Chemistry- J. A. Joule, K. Mills, G. F. Smith, Blackwell publishing Ltd, 5th edition, 2010.

12) Special Topics in Chemistry, Molecular Modelling and Drug Design (20214DSC26B).

MOLECULAR MODELLING & DRUG DESIGN

Objectives of the Course : The main goal of this course is to gain some knowledge on modern approaches used in molecular modeling, powerful computer-based technology used to identify and design molecules for new medications greatly shortening the discovery phase of drug development by powerful computer-based technology.

UNIT - I : Quantum mechanics & concepts in molecular modeling : Introduction – coordinate systems – potential energy surfaces – introduction to quantum mechanics – postulates – Schrodinger wave equation – hydrogen molecule – Born-Oppenheimer approximation, introduction to computer hardware and software.

Unit II: Molecular mechanics and energy minimization: Empirical force field models – Bond stretching – angle bending – torsional term – nonbonding interactions – thermodynamics properties using a forcefield – derived and non derived energy minimization method – simplex – sequential univariate method – steepest descent method – conjugate gradient method- Newton-Rapson method.

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Unit III: Molecular Dynamics and Monte Carlo simulation : ) Introduction – Using single Model – time steps – Multiple steps – Setting up MD – energy conservation in MD Simulation Examples – Monte Carlo – Random number generation – Difference in MD & MC.

Unit IV: Homology modeling: Comparative modeling of proteins – comparison of 3D structure – Homology – steps in homology modeling – tools – databases – side chain modeling – loop modeling.

Unit-V: Drug design: General approach to discovery of new drugs - lead discovery – lead modification – physiochemical principles of drug action – drug stereo chemistry – drug action - 3D database search – computer aided drug design – docking - molecular modeling in drug design – structure based drug design – pharmacophores - QSAR.

TEXT BOOKS:

1. A. R.Leach - Molecular Modeling Principles and Application, 2nd edition, Longman Publications, 1996
2. D. Baxevanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiely Indian Edition, 2001

REFERENCE BOOK:

3. T K Attwood, D J parry-Smith, Introduction to Bioinformatics, Pearson Education, 1st Edition, 11th Reprint 2005

13) Pericyclic Reactions(20214DSC26C),

Pericyclic reactions

UNIT-1 Aliphatic Nucleophilic Substitution Mechanisms Nucleoyhilic substitution: Substitution reactions of ambident nucleophiles, neighbouring group

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participation of O, S, N, halogens, aryl groups, alkyl and cycloalkyl groups in nucleophilic substitution reactions. Sigma, Pi bond participation in acylic and bicyclic systems (Non- classic carbocations)' Substitution at allylic, trigonal and Vinylic carbons, hydrolysis of esters, Meyer's aldehydes, ketones and carboxylic acids, alkylation with triakyl boranes. Aliphatic Electrophilic substitutions: SE1 SE2 and SEi mechanisms hydrogen exchange, migration of double bonds, halogenation of aldehydes, ketones, acids, acylhalides sulphoxides and sulphones, aliphatic diazonium coupling, nitrosation at Carbon and nitrogen diazo transfer reaction carbene and nitrene insertion, formation of sulphur yield, metalation with organometallic compounds and with metals. Decarboxylation of aliphatic acids. UNIT-II Aromatic and Heteroaromatic substitution: A general introduction to different mechanisms of aromatic substitution SN Ar, AN and aryne Von richter rearrangement, sommlet, Hauser rearrangement Smiles rearrangement. Radical substitution Mechanism: Reaction at Sp3 carbon: Reactivity in aliphatic substrates reactivity at bridged position, reactivity at Sp2 carbon. Reactivity in aromatic substrates, neighbouring group assistance in free radical reactions, effect of reactivity in the attacking radical effect of solvent on reactivity halogenation at an alkyl carbon and allylic carbon, hydroxylation at aromatic carbon by means of Fenton's reagent, oxidation of aldehydes to carboxylic acids, formation of cyclic ethers with Pb(OAC)4 Reed reaction, sandmayer reaction, kolbe reaction and Hunsdiecker reaction.

UNIT-III Molecular orbital symmetry, frontier orbitals of ethylene, 1,3 Butadiene, 1,3,5- Hexatriene; allyl system, classification of pericyclic reactions FMO approach, Woodward- Hoffman correlation diagram method and perturbation of molecular (PMO) approach for the explanation of pericyclic reactions under thermal and photochemical conditions. Electrocyclic Reactions: Conrotatory and disotatory motions (4n) and (4n+2), allyl systems and secondary effects. Cycloadditions: Antarafacial and suprafacial additions, notation, of cycloadditions, (4n) and (4n+2) systems with a greater emphasis on (2+2) and (4+4) - cycloadditions, (2+2) - additions of ketones secondary effects of substitutes on the rates of cycloadditions and chelotropic reactions.

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UNIT-IV FMO approach and perturbation of molecular (PMO) approach for the explanation of sigma tropic rearrgements under thermal and photochemical conditions, suprafacial and antarafacial shifts of H Sigmatropic shift involving carbon moieties, retention and inversion of configurations, (3.3) and (5.5) sigmatropic rearrangements detailed treatment of Claisen and Cope rearrangements fluxional tautomerism, aza-Cope rearrangem'ents and Barton reaction.

Reference Books:

1) Advanced Organic Chemistry: Reactions Mechani;sms and Structure by Jerry March, Mc.Graw Hill and Kogakush.
2) Molecular reactions and Photochemistry by Charles Dupey and O. Chapman, Prentice Hall.
3) Pericyclicreactions by S.N. Mukharji, Mcmilan.

14) Inorganic Materials of Industrial Importance(20214DSC26D).

Objectives:

The course introduces learners to the diverse roles of inorganic materials in the industry. It gives an insight into how these raw materials are converted into products used in day to day life. Students learn about silicates, fertilizers, surface coatings, batteries, engineering materials for mechanical construction as well as the emerging area of nano-sized materials. The course helps develop the interest of students in the frontier areas of inorganic and material chemistry.

Learning Outcomes:

By the end of the course, the students will be able to:

• Learn the composition and applications of the different kinds of glass. • Understand glazing of ceramics and the factors affecting their porosity.

• Give the composition of cement and discuss the mechanism of setting of cement. • Explain the suitability of fertilizers for different kinds of crops and soil.

• Explain the process of formulation of paints and the basic principle behind the protection

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offered by the surface coatings. • Explain the principle, working and applications of different batteries.

• List and explain the properties of engineering materials for mechanical construction used in day to day life.

• Explain the synthesis and properties of nano-dimensional materials, various semiconductor and superconductor oxides.

Unit 1 Silicate Industries Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, different types of safety glass, borosilicate glass, fluorosilicate glass, coloured glass, photosensitive glass, photochromic glass, glass wool and optical fibre. Ceramics: Brief introduction to types of ceramics, glazing of ceramics. Cement: Manufacture of Portland cement and the setting process, Different types of cements: quick setting cements, eco-friendly cement (slag cement), pozzolana cement.

Unit 2: Fertilizers: Different types of fertilizers (N, P and K). Importance of fertilizers, chemistry involved in the manufacture of the following fertilizers: urea, ammonium nitrate, calcium ammonium nitrate, ammonium phosphates, superphosphate of lime, potassium chloride and potassium nitrate.

Unit 3: Surface Coatings: Brief introduction to and classification of surface coatings, paints and pigments: formulation, composition and related properties, pigment volume concentration (PVC)and critical pigment volume concentration (CPVC), fillers, thinners, enamels and emulsifying agents. Special paints: heat retardant, fire retardant, eco-friendly paints, plastic paints, water and oil paints. Preliminary methods for surface preparation, metallic coatings (electrolytic and electroless with reference to chrome plating and nickel plating), metal spraying and anodizing. Contemporary surface coating methods like physical vapor deposition, chemical vapor deposition, galvanising, carburizing, sherardising, boriding, nitriding and cementation.

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Unit 4: Batteries: Primary and secondary batteries, characteristics of an Ideal Battery, principle, working, applications and comparison of the following batteries: Pb- acid battery, Li-metal batteries, Li-ion batteries, Li-polymer batteries, solid state electrolyte batteries, fuel cells, solar cells and polymer cells.

Unit 5: Engineering materials for mechanical construction: Composition, mechanical and fabricating characteristics and applications of various types of cast irons, plain carbon and alloy steels, copper, aluminum and their alloys like duralumin, brasses and bronzes cutting tool materials, superalloys, thermoplastics, thermosets and composite materials.

References: Theory:


- West, A. R. (2014),Solid State Chemistry and Its Application, Wiley
- Smart, L. E.; Moore, E. A. (2012),Solid State Chemistry An Introduction, CRC Press Taylor & Francis.
- Atkins, P.W.; Overton, T.L.; Rourke, J.P.; Weller, M.T.; Armstrong, F.A.(2010),Shriver and Atkins Inorganic Chemistry, W. H. Freeman and Company.
- Kent, J. A. (ed) (1997),Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
- Poole Jr., Charles P.; Owens, Frank J.(2003), Introduction to Nanotechnology, John Wiley and Sons.


15) Application of Computers in Chemistry(20214DSC26E),

COURSE CONTENTS:

Unit – I Introduction to Computers: Block diagram of computers; Input and output devices-key board, mouse, scanner, VDU, plotter, Types of printers; Primary & secondary memory - RAM, ROM, Secondary Memory devices-Hard Disk, CD, Flash Drive and Memory card; Volatile and non-volatile memory; CPU - ALU and control unit; Hardware & software, Software - system software and application software.

Unit – II

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Programming Languages, Number System and Operating System: Introduction to Algorithms and Flow charts, Programming languages - Machine, Assembly and high level language. Number System: Bits and Bytes, Decimal, binary and octal number system and their arithmetic. Operating system and its functions: Microsoft windows. Applications of Microsoft Office, Google classroom and Google meet.

Unit - III

C Programming Introduction; Style of C language; Character set; keywords, data types, variables and constants in C; Operators-Arithmetic, Relational, Logical, Bitwise, Ternary, Cast and Sizeof operators in C; Input and output statements in C language; Control and conditional statement in C; break and continue statement in loop. Storage classes in C; Functions (built in and user defined); Introduction to arrays.

Unit - IV

Computer applications in Physical and Analytical Chemistry: Listing the C-program for the following:Determination of rate constant of first order reactions, determination of rate constant for second order reactions, study of rate constant with variation of ionic strength, obtaining the heat of reaction using Hess's law of constant heat summation, obtaining the heat of reaction at different temperatures using Kirchoff's equation. Determination of Normality, Molarity and Molality of solutions, Determination of concentration using Beer- Lambert's law.

Unit - V

Computer applications in Inorganic and Organic Chemistry: Listing the C-program for the following: Determination of electronegativity of an atom from bond energy data using Pauling relation, determination of half life and average life of a radioactive nucleus. Determination of emprical formula of hydrocarbons and other organic compounds, Determination of molecular weights of organic compounds, Determination of molecular weights of organic compounds by Cryoscopic and ebullioscopic method. Determination of isoelectric point of amino acids. Chemdraw software and its applications.

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Suggested Readings:

1. Fundamentals of computer by V. Rajaraman
2. Programming in C (Schaum series outline) by Gotterfried.
3. "Computers in Chemistry" by K.V. Raman
4 Computer fundamentals and programming in C by Reema Thareja (2nd Edition)

16) Green Organic Synthesis: Principles and Applications(20214DSC35B),

Basic introduction and explaining goals of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry, Principles of Green Chemistry with their explanations and examples and special emphasis on Designing a Green Synthesis using these principles.

UNIT -Green Solvents, Supercritical fluids (SCFs), Super Critical Water (SCW), Supercritical Carbon Dioxide (SC-CO2); Pyrolysis of t-butylbenzene, Pinacol-pinacolone rearrangement, Beckmann rearrangement, Diels-Alder reactions, Reduction of aromatic nitro compounds. Reaction in Supercritical Carbon Dioxide; Kolbe – Schmitt reaction, Friedel-Crafts reaction.

UNIT-II Solid state reaction at room temperature: Aldol condensation, Reformatsky reaction, Synthesis of quinoxaline derivatives. Microwave assisted solid state reactions using solid support: Synthesis of heterocyclic compounds; Synthesis of benzimidazole, Synthesis of oxazoles/thiazoles, Synthesis of oxadiazoles, Synthesis of N-arylated pyrrole derivatives, Synthesis of quinolones, Synthesis of furans.

UNIT- III Catalyst and Catalysis; Homogeneous catalysis, Heterogeneous catalysis, Catalysis in Green chemistry, Biocatalysis, Reactions using biocatalyst, Biocatalytic conversion of penicillin to 6- aminopenicillanic acid. Photocatalysis, Titanium dioxide ($TiO_2$) as a green photocatalyst for destroying organic pollutants, Some important photocatalytic applications of $TiO_2$ - Photocatalytic disinfection or sterilization.

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UNIT-IV Polymer supported catalysis - Reaction using polymer supported catalyst, Substitution reaction

Introduction; Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents;

UNIT-V Combinatorial green chemistry; Proliferation of solvent less reactions; Non-covalent derivatization; Biomass conversion, co crystal controlled solid state synthesis (C2S3).

Suggested Learning Resources: Books

1. Ahluwalia, V.K., Kidwai, M.R. New Trends in Green Chemistry, Anamalaya Publishers (2005).
2. Anastas, P.T. & Warner, J.K, Green Chemistry- Theory and Practical, Oxford University Press (1998).

3. Matlack, A.S, Introduction to Green Chemistry, Marcel Dekker (2001).
4. Cann, M.C.and Connely, M.E. Real-World cases in Green Chemistry, ACS (2000).
5. Ryan, M.A. and Tinnesand, M. Introduction to Green Chemistry, American Chemical Society, (2002).
6. Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, Second Edition, 2010

17) Macromolecules as Engineering Materials(20214DSC35C),

UNIT-I Polymers: Introduction, methods of polymerization: Condensation and Free radical with examples. Explanation of molecular weight determination by number average and weight average methods, numerical problems. Synthesis, properties and industrial applications of polyvinylchloride (PVC) and polystyrene.

UNIT-II Fibers: Introduction to fibers, synthesis, properties and industrial applications of Kevlar. Synthesis, properties and industrial applications of Polyester.

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UNIT-III Plastics. Introduction, Synthesis, properties and industrial applications of poly (methyl methacrylate) (PMMA), synthesis, properties and industrial applications of Teflon.

UNIT-IV Composites: Introduction to composites, properties and industrial applications of carbon-based reinforced composites (graphene/carbon nano-tubes as fillers) properties and industrial applications of metal matrix polymer composites.

UNIT-V Lubricants: Introduction, classification, properties and industrial applications of lubricants.

18) Pharmaceutical Inorganic Chemistry(20214DSC35D).

UNIT I – Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals.

UNIT-II modified limit test for Chloride and Sulphate General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT –III – Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. Major extracellular and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.

UNIT-V Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol

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cement. UNIT III 10 Hours  Gastrointestinal agents Acidifiers: Ammonium chloride* and Dil. HCl Antacid: Ideal properties of antacids, combinations of antacids, Sodium

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4 th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3 rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry

19) Industrial Pharmacy(21214DSC35E),

UNIT-I Pilot plant design: Basic requirements for design, facility, equipment selecton, for tablets, capsules, liquid orals, parentraland semisolid preparations. Scale up: Importance, Technology transfer from R & D to pilotplant to plant scale, process scale up for tablets, capsules, liquidorals, semisolids, parentral, NDDS products – stress on formula, equipments, product uniformity, stability, raw materials, physicallayout, input, in-process and finished product specifications, problems encountered during transfer of technology

UNIT-II

Validation: General concepts, types, procedures & protocols, documentation, VMF, Analytical method validation, cleaningvalidation and vender qualification.

UNIT-III

Equipment Qualification: Importance, IQ, OQ, PQ forequipments – autoclave, DHS, membrane filter, rapid mixergranulator, cone blender, FBD, tablet compression machine,liquid filling and sealing machine. Aseptic room validation.

UNIT-IV

Process validation: Importance, validation of mixing,granulation, drying, compression, tablet coating, liquid filling andsealing, sterilization, water process systems,

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environmentalcontrol.
UNIT-V
Industrial safety: Hazards – fire, mechanical, electrical,chemical and pharmaceutical, Monitoring & prevention systems,industrial effluent testing & treatment. Control of environmentalpollution.

REFERENCES

1. Pharmaceutical process validation, JR Berry, Nash, Vol 57, Marcel Dekker,NY.
2. Pharmaceutical Production facilities, design and applications, by GC Cole,Taylor and Francis.
3. Pharmaceutical project management, T.Kennedy, Vol 86, Marcel Dekker,NY.
4. The theory & Practice of Industrial Pharmacy, L.Lachman, H.A.Lieberman,Varghese Publ. Bombay.
5. Tablet machine instruments in pharmaceuticals, PR Watt, John Wiley

20) Material Chemistry(20214DSC43B).

UNIT-I
Introduction to Materials Chemistry
UNIT-II
Different Types of Materials
UNIT-III
Materials in Advanced Technology
UNIT-IV
Materials for Energy Generation and Storage
UNIT-V
Miniaturization in Materials Science,

REFFERNCE BOOK

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1)Introduction to Materials Chemistry, 2nd Edition **Harry R. Allcock** ISBN: 978-1-119-34725-5 October 2019

21) Pharmacology (20214DSC43C),

UNIT I

General Pharmacology:

a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and
elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding.

b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration
and effect. Receptors, structural and functional families of receptors quantitation of drug receptors
interaction and elicited effects.

UNIT II

Neurotransmission

a. General aspects and steps involved in neurotransmission.

b. Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetylcholine).

c. Neurohumoral transmission in central nervous system (Detailed study about neurotransmittershistamine, serotonin, dopamine, GABA, glutamate and glycine).

d. Non-adrenergic non-cholinergic transmission (NANC), Cotransmission

Systemic Pharmacology A detailed study on pathophysiology of diseases, mechanism of action,
pharmacology and toxicology of existing as well as novel drugs used in the following systems

Autonomic Pharmacology Parasympathomimetics and lytics; sympathomimetics and

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lytics, agents affecting neuromuscular junction UNIT III Central nervous system Pharmacology General and local anesthetics Sedatives and hypnotics, drugs used to treat anxiety, Depression, psychosis, mania, epilepsy, neurodegenerative diseases, Narcotic and non-narcotic analgesics. UNIT IV Cardiovascular

anti- Pharmacology Diuretics, antihypertensives, antiischemics, arrhythmics, drugs for heart failure and hyperlipidemia, Hematinics, coagulants, anticoagulants, fibrinolytics and antiplatelet drugs
UNIT V
Autacoid Pharmacology The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autacoids. Pharmacology of antihistamines, 5HT antagonists. R22 M.Pharm Pharmacology JNTUH

REFERENCE BOOKS:

1. The Pharmacological Basis of Therapeutics, Goodman and Gilman's
2. Principles of Pharmacology. The Pathophysiologic basis of drug Therapyby David E Golan,
Armen H. Tashjian Jr, Elvin J. Armstrong, April W. Armstrong, Wolters, Kluwer-Lippincott
Williams & Wilkins Publishers.
3. Basic and Clinical Pharmacology by B. G Katzung
4. Hand book of Clinical Pharmacokinetics by Gibaldi andPrescott.
5. Applied biopharmaceutics and Pharmacokinetics by Leon Shargel and Andrew B. C. Yu.
6. Graham Smith. Oxford textbook of Clinical Pharmacology
7. Dipiro Pharmacology, Pathophysiological approach.
8. Advnced Pharmacology by Bikash Medhi. 1. Drugs and Cosmetics Act/Rules by Govt. of India Publications.

22) Herbal Drug Technology (20214DSC43D)

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Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs
Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products:
a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.
Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V

General Introduction to Herbal Industry Herbal drugs industry: Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and
aromatic plants in India. Schedule T – Good Manufacturing Practice of Indian systems of medicine
Components of GMP.

**Recommended Books: (Latest Editions)**

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeial standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals, Business Horizons Publishers, New Delhi, India, 2002.

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SCHOOL OF ARTS AND SCIENCE

DEPARTMENT OF ENGLISH

BOARD OF STUDIES MEETINGCIRCULAR

DATE: 27.5.2022

There will be a Board of Studies Meeting on 6.6.22 at 10 a.m in the department of English all the staffs must be attend the meeting

Agenda
Correction
Feedback

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School of Arts and Science
Department of English

**Minutes of the meeting of the Board of Studies (BoS)"**

**Date** : 6th May 2022
**Venue** : Seminar hall
**Time** : 10.00am to 2.00pm

Members present:

Chair: Dr.R.Inyavan, Assistant Professor and Head, Department of English,
PRIST Deemed to be University, Vallam, Thanjavur

External Members

| S.No. | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr.G.Arunachalam | Head & Professor Department of English,Raja Serfoji government Arts and Science (affiliated AUTONOMOUS) Thanjavur | Physical | |
| 2 | Dr.R.Sasthi | Associate Professor Department of English, School of Arts and Science, A.V.V.M.Sri Pushpam college (AUTONOMOUS) POONDI | Physical | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr.R.Inyavan | ENGLISH | Physical | |
| 2 | Mr.S.Ravikumar | ENGLISH | Physical | |
| 3 | Mr.S.Punniyamoorthi | ENGLISH | Physical | |
| 4. | Miss. J.Subarna r | ENGLISH | Physical | |

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Invited Participants

| S.No | Name/Degree/Designation | Department/Class Institute/Organization/Address | Online/ Physical | Signature (scan if online) |
|---|---|---|---|---|
| 1 | Dr. L Dhanapal<br>MSc. MTech PhD<br>Dean School of Arts and Science | Department of Physics,<br>PRIST Deemed to be University, Vallam, Thanjavur | Physical | |

Attendance List

| S NO | Name | Designation |
|---|---|---|
| 1 | Dr. G. Arunachalam | Hod, Associate Professor of English , Raja Saraboji College, Thanjavur |
| 2 | Dr. R.Shanthi | Associate Professor of English, A.V.V.M. Sri Puspam Poondi |
| 3 | Prof.R.Iniyavan | Assistant professor , English |
| 4 | Prof.S. Rasa Kumar | Assistant professor , English |
| 5 | Prof. S.Punniya Moorthy | Assistant professor ,English |
| 6 | Prof. J.Subarna | Assistant professor ,English |
| 7 | A.SASIREKHA | Teacher at THAMARAI International Matriculation school, Thanjavur |
| 8 | Jenifer | I MA English |

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**SCHOOL OF ARTS AND SCIENCE**

**DEPARTMENT OF ENGLISH**

**MINUTES OF THE MEETING OF THE BOARD OF STUDIES (BOS)"**

**Board: Department of English**

**The Meeting of Board of Studies (BOS) was held as given below:**

| | |
|---|---|
| Name of the BoS | Board of Studies |
| Department | English |
| Meeting no | 19 |
| Date and Time | 6.8.22 |
| Venue | PRINT BLOCK, English department |
| Members Attended | The details are given in the ANNEXURE-I |

| | AGENDA |
|---|---|
| 1 | Action taken on the previous Meeting Minutes |
| 2 | Discussion made on employability oriented paper introduce |
| 3 | Discussion on the change of teaching method and introducing ICT class rooms |
| 4 | Discussion on the development and awards of the BA English Curriculum |
| 5 | Discussion on the development of the MA English Curriculum |
| 6 | Discussion on Value added courses and its material preparation |
| 7 | Any other matter discussions / suggestions / modifications given by Panel of examiners (UG/PG) |
| 8 | Other Discussions Made by the Board |

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# MINUTES OF THE BOARD OF STUDIES MEETING

**Board: ENGLISH**

The Chairperson of BOS welcomed all the panel members for the meeting. The items listed in the agenda were taken for discussion.

The 16th Board of Studies Meeting of the Department of English, School of Arts and Science, Ponnaiyah Ramajayam Institute of Science and Technology was conducted as per the guidelines of the University Grants Commission on 16.6.2023 at 11.00 am. The following members were attending the meeting.

Dr.R.Iniyavan, Chairperson of the Board of Studies Meeting welcomed the Members in his introducing speech; he explained the details of the Agenda and the academic matters to be discussed. The agenda of the meeting was taken up for discussion. The following points were discussed during the meeting. The resolutions made in the Meeting are given below.

The committee appreciated the formulation of syllabus for BA English programme to meet out the criteria of the Education Empowerment and Social Relevance. In Addition, the Committee suggested the following corrections/modifications/ Suggestions in the Programme syllabus. New courses and value added courses were introduced as per the request of the stake holders and BOS members.

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The following are the minutes of the meeting

| |
|---|
| Agendum 1 To confirm the minutes of BOS's meeting held on 6.6.22 |
| Discussion The minutes of the Board of Studies meeting held on 6.6.22 were presented to the members. The suggestions received have been incorporated and placed for confirmation. The same was approved by the Academic council |
| Resolution The Board resolved to accept the same |
| Agendum 2: Action taken on the previous Meeting Minutes |
| Discussion: Action taken report of the decisions made in the previous BOS and approved by the academic council Action taken report was presented in the BOS |
| Resolution<br><br>**The Board resolved to accept the same and improvement of students there were few value added courses are introduced which helpful to them to get job offers and enhancing their academic skills.** |

| S.NO | COURSE NAME |
|---|---|
| 1 | **Diploma course on Content writing** |
| 2 | **Diploma course on Radio Jokey** |
| 3 | **Certificate course on Accent Training** |
| 4 | **Diploma In Visual Narratives** |
| 5 | **Certificate Course In Business Communication** |

| |
|---|
| Agendum 3: The board members discussed on reducing the contents in the syllabus |
| Discussion: The board members discussed on the units contains lot of contents that seems huge for students So the board decides to reduce the contents in BA English papers |
| Agendum 4 Discussion held on semester wise syllabus of General English. English I and II have content change and English III& IV contents was reduced as per the suggestions received from the stake holders. |
| Discussion: The following courses were submitted to the board members |

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22111AEC22 | English II | 5 | 0 | 0 | 3 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |

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Resolution: The board members recommended including technical English related exercises as supplementary materials for all units. The contents in every unit were discussed in the courses.

The board resolved to approve the finalized curriculum and contents.

Agendum 5: Discussion made on the BA English Literature syllabus its improvement

Discussion: A current curriculum for BA English was proposed with modifications to the committee and following points were discussed.

The following courses were submitted to the board members.

**BA ENGLISH- REGULATION 2022**
**COURSE STRUCTURE**
**SEMESTER – I**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC11/<br>22111AEC11/<br>22132AEC11/<br>22135AEC11 | Language-I (Tamil-I/<br>Advanced English-I/<br>Hindi-I/<br>French-I) | 4 | 0 | 0 | 2 |
| 22111AEC12 | English-I | 4 | 0 | 0 | 2 |
| 22111AEC13 | Literature in 1400-1600 Period | 5 | 0 | 0 | 3 |
| 22111AEC14 | Literature in Elizabethan Period | 5 | 0 | 0 | 3 |
| 22111AEC15 | Social History of England-I | 4 | 0 | 0 | 3 |
| 22111AEC16 | History of English Literature-I | 5 | 0 | 0 | 4 |

**Total-17**

**AUDIT COURSE**
SEMESTER – II

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| 221ACLSUIIV | Universal Human Values | - | - | - | 2 |

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC21/<br>22111AEC21/<br>22132AEC21/<br>22135AEC21 | Language-II (Tamil-II/<br>Advanced English-II /<br>Hindi-II/<br>French-II) | 4 | 0 | 0 | 2 |
| 22111AEC22 | English-II | 4 | 0 | 0 | 2 |
| 22111AEC23 | Literature in Jacobean Period | 5 | 0 | 0 | 3 |
| 22111AEC24 | Literature in Restoration Period | 5 | 0 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 22111AEC25 | Social History of England-II | 4 | 0 | 0 | 3 |
| 22111AEC26 | History of English Literature-II | 5 | 0 | 0 | 4 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22111RLC27 | Research Led Seminar | - | - | - | 1 |
| | Total | | | | 19 |
| | **AUDIT COURSES** | | | | |
| 221ACLSCOS | Communication Skills | - | - | - | 2 |
| 221ACSSBBE | Basic Behavioral Etiquette | - | - | - | 2 |
| | **SEMESTER – III** | | | | |
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| | **THEORY** | | | | |
| 22110AEC31/<br>22111AEC31/<br>22132AEC31/<br>22135AEC31 | Language-III (Tamil-III/<br>Advanced English-III /<br>Hindi-III/<br>French-III) | 4 | 0 | 0 | 2 |
| 22111AEC32 | English-III | 4 | 0 | 0 | 2 |
| 22111AEC33 | Literature in Augustan Period | 4 | 0 | 0 | 3 |
| 22111AEC34 | Literature in Romantic Period | 4 | 0 | 0 | 3 |
| 22111SEC35 | Literary Forms and Prosody | 5 | 0 | 0 | 4 |
| 22111AEC36 | Shakespeare | 4 | 0 | 0 | 3 |
| | **RESEARCH SKILL BASED COURSE** | | | | |
| 22111RMC37 | Research Methodology | 2 | 0 | 0 | 2 |
| | Total | | 19 | | |
| | **AUDIT COURSE** | | | | |
| 221ACLSOAN | Office Automation | - | - | - | 2 |

**SECOND YEAR**

**SEMESTER – IV**

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | **THEORY** | | | | |
| 22110AEC41/<br>22111AEC41/<br>22132AEC41/<br>22135AEC41 | Language-IV (Tamil-IV/<br>Advanced English-IV/<br>Hindi-IV/<br>French-IV) | 4 | 0 | 0 | 2 |
| 22111AEC42 | English-IV | 4 | 0 | 0 | 2 |
| 22111SEC43 | Language and Linguistics | 4 | 0 | 0 | 3 |
| 22111AEC44 | Literature in Victorian Period | 4 | 0 | 0 | 3 |
| 22111AEC46 | Literary Criticism | 5 | 0 | 0 | 4 |

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| | | | | | |
|---|---|---|---|---|---|
| 221ENST045 | Environmental Studies | 2 | 0 | 0 | 2 |
| | Total | | | | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSLMS | Leadership and Management Skills | - | - | - | 2 |
| 221ACSSAQA | General Aptitude and Quantitative Ability | - | - | - | 2 |

## THIRD YEAR

### SEMESTER – V

| Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|
| | THEORY | | | | |
| 22111AEC51 | Literature in Modern Period-I | 5 | 0 | 0 | 3 |
| 22111AEC52 | American Literature | 5 | 0 | 0 | 3 |
| 22111SEC53 | English Language Teaching | 5 | 1 | 0 | 5 |
| 22111SEC54 | Translation | 5 | 1 | 0 | 4 |
| 22111DSC55 | Discipline Specific Elective - I | 5 | 0 | 0 | 1 |
| | | | | | |
| | RESEARCH SKILL BASED COURSE | | | | |
| 22122DRC57 | Participation in Bounded Research | - | - | - | 1 |
| | Total | | | | 19 |
| | AUDIT COURSE | | | | |
| 221ACLSPSL | Professional Skills | - | - | - | 2 |
| | | - | - | - | 2 |

### THIRD YEA - SEMESTER – VI

| Course Code | Course Title | L | T | P |
|---|---|---|---|---|
| | THEORY | | | |
| 22111AEC61 | Literature in Modern Period-II | 5 | 0 | 0 |
| 22111AEC62 | Indian Writing in English | 5 | 0 | 0 |
| 22111AEC63 | Commonwealth Literature | 5 | 1 | 0 |
| 22111DSC64_ | Discipline Specific Elective –II | 5 | 0 | 0 |
| 221__OEC(2 Digit Course Name ) | Open Elective | 4 | 0 | 0 |
| 22112PRW65 | Project Work | - | - | - |

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| | | | | | |
|---|---|---|---|---|---|
| 22111PCE | Programme Exit Examination | | | | |

**AUDIT COURSE**

| | | |
|---|---|---|
| 22IAECSSIST | Interview Skills Training And Mock Test | 2 |
| 22IACISCET | Community Engagement | 1 |
| | Total Credits Programme | 116 |
| | Total Credits Audit Courses | 19 |

**DECIPILINE SPECIFIC ELECTIVIES**

| SNO | Programme name | Programme Name | Subject code | Subject Name | Semester |
|---|---|---|---|---|---|
| 1 | 22UGENGGE | BA English | 22111DSC55B | Single Author Study- Girish Karnad | V |
| 2 | 22UGENGGE | BA English | 22111DSC55C | Single Author Study- Arundhathi Roy | V |
| 3 | 22UGENGGE | BA English | 22111DSC55D | Single Author Study- Chinua Achebe | V |
| 4 | 22UGENGGE | BA English | 22111DSC55E | Single Author Study- Khalil Gibran | V |
| 5 | 22UGENGGE | BA English | 22111DSC64A | French Literature | VI |
| 6 | 22UGENGGE | BA English | 22111DSC64B | Medieval Literature | VI |
| 7 | 22UGENGGE | BA English | 22111DSC64C | Modernism and Post Modernism | VI |
| 8 | 22UGENGGE | BA English | 22111DSC64D | Australian Literature | VI |

Agendum 6: Discussion made on the Value added courses and its syllabus

| Sl.no | Course code | Name of the course |
|---|---|---|
| 1 | 22DCW101 | Diploma in Content Writing |
| 2 | 22DVN102 | Diploma in Visual Narratives |
| 3 | 22CAT101 | Certificate course in Accent Training |

Agendum 7: Discussion made on the MA English Literature syllabus ,its improvement

**Discussion:** A current curriculum for MA English was proposed with modifications to the committee and following points were discussed. Discipline Specific Elective Courses were introduced on self choice pattern. Here students are free to use their free will to select a particular paper, according to their

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## Discipline Specific Electives (PG)
## NEW COURSES

| S.NO | Programme Code | Programme Name | Subject Code | Subject name | Semester |
|---|---|---|---|---|---|
| 1 | 22PGENGGE | MA English | 22211DSC15A | British Poetry I: Chaucer to Hopkins | I |
| 2. | 22PGENGGE | MA English | 22211DSC15B | British Fiction I: Victorian to Early Modern | I |
| 3. | 22PGENGGE | MA English | 22211DSC15C | British Drama-I: Elizabethan Age | I |
| 4 | 22PGENGGE | MA English | 22211DSC15D | American Poetry-I | I |
| 5 | 22PGENGGE | MA English | 22211DSC25A | British Poetry II: Yeats to The Present Times | II |
| 6 | 22PGENGGE | MA English | 22211DSC25B | British Fiction II: Late Modern To Post-Modern | II |
| 7 | 22PGENGGE | MA English | 22211DSC25C | British Drama-II | II |
| 8 | 22PGENGGE | MA English | 22211DSC25D | American Poetry- II | II |
| 9 | 22PGENGGE | MA English | 22211DSC34A | Shakespeare Film Studies | III |
| 10 | 22PGENGGE | MA English | 22211DSC34B | Ben Johnson-work studies | III |
| 11 | 22PGENGGE | MA English | 22211DSC34C | Christopher Marlow work studies | III |
| 12 | 22PGENGGE | MA English | 22211DSC34E | George Bernard Shaw-work studies | III |
| 13 | 22PGENGGE | MA English | 22211DSC44A | Literary Terms and style | IV |
| 14 | 22PGENGGE | MA English | 22211DSC44B | Epics in Translation | IV |

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| | | | | | |
|---|---|---|---|---|---|
| 18 | 22PGLNGGIL | MA English | 2221IDSC44C | English for Career | IV |
| 19 | 22PGLNGGIL | MA English | 2221IDSC44D | Approaches to Teaching in Literature | IV |

Signature:

Chair(HoD)

Dept:

Name:

Date: 06/05/22

Signature:

6/5/22

Dean

Dean:

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Name:

Date:

1. Minutes of the previous BoS meeting, minutes and report on the follow up action taken
2. BoS Meeting 'Notification' sent to all members, including online meeting link
3. Online Screenshots and geo tagged photos in the venue
4. Attendance sheet / print of online attendees
5. Detailed syllabi with PEOs, POs, COs, etc. (in Annexures), if new Programme(s) introduction /Curriculum revision is discussed

Note: The 'minutes' of the BoS meeting along with the attachments as listed above must be mailed to the Registrar by the HoD within three days after the meeting, copying Dean concerned, Dean - Academic Affairs and the VC's office.

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## VALUE ADDED COURSES

1. DIPLOMA IN CONTENT WRITING
2. DIPLOMA IN RADIO JOCKEY
3 CERTIFICATE COURSE IN ACCENT TRAINING
4 DIPLOMA IN VISUAL NARRATIVES
5 CERTIFICATE COURSE IN BUSINESS COMMUNICATION

## DIPLOMA IN CONTENT WRITING

**Objectives:**

Learn to generate traffic and sales by writing effective content.

**Course Outcome:**

Learn how to write appealing content that attracts alot of readers.

**Course Content:**

Unit I: Basics of Content writing - The Concept of Content Writing and its relevance, Role and Functions of Content Writers

Unit II: Types of Content writing - The process of Content Writing, Editing and Proof-Reading, Writing blogs, case studies, white papers

Unit III: Visual Content – Infographics, Product Demonstrations

Interactive Content – Quizzes, Polls, Interactive white papers

Unit IV: Tools of the trade - Social Media- Understanding the basics of social media, Understanding social media content writing, Understanding PR

Unit V:

Plagiarism laws in Content Writing- What is plagiarism, rules on plagiarism, How to write plagiarism-free copies

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## DIPLOMA IN RADIO JOCKEY

Objectives
Make Confident, Creative and personality ability to do multi-tasking by handling public relations
To Roles ranged from supervising producers and appeared on a number of TV shows for making people aware of career choices as a Radio Jockey

Outcome
To enhance, correct breathing techniques, pronunciation, modulation, projection etc.
To enrich correct body language and flow of language

Unit-I- Effectively make airlines, weather and railways announcements

Unit-II- Effectively write/present interesting Radio Scripts & how to read the news on Radio & TV

Unit-III- How to get over the fear of public speaking & Professional Presentation & correct body language

Unit-IV- Narration, cartoon and lip sync dubbing (Theory only)

Unit-V- E-Book Narration- How to narrate & explore the upcoming E- book market boom

## CERTIFICATE COURCE IN ACCENT TRAINING

**Objectives:**

Segmental and suprasegmental aspects of pronunciation
Phonemes and sounds in isolation

**Course Outcome:**

Ability to understand English spoken by native speakers
Ability to speak in a more neutral fashion
Increased career growth opportunities, Improved self-confidence

**Course Content:**

Unit I:

Foundations of Narrative Design

Unit II:

Visual Storytelling - Storytelling Structure: Time and Space, Interactive Storytelling

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Unit III:

Advertising, Branding, and Information Design

Unit IV:

Computers, Multimedia, and World Building

Unit V:

Neutral Accent and its types

## DIPLOMA IN VISUAL NARRATIVES

**Objectives:**

Using elements of visual language effectively

**Course Outcome:**

Developing new uses and functions for word and Image based storytelling

**Course Content:**

Unit I: Visual storytelling techniques - to create dynamic imagery that conveys mood and emotion

Unit II: Media, image making drawing instruments - critical reflection on narrative as a visual form

Unit III: Analysis of essential drawing systems and techniques - "Glossary of Film Terminology" (Golden) Analyze Once Upon a Time in the West as a visual narrative

Unit IV: Compositional design and conceptualise scenes -Language of drawing, film, comics and sequential images

Unit V: Animation - The Principles of Animation (Thomas&Johnston), Animation processes and studios, Analyze animated works as visual narratives

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## CERTIFICATE COURSE IN BUSINESS COMMUNICATION

Objectives

Exchanging information, knowledge, ideas, thoughts and messages between individuals or groups in organizations.

Outcome

Applies the knowledge by speaking confidently and communicating effectively in different business situations.

CONTENTS:

Unit- I- Introduction

Importance of communication skills in Business Management

Types of communication

The media and tools of communication.

Unit II – Verbal and Non-verbal Communication

Personal language and body language.

Types of managerial speeches: occasional speech; thematic speech.

Group Communication in: group discussions, meetings, seminars, and conferences.

Art of facing interviews in: selection or placement, appraisal, disciplinary committees

Unit III – Written Communication Skills

Formats for business letters and memos, Job applications, Preparing a Follow-up messages and letters, Writing effective Business Reports Digital Communication-Using Web sources of knowledge Sharing.

Unit IV – Recruitment and Employment Correspondence letter of Acceptance, Letter of Resignation and Promotion, Testimonials and References.

Unit V – Business and Social Etiquette Workplace hierarchy, appropriate business attire, Telephone Etiquette, table etiquette. Language lab class for practical communication.

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**UG- B.A ENGLISH NEW COURSES**

**SINGLE AUTHOR STUDY- GIRISH KARNAD**

**UNIT- I**
A Bird's Eye View
Crossing to Talikota
**UNIT- II**
Wedding Album,
Bali : The Sacrifice
**UNIT-III**
Fire and the Rain
Boiled Beans on Toast
**UNIT-IV**
Yayati
**UNIT- V**
The Dreams of Tipu Sultan

**SINGLE AUTHOR STUDY- ARUNDHATHI ROY**

**UNIT-I**

The cost of living

The shape of the beast

**UNIT-II**

War Talk

The doctor and the saint

**UNIT-III**

Walking with the comrade

Listening to the Grasshoppers

**UNIT- IV**

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Power Politics

UNIT V

The Ordinary Person's Guilt to Empire

## SINGLE AUTHOR STUDY- CHINUA ACHEBE

**UNIT-I**

The trouble with Nigeria

**UNIT-II**

There was a Country

**UNIT-III**

Home and Exile

**UNIT- IV**

The Man of People

**UNIT-V**

Chike the River

## SINGLE AUTHOR STUDY-KHALIL GIBRAN

**UNIT-I**

Sand and Foam

**UNIT- II**

The Madman

**UNIT- III**

Tears and Laughter

**UNIT- IV**

Nymphs of the Valley

**UNIT – V**

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The Wanderer

## FRENCH LITERATURE

**UNIT- I**

Introduction to French Literature

**UNIT- II**

Classical French Literature

Enlightment and 1th Century Literature

**UNIT-III**

French Romanticism

**UNIT- IV**

Realism and Naturalism

**UNIT- V**

Symbolism and Modernism

## MEDIEVAL LITERATURE

**UNIT-I**

The not-so'dark' age Already rewriting history: Gildas

**UNIT-II**

Old Celtic literature Old Welsh: 'Y Gododdin' (pp. 9-15), Middle Welsh: 'Caru Merch Fonheddig – Wooing a Noble Girl' by Dafydd ap Gwilym ($14^{th}$ c.; handout) compare to 'The Flea' by John Donne publ. 1633 (handout) Old Irish: 'Messe ocus Pangur Bán' (poet's selfie with cat) (pp.

**UNIT-III**

Literature as Propaganda 'The Battle of Maldon'

Saint's Lives: 'The Passing of Mary of Egypt' (on line) 23 Sermons: Wulfstan the Homilist's 'Sermo Lupi ad Anglos

**UNIT- IV**

Middle English Lyrics: Geoffrey Chaucer 'Parliament of Fowles'

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**UNIT-V**

The Medieval 'Startrek': Term paper due; extract from Robert Manning of Brunne, Handlyng Synne

## MODERNISM AND POSTMODERNISM

**UNIT-I**

Fitzgerald- The Great Gatsby

**UNIT-II**

Ellison- Invisible Man

**UNIT-III**

Auster-City of Glass

**UNIT-IV**

Jackson Patchwork Girl

**UNIT-V**

Coover –The End of Books

Landow –Reconfiguring Narrative

## AUSTRALIAN LITERATURE

**UNIT- I**

Australian Literature. –Australia-Land and History People and Culture.

**UNIT- II**

Literary Beginnings-Oral Literature, Early Literature.

**UNIT- III**

Themes and Trends

**UNIT- IV**

Peter Carey- True History of the Kelly Gang

**UNIT- V**

Dorothy Porter- The Monkey's Mask

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## P.G M.A ENGLISH NEW COURSES

## BRITISH POETRY I: CHAUCER TO HOPKINS

UNIT- I

Introduction- Survey of English literature from: Chaucer to 19th century-landmarks-major writers-themes and concerns-socio-political developments.

UNIT- II

GeoffTrey Chaucer: Canterbury Tales (selections)
The General Prologue"
The Wife of Bath's Tale"
The Pardoner's Tale

UNIT- III

Sir Thomas Wyatt: sonnets (selections)
- Henry Howard, Earl of Surrey: sonnets (selections)
- Edmund Spenser: Amoretti (selections)

UNIT- IV

Sonnets (selections)

- Narrative poems: Venus and Adonis, The Rape of Lucrece

UNIT- V

John Donne: poems (selections)
The Sun Rising
The Ecstasy
Death Be Not Proud
The Wreck of the Deutschland
God's Grandeur

## BRITISH FICTION I: VICTORIAN TO EARLY MODERN

UNIT- I

Charlotte Brontë: Author of Jane Eyre

UNIT- II

Charles Dickens: Great Expectations,

UNIT- III

George Eliot: Middlemarch

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**UNIT- IV**

Thomas Hardy: The Mayor of Casterbridge,

**UNIT- V**

HG Wells: The Time Machine

## BRITISH DRAMA-I: ELIZABETHAN AGE

**UNIT- I**

The Spanish Tragedy: Thomas Kyd

**UNIT –II**

Gorboduc- Sackville and Norton

**UNIT –III**

The Shoemaker's Holiday:Thomas Dekker

**UNIT –IV**

King John- William Shakespeare

**UNIT – V**

Dr. Faustus–Christopher Marlowe

## AMERICAN POETRY-I

**UNIT- I**

Morton- New English Canaan

**UNIT- II**

Samuel Danforth – Almanacks

**UNIT –III**

Phillis Wheatley, - Poems on Various Subjects

**UNIT- IV**

Henry Wadsworth Longfellow –The Song of Hiawatha

**UNIT –V**

James Russell Lowell- Southern Literary Messenger

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## BRITISH POETRY II: YEATS TO THE PRESENT TIMES

**UNIT- I**

The Red Wheelbarrow- William Carlos Williams

**UNIT- II**

The Love Song of J. Alfred Prufrock - T.S. Eliot

**UNIT- III**

The Man He Killed: Thomas Hardy

**UNIT- IV**

In a Station of the Metro- Ezra Pound

**UNIT- V**

A Shropshire Lad –A.E. Housman,

## BRITISH FICTION II: LATE MODERN TO POST-MODERN

**UNIT- I**

Howards End- E.M. Forster

**UNIT- II**

White Teeth- Zadie Smith

**UNIT- III**

Atonement- McEwan touches

**UNIT- IV**

Jude the Obscure- Thomas Hardy

**UNIT- V**

Life After Life- Kate Atkinson

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## BRITISH DRAMA – II

**UNIT – I**

Look Back in Anger- John Osborne

**UNIT- II**

Major Barbara- George Bernard Shaw

**UNIT- III**

She Stoops to Conquer- Oliver Goldsmith

**UNIT- IV**

Long Day's Journey into Night- Eugene O'Neill,

**UNIT – V**

A Doll House - Henrik Ibsen

## AMERICAN POETRY – II

**UNIT- I**

On Imagination- Phillis Wheatley

**UNIT- II**

Why, Oh Why, the Doily? -Janice N. Harrington

The Fish - Elizabeth Bishop

**UNIT- III**

To speak of woe that is in marriage – Robert Lowell

The pink dog – Elizabeth bishop

**UNIT- IV**

Daddy -Sylvia Plath

**UNIT – V**

Dream song 1 – John Berryman

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## SHAKESPEARE FILM STUDIES

**UNIT- I**

Midsummer Night's Dream

**UNIT- II**

Much Ado About Nothing

**UNIT- III**

Richard III

**UNIT- IV**

Coriolanus

**UNIT- V**

Romeo and Juliet

## BEN JOHNSON- WORK STUDIES

**UNIT – I**

The silent woman

**UNIT- II**

Epicoene

**UNIT – III**

Bartholomew Fair

**UNIT – IV**

To Penshurst& To Celia

The forest

**UNIT – V**

Discoveries

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## CHRISTOPHER MARLOW – WORK STUDIES

**UNIT – I**

Edward III

**UNIT –II**

Faust

**UNIT –III**

Blank verse

**UNIT –IV**

Hero and The Leander

**UBIT – V**

Doctor Faustus

## GEORGE BERNARDSHAW- WORK STUDIES

**UNIT- I**

Passion Play

**UNIT – II**

Love Among the Artists

**UNIT – III**

The Miraculous Revenge

How he lied to her husband

**UNIT –IV**

Fabian essays in socialism

**UNIT – V**

The Quintessence of Ibsenism

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## LITERARY TERMS AND STYLE

**UNIT I - Literary Terms**

**UNIT II: Poetry& Types**

**UNIT III: Prose& Types**

**UNIT – IV: Drama & Types**

**UNIT –V Fiction & Types**

## EPICS IN TRANSLATION

**UNIT- I**

Thirukkural – Athigaram 123

**UNIT-II**

Kamparamayanam- sundrankandam

**UNIT- III**

Mhabaratham- Krishna Upathesam

**UNIT-IV**

Sivagasinthamani – Kunamalayar Innampagam

**UNIT – V**

Silappathigaram - Nadu Kan kathai

## ENGLISH FOR CAREER

**UNIT-I**

Entering the job market

**UNIT-II**

Resumes , module

**UNIT- III**

Writing Cover letters

**UNIT-IV**

Networking

**UNIT- V : Interviewing for the jobs**

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## APPROACHES TO TEACHING IN LITERATURE

**UNIT- I**

Language-based approach: Literature is used as a resource for learning a language.

**UNIT- II**

Communicative Language Teaching (CLT) approach:

**UNIT- III**

Literary theories:

**UNIT –IV**

Moral-philosophical approach, Information-based approach

**UNIT- V**

Paraphrastic approach, Stylistic approach:

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**
**Minutes of the meeting of the Board of Studies (BoS)**

Date: 06.03.2022
Venue: CSE ICT CLASSROOM
Time: 10.30 a.m
**Members present:**
Chair: Prof.Dr. Dr.R.Latha, Ph.D., HOD/CSE

**(https://meet.google.com/qrs-axxx-hmr)**

External Members

| S.No | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. S.A.SAHAAYA ARUL MARY | Professor and Head of CSE Department, Saranathan College of Engineering | Online | |
| 2 | Mr.V. PRASANNA VENKATESH | Senior Data Analyst S1APLUS Inc. USA | Online | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1. | Dr.R.Latha HOD/CSE | CSE | Physical | |
| 2. | Prof.Dr.S.Nithyanandam Ph.D | CSE | Physical | |
| 3. | Prof.S.JANCY SICKORY DAISY , M.Tech, Assistant Professor | CSE | Physical | |
| 4. | Prof.K.JAYANTHI, M.E, Assistant Professor | CSE | Physical | |
| 5. | Prof.Dr.L.S. Usharani Ph.D , Professor | CSE | Physical | |
| 6. | Prof.Dr.N.Arularasan Ph.D/ Associate Professor | CSE | Physical | |
| 7. | Prof.R.Tamizhselvan M.E., Dean | MECH | Physical | |
| 8. | Dr.K.Padmapriya Ph.D/ Associate Professor | CSE | Physical | |

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Invited Participants

| S.No. | Name Degree Designation<br>Institute Organization Address | Department/Class<br>Physical | Online<br>Physical | Signature<br>(scan, if online) |
|---|---|---|---|---|
| 1 | Mr Naveen<br>B E/ Data center Architect | TCS, Chennai | Physical | |
| 2 | Mr.N.Mohamed Wasif | Student | Physical | |

Agenda:

1. To Confirm the previous Meeting Minutes
2. To discuss the action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feed backs on B. Tech (FT/PT).
4. To Introduce new programme of B. Tech Artificial Intelligence and Data Science.
5. To recommend the panel of Examiners for B. Tech(FT/PT).
6. To recommended to value added courses conducting for B.Tech CSE & AIDS student.
7. To Introduce new courses for B.Tech (PT),M.Tech(PT&FT)

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## MINUTES OF THE MEETING

At the outset, the Chairman BOS welcomed the members for attending the meeting of the Board of Studies. In her introductory remarks, she described the agenda items.

| |
|---|
| Agendum 1: |
| Discussion: To confirm the previous BOS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes. |
| Resolution: The chairman confirmed the previous meeting minutes of BoS and discussed the action taken on the previous BOS Meeting Minutes. |
| Agendum 2: |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabi for B.TECH-CSE (Full Time/Part Time) and M.Tech-Computer Science and Engineering((Full Time/Part Time). |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabi and the abstract of stakeholders feedback on B.TECH-CSE (Full Time/Part Time) and M.Tech-Computer Science and Engineering (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |
| Agendum 3: |
| Discussion: To introduce 12 new courses for B.Tech (PT), 8 new courses for M.Tech (FT),8 new courses for M.Tech (PT) in 2022R and also 6 new courses for B.Tech (FT) CSE in 2020R. |
| Resolution: The members of the board also scrutinized and updated the new courses. |
| Agendum 4: |
| Discussion: To Introduce a new programme of B.Tech Artificial Intelligence and Data Science. |
| Resolution: The members of the board have unanimously recommended to introduce the Introduce new programme of B.Tech Artificial Intelligence and Data Science. |
| Agendum 5: |
| Discussion: To recommend the panel of Examiners for B.Tech(FT/PT) and for M.Tech-Computer Science and Engineering(FT/PT) |
| Resolution: The members of the board also scrutinized and updated the panel of examiners and recommended the panel of examiners for the B.TECH –CSE (FT/PT) & M.Tech-Computer Science and Engineering(FT/PT), and submitted the same for the Academic Council for its approval. |
| Agendum 6: |
| Discussion: To recommend the value added courses conducting for B.Tech CSE & AIDS student |
| B.Tech-CSE<br>➢ Virtual Reality<br>➢ Software Testing Automation<br>➢ Neural Networks<br>➢ Deep Learning<br><br>B.Tech-AI&DS<br>➢ Introduction to Java<br>➢ Web Development |

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## List of new courses

| | | |
|---|---|---|
| B.Tech(FT) CSE | Data Mining and Analytics | 20150E66F |
| B.Tech(FT) CSE | Modern Web Applications Development | 20150E75F |
| B.Tech(FT) CSE | Block chain Technologies | 20150E76F |
| B.Tech(FT) CSE | Risk Analytics | 20150E81F |
| B.Tech(FT) CSE | Software Architecture | 20150OE54C |
| B.Tech(FT) CSE | Web Technology | 20150OE74C |
| B.Tech(PT) CSE | Problem Solving and Python Programming | 22150C15P |
| B.Tech(PT) CSE | Programming in C | 22150C22P |
| B.Tech(PT) CSE | Software Engineering Fundamentals | 22150H41P |
| B.Tech(PT) CSE | Internet Programming | 22150H42P |
| B.Tech(PT) CSE | Cryptography and Network Security | 22150H61P |
| B.Tech(PT) CSE | Grid and Cloud Computing | 22150H72P |
| B.Tech(PT) CSE | Data Warehousing and Data Mining | 22150E44BP |
| B.Tech(PT) CSE | Professional Ethics in Engineering | 22150E44CP |
| B.Tech(PT) CSE | Graph Theory And Applications | 22150E64CP |
| B.Tech(PT) CSE | Cyber Forensics | 22150E74DP |
| B.Tech(PT) CSE | Information Retrieval Techniques | 22150E74BP |
| B.Tech(PT) CSE | Ad hoc and Sensor Networks | 22150E54AP |
| M.Tech(FT) CSE | Machine Learning Techniques | 22250H13 |
| M.Tech(FT) CSE | Internet of Things | 22250H23 |
| M.Tech(FT) CSE | Web Engineering | 22250E16B |
| M.Tech(FT) CSE | Information Retrieval Techniques | 22250E24C |
| M.Tech(FT) CSE | Language Technologies | 22250E25C |
| M.Tech(FT) CSE | Speech Processing and Synthesis | 2225E32B |
| M.Tech(FT) CSE | Reconfigurable Computing | 22250E33B |
| M.Tech(FT) CSE | Bio-inspired Computing | 22250E34B |
| M.Tech(PT) CSE | Internet of Things | 22250H22P |
| M.Tech(PT) CSE | Machine Learning Techniques | 22250E32P |
| M.Tech(PT) CSE | Information Retrieval Techniques | 22250E23CP |
| M.Tech(PT) CSE | Speech Processing and Synthesis | 22250E51BP |
| M.Tech(PT) CSE | Reconfigurable Computing | 22250E52BP |
| M.Tech(PT) CSE | Bio-inspired Computin | 22250E53BP |
| M.Tech(PT) CSE | Web Engineerin | 22250E33BP |
| M.Tech(PT) CSE | Language Technologies | 22250E23DP |

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

# PROGRAM HANDBOOK

## B.TECH-CSE(PART-TIME)

**[REGULATION 2022]**

**B.Tech. Part Time (Computer Science and Engineering)**

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## SEMESTER-I

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22148S11P | Transforms and Partial Differential Equations | 3 | 1 | 0 | 4 |
| 22152S12P | Digital Systems | 3 | 1 | 0 | 4 |
| 22150I11P | Data Structures and algorithms | 3 | 1 | 0 | 4 |
| 22150I14P | Computer Architecture and Organization | 3 | 1 | 0 | 4 |
| 22150I15P | Problem Solving And Python Programming | 3 | 0 | 0 | 3 |
| **Total No. of credits** | | | | | **19** |

## SEMESTER-II

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22148S21P | Numerical Methods | 3 | 1 | 0 | 4 |
| 22150I22P | Microprocessors and Interfacing | 3 | 1 | 0 | 4 |
| 22150I23P | Database Management Systems | 3 | 1 | 0 | 4 |
| 22150I24P | Design and Analysis Of Algorithm | 3 | 1 | 0 | 4 |
| 22150I25P | Programming in C | 3 | 0 | 0 | 3 |
| **Total No. of credits** | | | | | **19** |

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## SEMESTER-III

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22148S31P | Discrete Mathematics | 3 | 1 | 0 | 4 |
| 22150I132P | Operating System | 4 | 0 | 0 | 4 |
| 22150I133P | Artificial Intelligence | 4 | 0 | 0 | 4 |
| 22150I134P | Computer Networks | 4 | 0 | 0 | 4 |
| 22150L35P | Operating Systems and Networking Lab | 0 | 0 | 3 | 2 |
| Total No. of credits | | | | | 18 |

## SEMESTER - IV

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22150I141P | Software Engineering Fundamentals | 3 | 1 | 0 | 4 |
| 22150I142P | Internet Programming | 3 | 1 | 0 | 4 |
| 22150I143P | C# And .Net Framework | 3 | 1 | 0 | 4 |
| 221 E44 P | Elective-I | 3 | 1 | 0 | 4 |
| 22150L45P | Internet Programming Lab | 0 | 0 | 3 | 2 |
| Total No. of credits | | | | | 18 |

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## SEMESTER - V

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22150H51P | Object Oriented Analysis and Design | 4 | 0 | 0 | 4 |
| 22150H52P | Software Quality Management | 3 | 1 | 0 | 4 |
| 22150H53P | Graphics and Multimedia | 3 | 1 | 0 | 4 |
| 221_E54_P | Elective –II | 3 | 1 | 0 | 4 |
| 22150L55P | Software Development Lab | 0 | 0 | 3 | 2 |
| Total No. of credits | | | | | 18 |

## SEMESTER - VI

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22150H61P | Cryptography and Network Security | 4 | 0 | 0 | 4 |
| 22150H62P | Advanced Java programming | 3 | 1 | 0 | 4 |
| 22150H63P | Software Testing | 4 | 0 | 0 | 4 |
| 221_E64_P | Elective III | 4 | 0 | 0 | 4 |
| 22150L65P | Java Programming Lab | 0 | 0 | 3 | 2 |
| Total No. of credits | | | | | 18 |

## SEMESTER - VII

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22160S71P | Total Quality Management | 3 | 0 | 0 | 3 |
| 22150H72P | Grid and Cloud Computing | 4 | 0 | 0 | 4 |
| 22150H73P | Middleware Technologies | 3 | 1 | 0 | 4 |
| 221_E74_P | Elective IV | 3 | 0 | 0 | 3 |
| 22150P75P | Project | 0 | 0 | 12 | 6 |
| Total No. of credits | | | | | 20 |

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# LIST OF ELECTIVES

## SEMESTER - IV (ELECTIVE I)

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22150E44AP | Theory of Computation | 3 | 1 | 0 | 4 |
| 22150E44BP | Data Warehousing and Data Mining | 3 | 1 | 0 | 4 |
| 22150E44CP | Professional Ethics in Engineering | 3 | 1 | 0 | 4 |
| 22150E44DP | Advanced Databases | 3 | 1 | 0 | 4 |

## SEMESTER - V (ELECTIVE II)

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22150E54AP | Ad hoc and Sensor Networks | 3 | 1 | 0 | 4 |
| 22150E54BP | Principles of Compiler Design | 3 | 1 | 0 | 4 |
| 22150E54CP | Distributed Systems | 3 | 1 | 0 | 4 |
| 22150E54DP | Mobile Computing | 3 | 1 | 0 | 4 |

## SEMESTER - VI(ELECTIVE III)

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 22160E64AP | Principles of Management | 4 | 0 | 0 | 4 |
| 22150E64BP | Unix Internals | 4 | 0 | 0 | 4 |
| 22150E64CP | Graph Theory And Applications | 4 | 0 | 0 | 4 |
| 22150E64DP | Programming paradigms | 4 | 0 | 0 | 4 |

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## SEMESTER - VII (ELECTIVE VI)

| Subject Code | Subject Name | Periods Per Week | | | C |
|---|---|---|---|---|---|
| | | L | T | P | |
| 221501741AP | High Speed Networks | 3 | 0 | 0 | 3 |
| 221501742IP | Information Retrieval Techniques | 3 | 0 | 0 | 3 |
| 221501743CP | Software Project Management | 3 | 0 | 0 | 3 |
| 221501744DP | Cyber Forensics | 3 | 0 | 0 | 3 |

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# CREDITS DISTRIBUTION

| Semester | Theory Courses | | Elective Courses | | Practical Courses | | Project | Total Credit |
|---|---|---|---|---|---|---|---|---|
| | Nos | Credit | Nos | Credit | Nos | Credit | Credit | |
| I | 5 | 19 | - | - | - | - | - | 19 |
| II | 5 | 19 | - | - | - | - | - | 19 |
| III | 4 | 16 | - | - | 1 | 02 | - | 18 |
| IV | 3 | 12 | 1 | 04 | 1 | 02 | - | 18 |
| V | 3 | 12 | 1 | 04 | 1 | 02 | - | 18 |
| VI | 3 | 12 | 1 | 04 | 1 | 02 | - | 18 |
| VII | 3 | 11 | 1 | 03 | - | - | 06 | 20 |
| Total Credits | | | | | | | | 130 |

| TOTAL CREDITS | |
|---|---|
| Semester – I | 19 |
| Semester – II | 19 |
| Semester – III | 18 |
| Semester – IV | 18 |
| Semester – V | 18 |
| Semester – VI | 18 |
| Semester – VI | 20 |
| TOTAL CREDITS | 130 |

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## 22150II15P-PROBLEM SOLVING AND PYTHON PROGRAMMING

L T P C
3 0 0 3

OBJECTIVES:

On completion of the class, a student should be able:

- To knowthebasicsofalgorithmicproblemsolving
- To read and write simplePython programs.
- To develop Python programswithconditionals and loops.
- Todefine Pythonfunctions and call them.
- TousePython data structures –lists, tuples, dictionaries.

### UNIT-I ALGORITHMICPROBLEMSOLVING 9

Algorithms,buildingblocksofalgorithms(statements,state,controlflow,functions),notation(pseudocode, flowchart,programminglanguage),algorithmicproblemsolving,simplestrategies for developing algorithms(iteration,recursion).Illustrativeproblems:findminimuminalist,insertacar dinaguess an integer number in arrange. TowersofHanoi

### UNIT-II DATA, EXPRESSIONS, STATEMENTS 9

Python Interpreter and interactivemode ;valuesandtypes:int,float,boolean,string,andlist;variables ,expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables ,circulate the values of n variables, distance between two points.

### UNIT-III CONTROLFLOW, FUNCTIONS 9

Conditionals:Booleanvaluesandoperators,conditional(if),alternative(if-else),chainedconditional(if-elif-else); Iteration: state,while,for,break,continue,pass;functions:returnvalues,parameters, local and global scope, function composition, recursion; Strings: string slices,immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, suman array of numbers, linear search, binary search.

### UNIT-IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, listslices, listmethods,listloop,mutability,aliasing,cloninglists,list parameters;
Tuples: tupleassignment, tupleasreturnvalue;Dictionaries:operationsandmethods;advancedlist
Processing –list comprehension ;Illustrative programs: selection sort, insertion sort, merge sort, histogram.

### UNIT-V FILES, MODULES, PACKAGES 9

File sand exception:textfiles,readingandwritingfiles,formatoperator;commandline arguments, errors and exceptions,handling exceptions,modules, packages; Illustrative programs: word count, copy File.

**TOTAL:45 PERIODS**

**Text Book:**

Balagurusamy E, "Object Oriented Programming with C++", 3/E, TMG, 2006.

**Reference :**

1. Hubbard, "Programming with C++", 2/e, Schaum Outline Series, TMH, 2006.
2. Bjarne Stroustrup, "The C++ Programming Language", Addison Wesley Publications, Second

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## 22150H22P - PROGRAMMING IN C

**OBJECTIVES:**

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- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions, pointers and structures
- To do input outputand filehandlingin C

### UNIT-I BASICS OF C PROGRAMMING 12

Introduction to programming paradigms-Structure ofCprogram-Cprogramming:Data Types- Storage classes-Constants-EnumerationConstants-Keywords-Operators PrecedenceandAssociativity- Expressions-Input/outputstatements,Assignmentstatements-Decisionmakingstatements-Switch statement-Looping statements – Pre-processordirectives- Compilation process

### UNIT-II ARRAYS ANDSTRINGS 9+3

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy– Selection sort,linearand binary search

### UNIT-III FUNCTIONSANDPOINTERS 9+3

Introductiontofunctions:Functionprototype,functiondefinition,functioncall, Built-in functions(string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculate or using built- in functions, Binary Search using recursive functions-Pointers-Pointer operators-Pointer arithmetic –Arrays and pointers – Array of pointers –Example Program: Sorting of names-Parameter passing: Pass by value, Pass by reference-Example Program: Swapping of two numbers and changing the value of a variable using pass by reference

### UNIT-IV STRUCTURES 9+3

Structure-Nestedstructures-PointerandStructures-Arrayofstructures- ExampleProgramusing structures and pointers-Self –referential structures-Dynamic memory allocation-Singly linked list-typedef

### UNIT-V FILE PROCESSING 9+3

Files-Types of file processing: Sequential access, Random access-Sequential access file- Example Program: Findingaverageofnumbersstoredinsequentialaccessfile-Randomaccessfile- Example Program: Transaction processing using random access files – Command line arguments

**TOTAL:60 PERIODS**

**OUTCOMES:**

**Learners should be able to:**

- Develop simple applications in C using basic constructs
- Design and implement applications using arrays and strings
- Develop and implement applications in C using functions and pointers.
- Develop applications in C using structures.
- Design applications using sequential land random access file processing.

**TEXTBOOKS:**


1. ReemaThareja, —Programming in Cl, Oxford University Press, Second Edition, 2016.
2.Kernighan, B.W and Ritchie,D.M, —The C Programming languagel, Second Edition,



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## 22150H41P- SOFTWARE ENGINEERING FUNDAMENTALS

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**OBJECTIVES:**

- To know the generic models to structure the software development process.
- To understand different notion of complexity at both the module and system level.
- To be aware of some widely known design methods.
- To understand the role and contents of testing activities in different life cycle phases.

**UNIT -I SOFTWARE PROCESS** 9

Introdu-ction - S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

**UNIT -II SOFTWARE REQUIREMENT**

Sunctional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -S/W document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

**UNIT- III DESIGN CONCEPTS AND PRINCIPLES** 9

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems - Real time software design – system design – real time executives – data acquisition system - monitoring and control system. SCM – Need for SCM – Version control – Introduction to SCM process – Software configuration items.

**UNIT -IV TESTING** 9

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

**UNIT –V SOFTWARE PROJECT MANAGEMENT** 9

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking – Software changes – program evolution dynamics – software maintenance – Architectural evolution. Taxonomy of CASE tools.

**TOTAL : 45hrs**

**TEXT BOOK:**


1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 5th edition, 2001.


**REFERENCES:**


1. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
2. PankajJalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.



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## 22150H42P- INTERNET PROGRAMMING

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**OBJECTIVES:**

- To understand different Internet Technologies.
- To learn java-specific web services architectureTo design a context free grammar for any given language

**UNIT-I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0** 9

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message - Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

**UNIT-II CLIENT SIDE PROGRAMMING** 9

java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax - Function Files – Http Request – SQL.

**UNIT -III SERVER SIDE PROGRAMMING** 9

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

**UNIT-IV PHP and XML** 9

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

**UNIT -V INTRODUCTION TO AJAX and WEB SERVICES** 9

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

**TOTAL : 45 PERIODS**

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**OUTCOMES:**

**At the end of the course, the student should be able to:**

- Construct a basic website using HTML and Cascading Style Sheets.
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
- Develop server side programs using Servlets and JSP.
- Construct simple web pages in PHP and to represent data in XML format.
- Use AJAX and web services to develop interactive web applications Derive whether a problem is decidable or not.

**TEXTBOOKS:**


1.J Deitel and Deitel and Nieto, —Internet and World Wide Web - How to Programl, Prentice Hall, 5th Edition, 2011.


**REFERENCES:**


1. Stephen Wynkoop and John Burke —Running a Perfect Websitel, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, —Web Technologies A Computer Science Perspectivel Pearson Education, 2011.
4. Gopalan N.P. and AkilandeswariJ., Web Technologyl, Prentice Hall of India, 2011.
5. UttamK.Roy, —Web Technologiesl, Oxford University Press, 2011.


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## 22150S61P- CRYPTOGRAPHY AND NETWORK SECURITY

**OBJECTIVES:**

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

**UNIT-I INTRODUCTION** 9

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

**UNIT-II SYMMETRIC KEY CRYPTOGRAPHY**

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid"s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

**UNIT- III PUBLIC KEY CRYPTOGRAPHY** 9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

**UNIT- IV MESSAGE AUTHENTICATION AND INTEGRITY** 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509 Elliptic curve arithmetic-Elliptic curve cryptography.

**UNIT -V SECURITY PRACTICE AND SYSTEM SECURITY**

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

**TOTAL: 45 PERIODS**

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**OUTCOMES:**

**At the end of the course, the student should be able to:**

- Construct a basic website using HTML and Cascading Style Sheets.
- Build dynamic web page with validation using Java Script objects and

**REFERENCES:**

1. Stephen Wynkoop and John Burke —Running a Perfect Websi Edition,1999

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## 22150E44CP- PROFESSIONAL ETHICS IN ENGINEERING

**OBJECTIVES:**

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

**UNIT I HUMAN VALUES** **10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT II ENGINEERING ETHICS** **9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION** **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

**UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS** **9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

**UNIT V GLOBAL ISSUES** **8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

To apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

**TEXTBOOKS:**


1. Mike W. Martin and Roland Schinzinger, —Ethics in Engineering‖, Tata McGraw Hill, New Delhi,2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V, S, —Engineering Ethics‖, Prentice Hall of India,New Delhi, 2004


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**REFERENCES:**


1. Charles B. Fleddermann, —Engineering Ethics‖, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, —Engineering Ethics –Concepts and Cases‖, Cengage Learning, 2009.
3. John R Boatright, —Ethics and the Conduct of Business‖, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, —Fundamentals of Ethics for Scientists andEngineers‖, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, —Business Ethics: Decision Making for Personalintegrity and Social Responsibility‖ McGraw Hill education, India Pvt. Ltd., New Delhi, 2013.
6. 6. World Community Service Centre, ‗ Value Education', Vethathiri publications, Erode, 2011.


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## 2150II72P- GRID AND CLOUD COMPUTING

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**The student should be made to:**

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.

**Understand the security issues in the grid and the cloud environment**

### UNIT I INTRODUCTION 9

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

### UNIT II GRID SERVICES 9

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

### UNIT III VIRTUALIZATION 9

Clouddeployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

### UNIT IV PROGRAMMING MODEL 9

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework – Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

### UNIT V SECURITY 9

Trust models for Grid security environment – Authentication and Authorization methods –Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

### OUTCOME

**At the end of the course, the student should be able to:**

- Apply techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

### TEXT BOOK:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

### REFERENCES:

1. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications inthe Cloud", A Press, 2009
2. Tom White, "HadoopThe Definitive Guide", First Edition.

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O'Reilly, 2009.
3. Bo t Jacob (Editor), "Introduction to Grid Computing", IBM Red Books,Vervante, 2005
4. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009.
6. Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication, 2005.
7. Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall, CRC, Taylor and Francis Group, 2010.

## 22150E44BP- DATA WAREHOUSING AND DATA MINING LTPC 3104

**OBJECTIVES:**

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

**UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING(OLAP)**

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -
Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

**UNIT II DATA MINING – INTRODUCTION**

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques- Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

**UNIT III DATA MINING - FREQUENT PATTERN ANALYSIS**

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint
Based Frequent Pattern Mining, Classification using Frequent Patterns

**UNIT IV CLASSIFICATION AND CLUSTERING**

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection- Techniques to improve Classification Accuracy,Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering highdimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

**UNIT V WEKA TOOL**

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

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- Design a Data warehouse system and perform business analysis with OLAP tools
- Apply suitable pre-processing and visualization techniques for data analysis
- Apply frequent pattern and association rule mining techniques for data analysis
- Apply appropriate classification and clustering techniques for data analysis

**TEXTBOOK**

1. Jiawei Han and MichelineKamber, —Data Mining Concepts and Techniques‖, Third Edition,Elsevier, 2012.

**REFERENCES:**

1. Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP‖, TataMcGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, ShyamDiwakar and V. Ajay, —Insight into Data Mining Theory and
3. Practice‖,Eastern Economy Edition, Prentice Hall of India, 2006.
4. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools andTechniques‖, Elsevier, Second Edition.

## 22150E54AP- AD HOC AND SENSOR NETWORKS

**OBJECTIVES:**

**The student should be made to:**

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

**UNIT I INTRODUCTION** 9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures.
Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

**UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS** 9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

**UNIT IIIROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS** 9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

**UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS** 9

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

**UNIT V WSN ROUTING, LOCALIZATION & QOS** 9

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

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## 22150E73BP-INFORMATION RETRIEVALTECIHNIQUES LTPC 3003

**OBJECTIVES:**

- To understand the basics of Information Retrieval
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

**UNIT I INTRODUCTION** 9

Information Retrieval - Early Developments – The IR Problem – The User_s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search - Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

**UNIT II MODELING AND RETRIEVAL EVALUATION** 9

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

**UNIT III TEXT CLASSIFICATION AND CLUSTERING** 9

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes - Sequential Searching – Multi-dimensional Indexing.

**UNIT IV WEB RETRIEVAL AND WEB CRAWLING** 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures– Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank –Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms –Evaluation.

**UNIT V RECOMMENDER SYSTEM** 9

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering –
Collaborative Filtering – Matrix factorization models – Neighborhood models.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

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- Use an open source search engine framework and explore its capabilities
- Apply appropriate method of classification or clustering
- Design and implement innovative features in a search engine
- Design and implement a recommender system

**TEXTBOOKS:**

1. I RicardoBaeza Yates and BerthierRibeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2. Ricci, F, Rokach, L. Shapira, B.Kantor, —Recommender Systems Handbook‖, First Edition, 2011.

**REFERENCES:**

1. C. Manning, P. Raghavan, and H. Schütze, —Introduction to Information Retrieval, CambridgeUniversity Press, 2008.
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

## 22150E73DP-CYBER FORENSICS

| L | P | C |
|---|---|---|
| 3 | 0 | 3 |

**OBJECTIVES:**

- To learn computer forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data.

**UNIT I INTRODUCTION TO COMPUTER FORENSICS** 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

**UNIT II EVIDENCE COLLECTION AND FORENSICS TOOLS** 9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

**UNIT III ANALYSIS AND VALIDATION** 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

**UNIT IV ETHICAL HACKING** 9

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Introduction to Ethical Hacking – Foot printing and Reconnaissance – Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing.

**UNIT V ETHICAL HACKING IN WEB** 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers – Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

- Understand the basics of computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Identify the vulnerabilities in a given network infrastructure
- Implement real-world hacking techniques to test system security.

**TEXTBOOKS:**


1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —Computer Forensics and Investigationsl, Cengage Learning, India Edition, 2016.
2. CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.


**REFERENCES:**


1. John R.Vacca, —Computer Forensiesl, Cengage Learning, 2005
2. Marjie T.Britz, —Computer Forensics and Cyber Crimel: An Introductionl, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia — Ethical Hackingl Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik —Insider Computer Fraudl Auerbach Publications Taylor & Francis Group–2008.


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# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

# PROGRAM HANDBOOK

## M.Tech(PT)

[REGULATION 2022]

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## SEMESTER - I

| Semester. no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| I | 22248811AP | Higher Mathematics | 4 | 1 | 0 | 4 |
| I | 22250I112P | Adhoc & Sensor Networks | 4 | 0 | 0 | 4 |
| I | 22250I113P | Advanced Data Structures | 4 | 0 | 0 | 4 |
| Practical | | | | | | |
| I | 22250L14P | Advanced Web Technologies Lab | - | - | 3 | 3 |
| Total no of Credits | | | | | | 18 |

## SEMESTER - II

| Semester. no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250I121P | Middleware Technologies | 3 | 1 | 0 | 4 |
| II | 22250I122P | Internet of Things | 4 | 0 | 0 | 4 |
| II | 22250E23_P | Elective I | 3 | 0 | 0 | 3 |
| Practical | | | | | | |
| II | 22250L24P | .NET Technologies Lab | - | - | 3 | 3 |
| II | 222TECWRP | Technical Writing /Seminars | - | - | 3 | 3 |
| Total no of Credits | | | | | | 17 |

## SEMESTER - III

| Semester.no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250I131P | Modern Operating System | 4 | 0 | 0 | 4 |
| III | 22250E32P | Machine Learning Techniques | 4 | 0 | 0 | 4 |
| III | 22250E33_P | Elective-II | 3 | 0 | 0 | 3 |
| Total no of Credits | | | | | | 11 |

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## SEMESTER - IV

| Semester no. | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| IV | 22250H41P | Object Oriented Software Engineering | 4 | 0 | 0 | 4 |
| IV | 22250H42P | Software Project Management | 4 | 0 | 0 | 4 |
| IV | 22250E43_P | Elective-V | 3 | 0 | 0 | 3 |
| IV | 22250P44P | Project Work- Phase I | - | - | 6 | 10 |
| Total no of Credits | | | | | | 21 |

## SEMESTER - V

| Semester no. | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| V | 22250E51_P | Elective-IV | 3 | 0 | 0 | 3 |
| V | 22250E52_P | Elective-V | 3 | 0 | 0 | 3 |
| V | 22250E53_P | Elective-VI | 3 | 0 | 0 | 3 |
| Total no of Credits | | | | | | 9 |

## SEMESTER - VI

| Semester no. | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| VI | 22250P61P | Project Work- Phase II | 0 | 0 | 15 | 15 |
| Total no of Credits | | | | | | 15 |

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# LIST OF ELECTIVES

## SEMESTER - I ELECTIVE - I

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250E23AP | Advanced Distributed Computing | 3 | 0 | 0 | 3 |
| II | 22250E23BP | Data Warehousing & Data Mining | 3 | 0 | 0 | 3 |
| II | 22250E23CP | Information Retrieval Techniques | 3 | 0 | 0 | 3 |

## SEMESTER - II ELECTIVE - II

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E33AP | Multimedia Systems | 3 | 0 | 0 | 3 |
| III | 22250E33BP | Web Engineering | 3 | 0 | 0 | 3 |
| III | 22250E33CP | Software Metrics | 3 | 0 | 0 | 3 |

## SEMESTER - III - ELECTIVE - III

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250E43AP | Service Oriented Architecture | 3 | 0 | 0 | 3 |
| II | 22250E43BP | High Speed Networks | 3 | 0 | 0 | 3 |
| II | 22250E43CP | Language Technologies | 3 | 0 | 0 | 3 |

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## SEMESTER - IV - ELECTIVE - IV

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E51AP | Cloud Computing | 3 | 0 | 0 | 3 |
| III | 22250E51BP | Speech Processing and Synthesis | 3 | 0 | 0 | 3 |
| III | 22250E51CP | Soft Computing | 3 | 0 | 0 | 3 |

## SEMESTER - V - ELECTIVE - V

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E52AP | Advanced Database Technology | 3 | 0 | 0 | 3 |
| III | 22250E52BP | Reconfigurable Computing | 3 | 0 | 0 | 3 |
| III | 22250E52CP | Green Computing | 3 | 0 | 0 | 3 |

## SEMESTER - VI - ELECTIVE - VI

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E53AP | Software Quality Assurance | 3 | 0 | 0 | 3 |
| III | 22250E53BP | Bio-inspired Computing | 3 | 0 | 0 | 3 |
| III | 22250E53CP | Wireless Application Protocols | 3 | 0 | 0 | 3 |

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# CREDITS DISTRIBUTION

| Semester | Theory Courses | | Elective Courses | | Practical Courses | | Project | Total Credit |
|---|---|---|---|---|---|---|---|---|
| | Nos | Credit | Nos | Credit | Nos | Credit | Credit | |
| I | 3 | 12 | - | - | 1 | 03 | - | 15 |
| II | 2 | 08 | 1 | 03 | 2 | 06 | - | 17 |
| III | 2 | 08 | 1 | 03 | - | - | - | 11 |
| IV | 2 | 08 | 1 | 03 | 1 | - | 10 | 21 |
| V | - | - | 3 | 9 | - | - | - | 9 |
| VI | - | - | - | - | - | - | 15 | 15 |
| TOTAL | 9 | 36 | 6 | 18 | 3 | 9 | 21 | 87 |
| | | | | | | | | |
| TOTAL CREDITS | | | | | | | | 88 |

| TOTALCREDITS | |
|---|---|
| Semester – I | 15 |
| Semester – II | 17 |
| Semester – III | 11 |
| Semester – IV | 21 |
| Semester – V | 9 |
| Semester – VI | 15 |
| TOTAL | 88 |

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## 22250H22P - INTERNET OF THINGS

L T P C
4 0 0 4

**OBJECTIVES:**

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi
- To apply the concept of Internet of Things in the real world scenario.

### UNIT-I INTRODUCTION TO IoT

9

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG-IoT Platforms Design Methodology

### UNIT-II IoT ARCHITECTURE

9

M2M high-level ETSI architecture- IETF architecture for IoT- OG Architecture- IoT reference model- Domain model- information model- functional model- communication model- IoT reference architecture

### UNIT-III IoT PROTOCOLS

9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – ZigBee Architecture – Network layer – 6LoWPAN - CoAP - Security

### UNIT-IV BUILDING IoT WITH RASPBERRY PI & ARDUINO

9

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi -Raspberry Pi Interfaces -Programming Raspberry Pi with Python- Other IoT Platforms- Arduino.

**REFERENCE**


1. Arshdeep Bahga, Vijay Madisetti, —Internet of Things – A hands-on approach|, Universities Press, 2015
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things|, Springer, 2011.
3. Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspective|, CRC Press, 2012.
4. Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand David Boyle, "From Machine-to-Machine to the Internet of Things- Introduction to a New Age of Intelligence" ,Elsevier, 2014.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols|, Wiley, 2012


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## 22250E32P - MACHINE LEARNING TECHNIQUES

L T P C
4 0 0 4

**AIM:**
The main objective of this paper is to make the students to know the need of Machine Learning Techniques.

**OBJECTIVES:**
To introduce students to the basic concepts and techniques of Machine Learning.
To have a thorough understanding of the Supervised and Unsupervised learning techniques
To study the various probability based learning techniques
To understand graphical models of machine learning algorithms

**UNIT-I INTRODUCTION** **9**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron –DesignaLearningSystem –PerspectivesandIssuesinMachineLearning – ConceptLearningTask–ConceptLearningasSearch–FindingaMaximallySpecificHypothesis– VersionSpacesand the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – LinearSeparability–LinearRegression.

**UNIT-II LINEARMODELS** **9**

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation–RadialBasisFunctionsandSplines–Concepts–RBFNetwork– CurseofDimensionality–InterpolationsandBasisFunctions–SupportVectorMachines.

**UNIT-III TREE ANDPROBABILISTICMODELS** **9**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification andRegression Trees – Ensemble Learning – Boosting – Bagging – Different ways to CombineClassifiers – Probability and Learning – Data into Probabilities – Basic Statistics – GaussianMixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms –VectorQuantization–SelfOrganizingFeatureMap

**UNITIV DIMENSIONALITYREDUCTIONANDEVOLUTIONARYMODELS** **9**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – FactorAnalysis – Independent Component Analysis – Locally Linear Embedding – Isomap – LeastSquares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - GeneticOperators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting LostExample–MarkovDecisionProcess

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**UNIT V GRAPHICAL MODELS** 9

Markov Chain Monte Carlo Methods–Sampling–Proposal Distribution–Markov Chain Monte Carlo–Graphical Models–Bayesian Networks–Markov Random Fields–Hidden Markov Models–Tracking Methods

**Total : 45 hrs**

**REFERENCES:**


1. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
4. Stephen Marsland, —Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014
5. Tom M Mitchell, —Machine Learning‖, First Edition, McGraw Hill Education, 2013.


## 22250ES1P-SPEECH PROCSESSING AND SYSTHESIS

L T P C

3 0 0 3

**OBJECTIVES**

To understand the mathematical foundations needed for speech processing
To understand the basic concepts and algorithms of speech processing and synthesis To familiarize the students with the various speech signal representation, coding and recognition techniques
To appreciate the use of speech processing in current technologies and to expose the students to real–world applications of speech processing

**UNIT –I FUNDAMENTALS OF SPEECH PROCESSING** 9

Introduction – Spoken Language Structure – Phonetics and Phonology – Syllables and Words–Syntax and Semantics–Probability, Statistics and Information Theory– Probability Theory–Estimation Theory–Significance Testing–Information Theory.

**UNIT-II SPEECH SIGNAL REPRESENTATIONS AND CODING** 9

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Overview of Digital Signal Processing – Speech Signal Representations – Short time FourierAnalysis
Acoustic Model of Speech Production – Linear Predictive Coding – CepstralProcessing
FormantFrequencies– TheRoleofPitch–SpeechCoding–LPCCoder.

**UNIT III SPEECHRECOGNITION** 9

Hidden Markov Models – Definition – Continuous and Discontinuous HMMs – PracticalIssues –
Limitations. Acoustic Modeling – Variability in the Speech Signal – ExtractingFeatures – Phonetic
Modeling – Adaptive Techniques – Confidence Measures – OtherTechniques.

**UNIT-IVTEXTANALYSIS**

Lexicon – Document Structure Detection – Text Normalization – Linguistic Analysis –
HomographDisambiguation–Morphological Analysis–Letter-to-soundConversion–
Prosody–Generationschematic–SpeakingStyle–SymbolicProsody–DurationAssignment–
PitchGeneration

**UNIT-V- SPEECHSYNTHESIS**

Attributes–FormantSpeechSynthesis–ConcatenativeSpeechSynthesis–Prosodic
ModificationofSpeech–
ourcefilterModelsforProsodyModification–EvaluationofTTSSystems.

**REFERENCES:** **TOTAL: 45PERIODS**


1. JosephMariani,—LanguageandSpeechProcessing‖,W iley,2009.
2. LawrenceRabinerandBiing-HwangJuang,—FundamentalsofSpeechRecognition‖,Pre nticeHallSignal ProcessingSeries,1993.
3. SadaokiFurui,—DigitalSpeechProcessing,Synthesis,andRecognition,SecondEditio n,(Si gnal ProcessingandCommunications)‖, Marcel Dekker,2000.
4. ThomasF.Quatieri,—Discrete-TimeSpeechSignalProcessing‖,PearsonEducation,2002.
5. XuedongHuang,AlexAcero,Hsiao-Wuen Hon,—Spoken Language Processing–A guidetoTheory,AlgorithmandSystemDevelopment‖,Prentice HallPTR,2001


## 22250E52BP - RECONFIGURABLE COMPUTING

**L T P C**
**4 0 0 4**

**OBJECTIVES:**

- Tounderstandtheneedforreconfigurable computing
- Toexposethestudents tovariousdevicearchitectures
- Toexamine thevarious reconfigurablecomputing systems
- Tounderstandthedifferenttypes ofcomputemodelsforprogramming reconfigurable
- architectures
- Toexpose thestudentstoHDL programmingandfamiliarizewith thedevelopment

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- environment
- Toexposethestudents tothevariousplacementandroutingprotocols
- Todevelopapplications with FPGAs

**UNITI DEVICEARCHITECTURE**

GeneralPurposeComputingVsReconfigurableComputing– SimpleProgrammableLogicDevices–ComplexProgrammableLogicDevices–FPGAs– DeviceArchitecture-CaseStudies.

**UNITIIRECONFIGURABLECOMPUTINGARCHITECTURESANDSYSTEMS** 9

ReconfigurableProcessingFabricArchitectures– RPFIntegrationintoTraditionalComputingSystems– ReconfigurableComputingSystems– CaseStudies–ReconfigurationManagement.

**UNITIIIPROGRAMMINGRECONFIGURABLESYSTEMS**

ComputeModels-ProgrammingFPGAApplicationsinHDL– CompilingCforSpatialComputing

**–OperatingSystemSupportforReconfigurableComputing. UNITIVMAPPINGDESIGNS TORECONF**

TheDesignFlow -Technology Mapping–FPGAPlacementandRouting– ConfigurationBitstreamGeneration–CaseStudieswithAppropriateTools.

**UNITV APPLICATIONDEVELOPMENTWITH FPGAS** 9

CaseStudiesofFPGAApplications–SystemonaProgrammableChip(SoPC)Designs.

**TOTAL:45PERIODS**

**REFERENCES:**


1. ChristopheBobda,—IntroductiontoReconfigurableComputing– Architectures,AlgorithmsandApplications|,Springer,2010.
2. MayaB GokhaleandPaulS.Graham,—ReconfigurableComputing:Acce lerating ComputationwithField-Programmable GateArrays|,Springer,2005.
3. FPGAFrontiers:NewApplicationsinReconfigurableComputing,2017,NicoleHem soth,TimothyPrickettMorgan,NextPlatform.
4. ReconfigurableComputing:FromFPGAs toHardware/SoftwareCodesign 2011Editionby JoaoCardoso(Editor),MichaelHübne,Springer
5. ScottHauckandAndreDehon(Eds.), —ReconfigurableComputing– TheTheory andPracticeofFPGA-


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## 22250E53BP - BIO-INSPIRED COMPUTING

L T P C
4 0 0 4

OBJECTIVES:

- Build a solid foundation and acquire the vocabulary you need to supervise or to communicate with others who use these tools.
- To have ability to design drugs.
- To understand Evolutionary Trees and Phylogeny.
- Learn the key methods and tools used in bioinformatics.

**UNIT I FUNDAMENTALS 7**

The Central Dogma – Killer Application – Parallel Universes – Watson's Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications.

**UNIT II DATABASE AND NETWORKS 9**

Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

**UNIT III SEARCH ENGINES AND DATA VISUALIZATION 10**

Search Process – Technologies – Searching and Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation.

**UNIT IV STATISTICS– DATA MINING AND PATTERN MATCHING 11**

Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

**UNIT V MODELING SIMULATION AND COLLABORATION 8**

Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration and Communication – Standards – Issues – Case Study.

**Total: 45hrs**

**TEXT BOOK:**

1. Bryan Bergeron, "Bio Informatics Computing", Prentice Hall, 2003.

**REFERENCES:**

1. T.K. Affward, D.J. Parry Smith, "Introduction to Bio Informatics", Pearson Education, 2001.
2. Pierre Baldi, Soren Brunak, "Bio Informatics The Machine Learning Approach", 2nd Edition, First East West Press, 2003.

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## 22250E33BP- WEB ENGINEERING

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OBJECTIVES:

- Understandthecharacteristics ofweb applications
- Learnto Model webapplications
- Be awareofSystematicdesign methods
- Befamiliarwiththetestingtechniquesforweb applications

**UNIT I INTRODUCTIONTOWEBENGINEERING**

Motivation,CategoriesofWebApplications,CharacteristicsofWebApplications,Requirements of Engineering in Web Application Web Engineering-Components of WebEngineeringWebEngineeringProcess-Communication-Planning

**UNIT II WEB APPLICATION ARCHITECTURES & MODELLING WEBAPPLICATIONS 9**

Introduction-CategorizingArchitecturesSpecificsofWebApplicationArchitectures,Components of a Generic Web Application Architecture- Layered Architectures, 2-LayerArchitectures,N-LayerArchitectures-DataaspectArchitectures,Database centricArchitectures- Architectures for Web Document Management- Architectures for MultimediaData-ModelingSpecifications WebEngineering,Levels,Aspects,PhasesCustomization,ModelingRequirements,HypertextModeling,Hypertext tructureModelingConcepts,Access Modeling Concepts, Relation to Content Modeling, Presentation Modeling, Relations Hypertext Modeling, Customization Modeling, Modelling Framework-Modeling languages-Analysis Modeling for Web Apps-The Content Model-The Interaction Model-ConfigurationModel

**UNIT III WEB APPLICATIONDESIGN**

Design for WebApps- Goals-Design Process-Interactive Design- Principles and GuidelinesWorkflow-Preliminaries-DesignSteps Usability-Issues-InformationDesignInformationArchitecture- structuring- Accessing Information-Navigation Design- Functional Design-WepApp Functionality-DesignProcess-FunctionalArchitecture- Detailed Functional Design

**UNITIV TESTINGWEBAPPLICATIONS 9**

Introduction-Fundamentals-TestSpecificsinWebEngineering-TestApproachesConventionalApproaches,AgileApproaches-Testingconcepts-TestingProcess-TestSchemeTest Methods and Techniques- Link Testing- Browser Testing-Usability Testing Load, Stress, and Continuous Testing, Testing Security, Test-driven Development, - ContentTesting-Userinterfacetesting Usability Testing-CompatibilityTestingComponentLevelTesting-Navigation Testing-Configuration testing-Security and Performance Testing- TestAutomation.

**UNITV PROMOTINGWEBAPPLICATIONS ANDWEBPROJECT MANAGEMENT 9**

Introduction-challengesinlaunchingthewebApplication-PromotingWebApplicationContentManagement-UsageAnalysis-WebProjectManagement-ChallengesinWebProject Management-Managing Web Team- Managing the Development Process of WebApplication- Risk, Developing a Schedule, Managing Quality, Managing Change, TrackingtheProject.Introduction tonode.JS websockets.

**TOTAL: 45 PERIODS**

REFERENCES:

1. ChrisBates,—WebProgramming:BuildingInternetApplications|,ThirdEdition,WileyIndi aEdition,2007.

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## 22250E23DP- LANGUAGE TECHNOLOGIES

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**OBJECTIVES**

- Tolearnthefundamentals ofnaturallanguageprocessing
- Toappreciatetheuse ofCFGandPCFGin NLP
- Tounderstand theroleofsemantics and pragmatics

**UNIT I INTRODUCTION** 9

Words-RegularExpressionsandAutomata-WordsandTransducers-N-grams-Part-of-Speech Tagging-HiddenMarkovandMaximumEntropyModels.

**UNIT II SPEECH** 9

Speech-Phonetics-SpeechSynthesis-AutomaticSpeechRecognition-SpeechRecognition - AdvancedTopics-ComputationalPhonolo

**UNIT III SYNTAX** 9

FormalGrammarsofEnglish-SyntacticParsing-StatisticalParsing-FeaturesandUnification - LanguageandComplexity.

**UNIT IV SEMANTICSANDPRAGMATICS** 9

TheRepresentationofMeaning-ComputationalSemantics-LexicalSemanticsComputationalLexicalSemantics -ComputationalDiscou

**UNIT V APPLICATIONS** 9

InformationExtraction-QuestionAnsweringandSummarizationDialogueandConversationalAgents-MachineTranslation.

**TOTAL:45PERIODS**

**OUTCOMES:**

Uponcompletionofthiscourse,thestudentsshouldbeableto:

- Totagagiventextwith basicLanguagefeatures
- Todesignaninnovative application usingNLP components
- Toimplementarule basedsystemtotacklemorphology/syntaxofalanguage
- Todesigna tagsettobeusedfor statisticalprocessingforreal-timeapplications
- To compare and contrast use of different statistical approaches for different types ofNLPapplications.

**REFERENCES:**


1.Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", AtlanticPublisher,2f

2.DanielJurafsky,"SpeechandLanguageProcessing:An IntroductiontoNaturalLanguage Processing, Computational Linguistics Speech", Pearson Publication,2014.

3.NitinIndurkhya and Fred J. Dameratt, "Handbook of Natural Langu Processing",SecondEdition,ChapmanandHall/CRCPress,2010.

4. RichardM Reese,"NaturalLanguage Processing withJava",O_ReillyMedia,2015.

5.Steven Bird, Ewan Klein and Edward Loper, -"Natural Language Processing with Python",FirstEdition,O_ReillyMedia,2009.


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**2225IT23CP-INFORMATIONRETRIEVALTECHNIQUES** **LTPC**
**3003**

**OBJECTIVES:**

- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

**UNIT I INTRODUCTION** **9**

Information Retrieval – Early Developments – The IR Problem – The User_s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

**UNIT II MODELING AND RETRIEVAL EVALUATION** **9**

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

**UNIT III TEXT CLASSIFICATION AND CLUSTERING** **9**

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing.

**UNIT IV WEB RETRIEVAL AND WEB CRAWLING** **9**

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures– Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank –Evaluations – Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms –Evaluation.

**UNIT V RECOMMENDER SYSTEM** **9**

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering –
Collaborative Filtering – Matrix factorization models – Neighborhood models..

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

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- Use an open source search engine framework and explore its capabilities
- Apply appropriate method of classification or clustering.
- Design and implement innovative features in a search engine.
- Design and implement a recommender system.

**TEXTBOOKS:**


3. 1.RicardoBaeza-Yates and BerthierRibeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
4. Ricci, F, Rokach, L. Shapira, B.Kantor, —Recommender Systems Handbookl, First Edition, 2011.


**REFERENCES:**


3. C. Manning, P. Raghavan, and H. Schütze, —Introduction to Information Retrieval, CambridgeUniversity Press, 2008.
4. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval:Implementing and Evaluating Search Engines, The MIT Press, 2010.


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# DEPARTMENT OF
# COMPUTER SCIENCE & ENGINEERING

# PROGRAM HANDBOOK

## M.Tech
## COMPUTER SCIENCE AND ENGINEERING
## [ FULL TIME ]

[ REGULATION 2022 ]

*[For candidates admitted to M.Tech CSE program from June 2022 onwards]*

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# SEMESTER – I

| Semester. no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| I | 22248S11A | Higher Mathematics | 4 | 1 | 0 | 4 |
| I | 22250H12 | Modern Operating System | 4 | 0 | 0 | 4 |
| I | 22250H13 | Machine Learning Techniques | 4 | 0 | 0 | 4 |
| I | 22250H14 | Adhoc and Sensor Network | 4 | 0 | 0 | 4 |
| I | 22250H15 | Advanced Data Structures and Algorithms | 4 | 1 | 0 | 4 |
| I | 22250E16_ | Elective - I | 3 | 0 | 0 | 3 |
| **Practical** | | | | | | |
| I | 22250L17 | Advanced Web Technologies Lab | - | - | 3 | 3 |
| **Total no of Credit** | | | | | **26** | |

# SEMESTER – II

| Semester. no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250H21 | Middleware Technologies | 3 | 1 | 0 | 4 |
| II | 22250H22 | Object Oriented Software Engineering | 4 | 0 | 0 | 4 |
| II | 22250H23 | Internet of Things | 4 | 0 | 0 | 4 |
| II | 22250E24_ | Elective II | 3 | 0 | 0 | 3 |
| II | 22250E25_ | Elective – III | 3 | 0 | 0 | 3 |
| **Practical** | | | | | | |
| II | 22250L26 | .NET Technologies Lab | - | - | 3 | 3 |
| II | 222TECWR | Technical Writing /Seminars | - | - | 3 | 3 |
| **Total no of Credit** | | | | | **24** | |

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# SEMESTER – III

| Semester.no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250H31 | Software Project Management | 4 | 0 | 0 | 4 |
| III | 22250E32_ | Elective-IV | 3 | 0 | 0 | 3 |
| III | 22250E33_ | Elective-V | 3 | 0 | 0 | 3 |
| III | 22250E34_ | Elective-VI | 3 | 0 | 0 | 3 |
| III | 22250P35 | Project Work- Phase I* | - | - | 10 | 10 |
| **Total no of Credit** | | | | | | **23** |

## SEMESTER – IV

| Semester no. | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| IV | 22250P41 | Project Work- Phase II* | - | - | 15 | 15 |
| **Total no of Credit** | | | | | | **15** |

*** - Only review will be conducted**

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# List of Electives
## Semester – I - Elective – I

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| I | 22250E16A | Multimedia Systems | 3 | 0 | 0 | 3 |
| I | 22250E16B | Web Engineering | 3 | 0 | 0 | 3 |
| I | 22250E16C | Software Metrics | 3 | 0 | 0 | 3 |

## SEMESTER – II - Elective – II

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250E24A | Advanced Distributed Computing | 3 | 0 | 0 | 3 |
| II | 22250E24B | Data Warehousing & Data Mining | 3 | 0 | 0 | 3 |
| II | 22250E24C | Information Retrieval Techniques | 3 | 0 | 0 | 3 |

## SEMESTER – II - Elective – III

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| II | 22250E25A | Service Oriented Architecture | 3 | 0 | 0 | 3 |
| II | 22250E25B | High Speed Networks | 3 | 0 | 0 | 3 |
| II | 22250E25C | Language Technologies | 3 | 0 | 0 | 3 |

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## SEMESTER – III - Elective – IV

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E32A | Cloud Computing | 3 | 0 | 0 | 3 |
| III | 22250E32B | Speech Processing and Synthesis | 3 | 0 | 0 | 3 |
| III | 22250E32C | Soft Computing | 3 | 0 | 0 | 3 |

## SEMESTER – III - Elective – V

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E33A | Advanced Database Technology | 3 | 0 | 0 | 3 |
| III | 22250E33B | Reconfigurable Computing | 3 | 0 | 0 | 3 |
| III | 22250E33C | Green Computing | 3 | 0 | 0 | 3 |

## SEMESTER – III - Elective – VI

| Semester no | Subject Code | Subject Title | Periods per Week | | | C |
|---|---|---|---|---|---|---|
| | | | L | T | P | |
| III | 22250E34A | Software Quality Assurance | 3 | 0 | 0 | 3 |
| III | 22250E34B | Bio-inspired Computing | 3 | 0 | 0 | 3 |
| III | 22250E34C | Wireless Application Protocols | 3 | 0 | 0 | 3 |

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# CREDITS DISTRIBUTION

| Semester | Theory Courses | | Elective Courses | | Practical Courses | | Total Credits |
|---|---|---|---|---|---|---|---|
| | Nos. | Credits | Nos. | Credits | Nos. | Credits | |
| I | 05 | 20 | 01 | 03 | 01 | 03 | 26 |
| II | 03 | 12 | 02 | 06 | 02 | 06 | 24 |
| III | 01 | 04 | 03 | 9 | 01 | 10 | 23 |
| IV | - | - | - | - | 01 | 15 | 15 |
| TOTAL | | | | | | | 88 |

| TOTAL CREDITS | |
|---|---|
| Semester – I | 26 |
| Semester – II | 24 |
| Semester – III | 23 |
| Semester – IV | 15 |
| **TOTAL** | **88** |

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## 22250H23 - INTERNET OF THINGS L T P C 4 0 0 4

**OBJECTIVES:**

- Tounderstandthefundamentalsof InternetofThings
- Tolearn about thebasicsofIOT protocols
- Tobuild asmalllowcostembeddedsystem usingRaspberry Pi.

Toapply theconceptofInternetofThingsinthereal worldscenario.

### UNIT-I INTRODUCTION TOIoT 9

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels &Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management withNETCONF-YANG-IoTPlatformsDesign Methodology

### UNIT-II IoT ARCHITECTURE 9

M2Mhigh-levelETSIarchitecture-IETFarchitectureforIoT-OGCarchitecture-IoTreference model-Domainmodel-informationmodel-functionalmodel-communicationmodel-IoTreferencearchitecture

### UNIT-III IoTPROTOCOLS 9

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus- ZigbeeArchitecture–Networklayer–6LowPAN-CoAP-Security

### UNIT-IV BUILDINGIoTWITH RASPBERRY PI&ARDUINO 9

Building IOT with RASPERRY PI-IoT Systems - Logical Design using Python – IoT PhysicalDevices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi -RaspberryPi Interfaces -ProgrammingRaspberryPi with Python- Other IoTPlatforms-Arduino.

**REFERENCE**


1.ArshdeepBahga,VijayMadisetti,—InternetofThings-Ahands-on approachI,UniversitiesPress,2015

2.Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting theInternetofThingsI,Springer,2011.

3.HonboZhou,—TheInternetofThingsintheCloud:AMiddlewarePerspectiveI, CRCPress,2012.

4.Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, StefanAvesand.DavidBoyle,"FromMachine-to-Machine totheInternetofThings-Introductiontoa NewAgeofIntelligence",Elsevier, 2014.

5.Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – KeyApplicationsandProtocolsI,Wiley,2012


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## 22250H13 - MACHINE LEARNING TECHNIQUES

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**AIM:**

The main objective of this paper is to make the students to know the need of Machine Learning Techniques.

**OBJECTIVES:**

To introduce students to the basic concepts and techniques of Machine Learning.
To have a thorough understanding of the Supervised and Unsupervised learning techniques
To study the various probability based learning techniques
To understand graphical models of machine learning algorithms

**UNIT-I INTRODUCTION** 9

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron –DesignaLearningSystem –PerspectivesandIssuesinMachineLearning – ConceptLearningTask–ConceptLearningasSearch–FindingaMaximallySpecificHypothesis– VersionSpacesand the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – LinearSeparability–LinearRegression.

**UNIT-II LINEARMODELS** 9

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation–RadialBasisFunctionsandSplines–Concepts–RBFNetwork– CurseofDimensionality–InterpolationsandBasisFunctions–SupportVectorMachines.

**UNIT-III TREE ANDPROBABILISTICMODELS** 9

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification andRegression Trees – Ensemble Learning – Boosting – Bagging – Different ways to CombineClassifiers – Probability and Learning – Data into Probabilities – Basic Statistics – GaussianMixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms –VectorQuantization–SelfOrganizingFeatureMap

**UNITIV DIMENSIONALITYREDUCTIONANDEVOLUTIONARYMODELS** 9

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – FactorAnalysis – Independent Component Analysis – Locally Linear Embedding – Isomap – LeastSquares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - GeneticOperators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting LostExample–MarkovDecisionProcess

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**UNITV GRAPHICALMODELS** 9

Markov ChainMonteCarloMethods–Sampling–ProposalDistribution–MarkovChainMonte Carlo–GraphicalModels–BayesianNetworks–MarkovRandomFields– HiddenMarkovModels–TrackingMethods

**Total : 45 hrs**

**REFERENCES:**


7. EthemAlpaydin,—IntroductiontoMachineLearning3e(AdaptiveComputationandMachineLearning Series)I, ThirdEdition,MITPress,2014

8. JasonBell,—MachineLearning– HandsonforDevelopersandTechnicalProfessionalsI,FirstEdition,Wiley, 2014
9. PeterFlach,—MachineLearning:TheArtandScienceofAlgorithmsthatMakeSenseofDataI,FirstEdition,CambridgeUniversity Press,2012.
10. StephenMarsland,—MachineLearning–
11. AnAlgorithmicPerspectiveI,SecondEdition,ChapmanandHall/CRCMachineLearningandatter nRecognitionSeries,2014.
12. TomMMitchell,—MachineLearningI,FirstEdition,McGrawHillEducation,2013.


## 2225E32B-SPEECH PROCSESSING AND SYSTHESIS

LTPC

3003

**OBJECTIVES**

To understand the mathematical foundations needed for speech processing
To understand the basic concepts and algorithms of speech processing and synthesis To familiarize the students with the various speech signal representation, coding and recognition techniques
To appreciate the use of speech processing in current technologies and to expose the students to real–world applications of speech processing

**UNIT –I FUNDAMENTALSOFSPEECHPROCESSING** 9

Introduction – Spoken Language Structure – Phonetics and Phonology – SyllablesandWords– SyntaxandSemantics–Probability,StatisticsandInformationTheory– ProbabilityTheory– EstimationTheory–SignificanceTesting–InformationTheory.

**UNIT-II SPEECHSIGNALREPRESENTATIONSANDCODING** 9

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Overview of Digital Signal Processing – Speech Signal Representations – Short time FourierAnalysis Acoustic Model of Speech Production – Linear Predictive Coding – CepstralProcessing FormantFrequencies–TheRoleofPitch–SpeechCoding–LPCCoder.

**UNIT III SPEECHRECOGNITION** 9

Hidden Markov Models – Definition – Continuous and Discontinuous HMMs – PracticalIssues Limitations. Acoustic Modeling – Variability in the Speech Signal – ExtractingFeatures – Phonetic Modeling – Adaptive Techniques – Confidence Measures – OtherTechniques.

**UNIT-IV TEXTANALYSIS** 9

Lexicon – Document Structure Detection – Text Normalization – Linguistic Analysis –HomographDisambiguation–Morphological Analysis–Letter-to-soundConversion– Prosody–Generationschematic–SpeakingStyle–SymbolicProsody–DurationAssignment– PitchGeneration

**UNIT-V- SPEECHSYNTHESIS** 9

Attributes–FormantSpeechSynthesis–ConcatenativeSpeechSynthesis–Prosodic ModificationofSpeech– ourcefilterModelsforProsodyModificationEvaluationofTTSSystems.

**TOTAL: 45 PERIODS**

**REFERENCES:**


1. JosephMariani,—LanguageandSpeechProcessingI,W iley,2009.
2. LawrenceRabinerandBiing-HwangJuang,—FundamentalsofSpeechRecognitionI,Pre nticeHallSignal ProcessingSeries,1993.
3. SadaokiFurui,—DigitalSpeechProcessing:Synthesis,andRecognition,SecondEditio n.(Si gnal ProcessingandCommunications)I, Marcel Dekker,2000.
4. ThomasF.Quatieri,—Discrete-TimeSpeechSignalProcessingI,PearsonEducation,2002.
5. XuedongHuang,AlexAcero,Hsiao-Wuen Hon,—SpokenLanguageProcessing–A guidetoTheory,AlgorithmandSystemDevelopmentI,Prentice HallPTR,2001.


## 22250E33B- RECONFIGURABLE COMPUTING

**L T P C**
**4 0 0 4**

**OBJECTIVES:**

- Tounderstandtheneedforreconfigurable computing
- Toexposethestudents tovariousdevicearchitectures
- Toexamine thevarious reconfigurablecomputing systems

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- Tounderstandthedifferenttypes ofcomputemodelsforprogramming reconfigurable
- architectures
- Toexpose thestudentstoHDL programmingandfamiliarizewith thedevelopment
- environment
- Toexposethestudents tothevariousplacementandroutingprotocols
- Todeveloapplications with FPGAs

**UNITI DEVICEARCHITECTURE**

GeneralPurposeComputingVsReconfigurableComputing– SimpleProgrammableLogicDevices–ComplexProgrammableLogicDevices–FPGAs– DeviceArchitecture-CaseStudies.

**UNITIIRECONFIGURABLECOMPUTINGARCHITECTURESANDSYSTEMS**

ReconfigurableProcessingFabricArchitectures– RPFIntegrationintoTraditionalComputingSystems– ReconfigurableComputingSystems– CaseStudies–ReconfigurationManagement.

**UNITIIIPROGRAMMINGRECONFIGURABLESYSTEMS**

ComputeModels-ProgrammingFPGAApplicationsinHDL– CompilingCforSpatialComputing

–**OperatingSystemSupportforReconfigurableComputing. UNITIVMAPPINGDESIGNS TORECONFI(**

TheDesignFlow -Technology Mapping–FPGAPlacementandRouting– ConfigurationBitstreamGeneration–CaseStudieswithAppropriateTools.

**UNITV APPLICATIONDEVELOPMENTWITH FPGAS** 9

CaseStudiesofFPGAApplications–SystemonaProgrammableChip(SoPC)Designs.

**TOTAL:45PERIODS**

**REFERENCES:**


6. ChristopheBobda,—IntroductiontoReconfigurableComputing– Architectures,AlgorithmsandApplications|,Springer,2010.
7. MayaB.GokhaleandPaulS.Graham,—ReconfigurableComputing:Acce IeratingComputationwithFi Programmable GateArrays|,Springer,2005.
8. FPGAFrontiers:NewApplicationsinReconfigurableComputing,2017,NicoleHem soth,TimothyPricketMorgan,NextPlatform.
9. ReconfigurableComputing:FromFPGAs toHardware/SoftwareCodesign 2011Editic JoaoCardoso(Editor),MichaelHübne,Springer
10. ScottHauckandAndreDehon(Eds.), —ReconfigurableComputing–TheTheory andPracticeofFPGA-


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**22250E34B - BIO-INSPIRED COMPUTING** **L T P C**
**4 0 0 4**

OBJECTIVES:

- Build a solid foundation and acquire the vocabulary you need to supervise or to communicate with others who use these tools.
- To have ability to design drugs.
- To understand Evolutionary Trees and Phylogeny.
- Learn the key methods and tools used in bioinformatics.

**UNIT I FUNDAMENTALS 7**
The Central Dogma – Killer Application – Parallel Universes – Watson's Definition – Top Down Vs Bottom Up Approach – Information Flow – Convergence – Communications.

**UNIT II DATABASE AND NETWORKS 9**
Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

**UNIT III SEARCH ENGINES AND DATA VISUALIZATION 10**
Search Process – Technologies – Searching and Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation.

**UNIT IV STATISTICS– DATA MINING AND PATTERN MATCHING 11**
Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

**UNIT V MODELING SIMULATION AND COLLABORATION 8**
Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration and Communication – Standards – Issues – Case Study.

**Total: 45hrs**

**TEXT BOOK:**

1. Bryan Bergeron, "Bio Informatics Computing", Prentice Hall, 2003.

**REFERENCES:**

3. T.K. Affward, D.J. Parry Smith, "Introduction to Bio Informatics", Pearson Education, 2001.
4. Pierre Baldi, Soren Brunak, "Bio Informatics The Machine Learning Approach", 2nd Edition, First East West Press, 2003.

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## 22250E16B- WEB ENGINEERING

L T P C
4 0 0 4

OBJECTIVES:

- Understandthecharacteristics ofweb applications
- Learnto Model webapplications
- Be awareofSystematicdesign methods
- BeFamiliarwiththetestingtechniquesforweb applications

**UNIT I INTRODUCTIONTOWEBENGINEERING**

Motivation,CategoriesofWebApplications,CharacteristicsofWebApplications Requirements of Engineering in Web Application Web Engineering-Components of WebEngineeringWebEngineeringProcess-Communication-Planning.

**UNIT II WEB APPLICATION ARCHITECTURES & MODELLING WEBAPPLICATIONS** 9

Introduction-CategorizingArchitecturesSpecificsofWebApplicationArchitectures,Components of a Generic Web Applicatio Architecture- Layered Architectures, 2-LayerArchitectures,N-LayerArchitectures-DataaspectArchitectures,Databas centric Architectures- Architectures for Web Document Management- Architectures for MultimediaData-ModelingSpecifics WebEngineering,Levels,Aspects,PhasesCustomization,ModelingRequirements,HypertextModeling,Hypertext tructureModelingConcepts,Access Modeling Concepts, Relation to Content Modeling, Presentation Modeling, Relation Hypertext Modeling, Customization Modeling, Modelling Framework-Modeling languages-Analysis Modeling for Web Apps-Th Content Model-The Interaction Model-ConfigurationModel.

**UNIT III WEB APPLICATIONDESIGN** 9

Design for WebApps- Goals-Design Process-Interactive Design- Principles and GuidelinesWorkflow-Preliminaries-DesignSteps Usability-Issues-InformationDesignInformationArchitecture- structuring- Accessing Information-Navigation Design- Functiona Design-WepApp Functionality-DesignProcess-FunctionalArchitecture- Detailed Functional Design

**UNITIV TESTINGWEBAPPLICATIONS** 9

Introduction-Fundamentals-TestSpecificsinWebEngineering-TestApproachesConventionalApproaches,AgileApproaches-Testingconcepts-TestingProcess-TestSchemeTest Methods and Techniques- Link Testing- Browser Testing-Usability Testing Load, Stress, and Continuous Testing, Testing Security, Test-driven Development, - ContentTesting-UserInterfacetesting UsabilityTesting-CompatibilityTestingComponentLevelTesting-Navigation Testing-Configuration testing-Security an Performance Testing- TestAutomation.

**UNITV PROMOTINGWEBAPPLICATIONS ANDWEBPROJECT MANAGEMENT** 9

Introduction-challengesinlaunchingthewebApplication-PromotingWebApplicationContentManagement-UsageAnalysis-WebProjectManagement-ChallengesinWebProject Management-Managing Web Team- Managing the Development Process of WebApplication- Risk, Developing a Schedule, Managing Quality, Managing Change, TrackingtheProject.Introduction tonodeJS websockets.

**TOTAL: 45 PERIODS**

REFERENCES:

1. ChrisBates,—WebProgramming:BuildingInternetApplications|,ThirdEdition,WileyIndi aEdition,2007.

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## 22250E25C- LANGUAGETECHNOLOGIES

L T P C
4 0 0 4

OBJECTIVES:

- Tolearnthefundamentals ofnaturallanguageprocessing
- Toappreciatetheuse ofCFGandPCFGin NLP
- Tounderstand theroleofsemantics and pragmatics

**UNITI INTRODUCTION** 9

Words-RegularExpressionsandAutomata-WordsandTransducers-N-grams-Part-of-Speech-Tagging-HiddenMarkovandMaximumEntropyModels.

**UNITII SPEECH** 9

Speech-Phonetics-SpeechSynthesis-AutomaticSpeechRecognition-SpeechRecognition:- AdvancedTopics-ComputationalPhonolo

**UNITIII SYNTAX** 9

FormalGrammarsofEnglish-SyntacticParsing-StatisticalParsing-FeaturesandUnification - LanguageandComplexity.

**UNITIV SEMANTICSANDPRAGMATICS** 9

TheRepresentationofMeaning-ComputationalSemantics-LexicalSemanticsComputationalLexicalSemantics -ComputationalDiscou

**UNITV APPLICATIONS** 9

InformationExtraction-QuestionAnsweringandSummarizationDialogueandConversationalAgents-MachineTranslation.

TOTAL:45PERIODS

**OUTCOMES:**

Uponcompletionofthiscourse,thestudentsshouldbeableto:

- Totagagiventextwith basicLanguagefeatures
- Todesignaninnovative application usingNLP components
- Toimplementarule basedsystemtotacklemorphology/syntaxofalanguage
- Todesigna tagsettobeusedfor statisticalprocessingforreal-timeapplications
- To compare and contrast use of different statistical approaches for different types ofNLPapplications.

**REFERENCES:**


1.Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", AtlanticPublisher,2(

2.DanielJurafsky,"SpeechandLanguageProcessing:An IntroductionNaturalLanguage Processing, Computational Linguistics Speech", Pearson Publication,2014.

3.NitinIndurkhya and Fred J. Damerau, "Handbook of Natural Langu Processing",SecondEdition,ChapmanandHall/CRCPress,2010.

4. RichardM Reese,"NaturalLanguage Processing withJava",O_ReillyMedia,2015.

5.Steven Bird, Ewan Klein and Edward Loper, -"Natural Language Processing withPython",FirstEdition,O_ReillyMedia,2009.


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## 22250E24C-INFORMATIONRETRIEVALTECHNIQUES

LTPC
3003

**OBJECTIVES:**

- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

**UNIT I INTRODUCTION** 9

Information Retrieval – Early Developments – The IR Problem – The User_s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

**UNIT II MODELING AND RETRIEVAL EVALUATION** 9

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

**UNIT III TEXT CLASSIFICATION AND CLUSTERING** 9

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing.

**UNIT IV WEB RETRIEVAL AND WEB CRAWLING** 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures– Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank –Evaluations – Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms –Evaluation.

**UNIT V RECOMMENDER SYSTEM** 9

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering –
Collaborative Filtering – Matrix factorization models – Neighborhood models..

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able to:**

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- Use an open source search engine framework and explore its capabilities
- Apply appropriate method of classification or clustering.
- Design and implement innovative features in a search engine.
- Design and implement a recommender system.

**TEXTBOOKS:**


5. 1.RicardoBaeza-Yates and BerthierRibeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
6. Ricci, F, Rokach. L. Shapira, B.Kantor, —Recommender Systems Handbookl, First Edition, 2011.


**REFERENCES:**


5. C. Manning, P. Raghavan, and H. Schütze, —Introduction to Information Retrieval, CambridgeUniversity Press, 2008.
6. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval:Implementing and Evaluating Search Engines, The MIT Press, 2010.


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# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## Value added courses

### 235150VR- VIRTUAL REALITY

**UNIT –I INTRODUCTION TO VIRTUAL REALITY (VR)**

Defining Virtual Reality, Key elements of virtual reality experience, Virtual Reality, Telepresence, Augmented Reality and Cyberspace.

**UNIT-II INPUT DEVICES: (TRACKERS, NAVIGATION, AND GESTURE INTERFACES)**

Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

**UNIT-III MODELING:**

Geometric modeling, Kinematics modeling, Physical modeling, Behaviour modeling, Model management.

**UNIT-IV AUGMENTED REALITY (AR)**

Taxonomy, Technology and Features of Augmented Reality, AR VsVR, Challenges with AR, AR systems and functionality, Augmented Reality Methods, Visualization Techniques for Augmented Reality, Enhancing interactivity in AR

**UNIT-V INTERACTION & AUDIO**

Interaction - Motor Programs and Remapping, Locomotion, Manipulation,Social Interaction, Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### Value added courses

### 23S1508TA SOFTWARE TESTING AUTOMATION

UNIT – I **INTRODUCTION TO VIRTUAL REALITY (VR)**

Defining Virtual Reality, Key elements of virtual reality experience, Virtual Reality, Telepresence, Augmented Reality and Cyberspace.

**UNIT-II INPUT DEVICES: (TRACKERS, NAVIGATION, AND GESTURE INTERFACES)**

Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

**UNIT-III MODELING**

Geometric modeling, Kinematics modeling, Physical modeling, Behaviour modeling, Model management.

UNIT-IV **AUGMENTED REALITY (AR)**

Taxonomy, Technology and Features of Augmented Reality, AR VsVR, Challenges with AR.

**UNIT-V AR TECHNIQUES**

.AR systems and functionality, Augmented Reality Methods, Visualization Techniques for

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Augmented Reality. Enhancing interactivity in AR Environments.

**Duration:45hours**

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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### Value added courses

### 235150NN NEURAL NETWORKS

**UNIT I FUNDAMENTALS OF NEURAL NETWORKS**

Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks, Various Learning Techniques, Perception and Convergence Rule, Auto-Associative and Hetero-Associative Memory

**UNIT II BACKPROPAGATION NETWORKS**

Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perceptron Model; Back Propagation Learning Methods, Effect of Learning Rule Co – Efficient ;Back Propagation Algorithm, Factors Affecting Backpropagation Training, Applications

**UNIT III COMPETITIVE NEURAL NETWORKS**

Kohonen's Self Organizing Map – SOM Architecture, learning procedure – Application: Learning Vector Quantization – learning by LVQ: Adaptive Resonance Theory – Learning procedure – Applications.

**UNIT IV PARAMETRIC MACHINE LEARNING**

Logistic Regression: Classification and representation – Cost function – Gradient descent – Advanced optimization – Regularization - Solving the problems on overfitting. Perceptron –Neural Networks –

**UNIT-V LINERITY**

Multi – class Classification - Backpropagation – Non-linearity with activation functions (Tanh, Sigmoid, Relu, PRelu) - Dropout as regularization.

**Duration:45hours**

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# SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

# PROGRAM HANDBOOK

## B.TECH – FULL TIME

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# COURSE

# STRUCTURE

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## B.TECH (FT) CSE [REGULATION 2020]

### SEMESTER I

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1. | 20147S11 | Communicative English | 4 | 0 | 0 | 4 |
| 2. | 20148S12 | Engineering Mathematics I | 4 | 0 | 0 | 4 |
| 3. | 20149S13 | Engineering Physics | 3 | 0 | 0 | 3 |
| 4. | 20149S14 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 5. | 20154S15 | Engineering Graphics | 2 | 0 | 4 | 4 |
| 6. | 20150S16 | Problem Solving and Python Programming | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | | |
| 7. | 20150L17 | Problem Solving and Python Programming Lab | 0 | 0 | 4 | 2 |
| 8. | 20149L18 | Physics and Chemistry Laboratory | 0 | 0 | 4 | 2 |
| 9. | 201VEA19 | Value Education | | | | - |
| | | TOTAL | 19 | 0 | 12 | 25 |

### SEMESTER II

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1 | 20147S21 | Technical English | 4 | 0 | 0 | 4 |
| 2 | 20148S22 | Engineering Mathematics – II | 4 | 0 | 0 | 4 |
| 3 | 20149S23A | Physics for Information Science | 3 | 0 | 0 | 3 |
| 4 | 20149S24A | Environmental Science And Engineering | 3 | 0 | 0 | 3 |
| 5 | 20153S25A | Basic Electrical, Electronics And measurement Engineering | 3 | 0 | 0 | 3 |
| 6 | 20150S26A | Programming in C | 3 | 2 | 0 | 4 |
| PRACTICAL | | | | | | |
| 7 | 20154L27 | Engineering Practices Lab | 0 | 0 | 4 | 2 |
| 8 | 20150L28A | C Programming Lab | 0 | 0 | 4 | 2 |
| 9 | 201ICA29 | Fundamentals of Indian constitution and Economy | | | | - |
| | | TOTAL | 20 | 2 | 8 | 25 |

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## SEMESTER III

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 20148S31A | Discrete Mathematics | 4 | 0 | 0 | 4 |
| 2. | 20150S32 | Digital Principles and System Design | 4 | 0 | 0 | 4 |
| 3. | 20150C33 | Data Structures | 3 | 0 | 0 | 3 |
| 4. | 20150C34 | Object Oriented Programming | 3 | 0 | 0 | 3 |
| 5. | 20150S35 | Communication Engineering | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6. | 20150L36 | Data Structures Laboratory | 0 | 0 | 4 | 2 |
| 7. | 20150L37 | Object Oriented Programming Laboratory | 0 | 0 | 4 | 2 |
| 8. | 20150L38 | Digital Systems Laboratory | 0 | 0 | 4 | 2 |
| 9. | 20150L39 | Interpersonal Skills/Listening &Speaking | 0 | 0 | 2 | 1 |
| | | **TOTAL** | 17 | 0 | 14 | 24 |

## SEMESTER IV

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20148S41A | Probability and Queuing Theory | 4 | 0 | 0 | 4 |
| 2 | 20150C42 | Computer Architecture | 3 | 0 | 0 | 3 |
| 3 | 20150C43 | Database Management Systems | 3 | 0 | 0 | 3 |
| 4 | 20150C44 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 |
| 5 | 20150C45 | Operating Systems | 3 | 0 | 0 | 3 |
| 6 | 20150C46 | Software Engineering | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 7 | 20150L47 | Database Management Systems Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20150L48 | Operating Systems Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20150L49 | Advanced Reading and Writing | 0 | 0 | 2 | 1 |
| **Research Skill Based (RSB) Course** | | | | | | |
| 10 | 19150CRS | Research Led Seminar | | | | 1 |
| | | **TOTAL** | 19 | 0 | 10 | 25 |

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## SEMESTER V

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1 | 20148S51A | Algebra and Number Theory | 4 | 0 | 0 | 4 |
| 2 | 20150C52 | Computer Networks | 3 | 0 | 0 | 3 |
| 3 | 20150C53 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 4 | 201__OE54__ | Open Elective – I | 3 | 0 | 0 | 3 |
| 5 | 20150C55 | Theory of Computation | 3 | 0 | 0 | 3 |
| 6 | 20150C56 | Object Oriented Analysis and Design | 3 | 0 | 0 | 3 |
| | | **PRACTICAL** | | | | |
| 7 | 20150L57 | Microprocessors and Microcontrollers Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20150L58 | Object Oriented Analysis and Design Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20150L59 | Networks Laboratory | 0 | 0 | 4 | 2 |
| | | **Research Skill Based (RSB) Course** | | | | |
| 10 | 20150CRM | Research Methodology | 3 | 0 | 0 | 3 |
| | | **TOTAL** | **22** | **0** | **12** | **28** |

## SEMESTER VI

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1 | 20150C61 | Internet Programming | 3 | 0 | 0 | 3 |
| 2 | 20150C62 | Artificial Intelligence | 3 | 0 | 0 | 3 |
| 3 | 20150C63 | Mobile Computing | 3 | 0 | 0 | 3 |
| 4 | 20150C64 | Compiler Design | 3 | 2 | 0 | 4 |
| 5 | 20150C65 | Distributed Systems | 3 | 0 | 0 | 3 |
| 6 | 20150E66 | Elective - I | 3 | 0 | 0 | 3 |
| | | **PRACTICAL** | | | | |
| 7 | 20150L61 | Internet Programming Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20150L62 | Mobile Application Development Laboratory | 0 | 0 | 4 | 2 |
| 9 | 20150L63 | Mini Project | 0 | 0 | 4 | 2 |
| 10 | 20150L64 | Professional Communication | 0 | 0 | 2 | 1 |
| | | **Research Skill Based (RSB) Course** | | | | |
| 11 | 20150CBR | Participation in Bounded Research | | | | 1 |
| | | **TOTAL** | **18** | **2** | **14** | **27** |

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## SEMESTER VII

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1 | 20150S71 | Principles of Management | 3 | 0 | 0 | 3 |
| 2 | 20150C72 | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 3 | 20150C73 | Cloud Computing | 3 | 0 | 0 | 3 |
| 4 | 201__OE74__ | Open Elective - II | 3 | 0 | 0 | 3 |
| 5 | 20150E75__ | Elective – II | 3 | 0 | 0 | 3 |
| 6 | 20150E76__ | Elective – III | 3 | 0 | 0 | 3 |
| | | **PRACTICAL** | | | | |
| 7 | 20150L77 | Cloud Computing Laboratory | 0 | 0 | 4 | 2 |
| 8 | 20150L78 | Security Laboratory | 0 | 0 | 4 | 2 |
| | | **Research Skill Based (RSB) Course** | | | | |
| 9 | 20150CSR | Design / Socio-Technical Project | | | | 3 |
| | | **TOTAL** | **18** | **0** | **8** | **25** |

## SEMESTER VIII

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1 | 20150E81__ | Elective – IV | 3 | 0 | 0 | 3 |
| 2 | 20150E82__ | Elective – V | 3 | 0 | 0 | 3 |
| | | **PRACTICAL** | | | | |
| 3 | 20150P83 | Project Work | 0 | 0 | 20 | 10 |
| 4 | 20150PEE | Program Exit Examination | | | | 2 |
| | | **TOTAL** | **6** | **0** | **20** | **18** |

## ELECTIVE I (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **THEORY** | | | | |
| 1 | 20150E66A | Data Warehousing and Data Mining | 3 | 0 | 0 | 3 |
| 2 | 20150E66B | Software Testing | 3 | 0 | 0 | 3 |
| 3 | 20150E66C | Embedded Systems | 3 | 0 | 0 | 3 |
| 4 | 20150E66D | Graph Theory and Applications | 3 | 0 | 0 | 3 |
| 5 | 20150E66E | Digital Signal Processing | 3 | 0 | 0 | 3 |
| 6 | 20150E66F | Data Mining and Analytics | 3 | 0 | 0 | 3 |

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## ELECTIVE II (SEMESTER VII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1 | 20150E75A | Big Data Analytics | 3 | 0 | 0 | 3 |
| 2 | 20150E75B | Machine Learning Techniques | 3 | 0 | 0 | 3 |
| 3 | 20150E75C | Software Project Management | 3 | 0 | 2 | 3 |
| 4 | 20150E75D | Internet of Things | 3 | 0 | 0 | 3 |
| 5 | 20150E75E | Service Oriented Architecture | 3 | 0 | 0 | 3 |
| 6 | 20150E75F | Modern Web Applications Development | 3 | 0 | 0 | 3 |

## ELECTIVE III (SEMESTER VII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1 | 20150E76A | Multi-core Architectures and Programming | 3 | 0 | 0 | 3 |
| 2 | 20150E76B | Human Computer Interaction | 3 | 0 | 0 | 3 |
| 3 | 20150E76C | C# and .Net Programming | 3 | 0 | 0 | 3 |
| 4 | 20150E76D | Wireless Adhoc and Sensor Networks | 3 | 0 | 2 | 3 |
| 5 | 20150E76E | Advanced Topics on Databases | 3 | 0 | 0 | 3 |
| 6 | 20150E76F | Block chain Technologies | 3 | 0 | 0 | 3 |

## ELECTIVE IV (SEMESTER VIII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1 | 20150E81A | Digital Image Processing | 3 | 0 | 0 | 3 |
| 2 | 20150E81B | Social Network Analysis | 3 | 0 | 0 | 3 |
| 3 | 20150E81C | Information Security | 3 | 0 | 0 | 3 |
| 4 | 20150E81D | Cyber Forensics | 3 | 0 | 0 | 3 |
| 5 | 20150E81E | Soft Computing | 3 | 0 | 0 | 3 |
| 6 | 20150E81F | Risk Analytics | 3 | 0 | 0 | 3 |

## ELECTIVE V (SEMESTER VIII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1 | 20150E82A | Information Retrieval Techniques | 3 | 0 | 0 | 3 |
| 2 | 20150E82B | Natural Language Processing | 3 | 0 | 2 | 3 |
| 3 | 20150E82C | Parallel Algorithms | 3 | 0 | 0 | 3 |
| 4 | 20150E82D | Speech Processing | 3 | 0 | 0 | 3 |
| 5 | 20150E82E | Fundamentals of Nano Science | 3 | 0 | 0 | 3 |

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## OPEN ELECTIVE I (SEMESTER V)

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1. | ECE | 20152OE54A | Basics Of Bio Medical Instrumentation | 3 | 0 | 0 | 3 |
| 2. | | 20152OE54B | Sensors And Transducers | 3 | 0 | 0 | 3 |
| 3. | | 20152OE54C | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 4. | EEE | 20153OE54A | Industrial Nano Technology | 3 | 0 | 0 | 3 |
| 5. | | 20153OE54B | Energy Conservation and Management | 3 | 0 | 0 | 3 |
| 6. | | 20153OE54C | Computer Aided Design of Electrical Apparatus | 3 | 0 | 0 | 3 |
| 7. | MECH | 20154OE54A | Renewable energy sources | 3 | 0 | 0 | 3 |
| 8. | | 20154OE54B | Automotive Systems | 3 | 0 | 0 | 3 |
| 9. | | 20154OE54C | Electronics and Microprocessors | 3 | 0 | 0 | 3 |
| 10. | CIVIL | 20155OE54A | Air Pollution And Control Engineering | 3 | 0 | 0 | 3 |
| 11. | | 20155OE54B | Geographic Information Systems | 3 | 0 | 0 | 3 |
| 12. | | 20155OE54C | Drinking Water Supply and Treatment | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE II (SEMESTER VII)

| Sl. No | DEPT | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1. | ECE | 20152OE74A | Robotics | 3 | 0 | 0 | 3 |
| 2. | | 20152OE74B | Electronic Devices | 3 | 0 | 0 | 3 |
| 3. | | 20152OE74C | Wireless Communication | 3 | 0 | 0 | 3 |
| 4. | EEE | 20153OE74A | Basic Circuit Theory | 3 | 0 | 0 | 3 |
| 5. | | 20153OE74B | Introduction To Renewable Energy Systems | 3 | 0 | 0 | 3 |
| 6. | | 20153OE74C | Power Electronics for Renewable Energy Systems | 3 | 0 | 0 | 3 |
| 7. | MECH | 20154OE74A | Industrial Safety | 3 | 0 | 0 | 3 |
| 8. | | 20154OE74B | Testing Of Materials | 3 | 0 | 0 | 3 |
| 9. | | 20154OE74C | Nuclear Engineering | 3 | 0 | 0 | 3 |
| 10. | CIVIL | 20155OE74A | Green Building Design | 3 | 0 | 0 | 3 |
| 11. | | 20155OE74B | Waste Water Treatment | 3 | 0 | 0 | 3 |
| 12. | | 20155OE74C | Fundamentals of Aeronautical Engineering | 3 | 0 | 0 | 3 |

## TOTAL CREDITS – 197

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| 201500E54C | SOFTWARE ARCHITECTURE | L T P C<br>3 0 0 3 |
|---|---|---|

**OBJECTIVES:**

- Understand the fundamentals of software architecture.
- Study the various software development methodologies.
- Learn the importance of architectural documentation and evaluation.
- Learn the various software architecture design components.
- Relate software architecture and software quality.

**UNIT I INTRODUCTION** 9

Basic concepts of software architecture – Context of Software Architecture – ABC cycle – What software architecture is and what it isn't – Architectural patterns – Good Architecture- Reference models – Architectural structures and Views-Introduction to styles – Decentralized Architectures.

**UNIT II DESIGN METHODOLOGIES** 9

Structured design- Design Practices-Stepwise refinement – Incremental design- Structured system analysis and design –Jackson structured programming – Jackson system Development.

**UNIT III ARCHITECTURAL DESCRIPTION DOCUMENTATION AND EVALUATION 9**

Early architecture description Languages-Domain and style specific ADL's- Extensible ADL's – Documenting software architecture – Uses and Audiences for Architecture Documentation – Views – Choosing Views – Combining Views –Architecture evaluation – Evaluation Factors –Architecture Tradeoff Analysis Method – Lightweight Architecture Evaluation – ATAM.

**UNIT IV ARCHITECTURE DESIGN** 9

Typical architectural design-Dataflow-Independent Components-Call and return – Using styles in design – Architectural design Space-Design space of architectural elements – Design space of architectural styles.

**UNIT V IMPLEMENTATION AND CONFORMANCE TO ARCHITECTURE 9**

Understanding quality attributes- Implementation of Quality attributes in Architecture – Architecture and requirements conformance –Functionality– Quality attribute considerations – System quality Attributes-Introduction to tactics – Achieving Quality Attributes through Tactics –Tactics types – Architectural patterns and styles – Architecture and Quality Attributes – Quality attribute scenarios in practice.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon Completion of the course, the students should be able to:

- Develop Software applications starting from software architecture and design.
- Learn and evaluate existing software architectures.
- Realize importance of architectural documentation and document them.
- Employ various software architecture design components.
- Design methods for improving software quality from the perspective of software architecture.

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**TEXT BOOKS:**

1. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Third Edition, Addison,Wesley, 2012.
2. David Budgen, "Software Design", Second Edition, Pearson Education, 2004.

**REFERENCES:**

1. Richard N Taylor, NenadMedvidovic and Eric M Dashofy, "Software Architecture, Foundations, Theory and Practice", Wiley 2010.
2. Hong Zhu, "Software Design Methodology from Principles to Architectural Styles", Elsevier, 2005.
3. Mary Shaw and David Garlan, "Software Architecture - Perspectives on an emerging Discipline",Pearson Education, 2008.

| 20150OE74C | WEB TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

To understand about client-server communication and protocols used during communication.

To design interactive web pages using Scripting languages.

To learn server side programming using servlets and JSP.

To develop web pages using XML/XSLT.

**UNIT I WEB SITE BASICS AND HTML** 9

Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols –The World Wide Web-HTTP request message-response message-Web Clients Web Servers. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics- Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-HTML 5.0.

**UNIT II CSS AND CLIENT SIDE SCRIPTING** 9

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML- Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-CSS3.0. Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-StatementsOperators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

**UNIT III SERVER SIDE SCRIPTING** 9

Host Objects: Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window. Server-Side Programming: Java Servlets- Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data- Sessions-Cookies-URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency- Databases and Java Servlets.

**UNIT IV JSP AND XML** 9

Separating Programming and Presentation: JSP Technology Introduction-JSP and ServletsRunning JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and FilesSupport for the Model-View-Controller Paradigm- Databases and JSP. Representing Web Data:

XML-Documents and Vocabularies-Versions and Declaration-Namespaces- DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data:

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XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers.

**UNIT V AJAX AND WEB SERVICES** 9

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods. Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

At the end of the course, the student should be able to:

- Design simple web pages using markup languages like HTML and XHTML.
- Create dynamic web pages using DHTML and java script that is easy to navigate and use.
- Program server side web pages that have to process request from client side web pages.
- Represent web data using XML and develop web pages using JSP.
- Understand various web services and how these web services interact.

**TEXT BOOK:**

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

**REFERENCES**

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007 .

2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

3. Marty Hall and Larry Brown," Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.

4. Bates, "Developing Web Applications", Wiley, 2006

**20150E66F** **DATA MINING AND ANALYTICS**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.
- Learn the different ways of Data Analysis
- To familiar with the visualization

**UNIT I DATA MINING – INTRODUCTION** 9

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

**UNIT II DATA MINING - FREQUENT PATTERN ANALYSIS** 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi-Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

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**UNIT III CLASSIFICATION AND CLUSTERING** 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

**UNIT IV DATA ANALYSIS** 9

Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting-Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

**UNIT V FRAMEWORKS AND VISUALIZATION** 9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

**TOTAL :45 PERIODS**

**OUTCOMES:**

Upon completion of the course, the students should be able to:

- Apply suitable pre-processing and visualization techniques for data analysis
- Apply frequent pattern and association rule mining techniques for data analysis
- Apply appropriate classification and clustering techniques for data analysis
- Compare and contrast various soft computing frameworks
- Use Visualization techniques

**TEXT BOOKS:**

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.

2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

**REFERENCES:**

1. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.

2. Ian H.Witten and Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques", Elsevier, Second Edition.

3. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.

4. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.

5. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

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| 20150E75F | MODERN WEB APPLICATIONS DEVELOPMENT | L T P C<br>3 0 0 3 |
|---|---|---|

**OBJECTIVES:**

To understand the back end data model and accessing

To understand Django fundamentals and use its concepts to build and deploy robust web applications and apps.

Learn about Django URL patterns and views and deploy Django applications

**UNIT I PYTHON: OBJECT ORIENTED PROGRAMMING** 9

Class Definitions – Instantiation - Sub Classing – Inner Classes – Regular Expressions – Inheriting from other classes- Class and Static Methods – Private Methods- Polymorphism - Importing python modules and libraries-Creating objects-Manipulating and working with objects.

**UNIT II DJANGO** 9

Creating the Project – Running the Development Server – Creating the Application – Designing a Model – Setting up the Database – Setting up the Application – Dynamic Web Sites – Communication – Data Storage – Presentation.

**UNIT III DJANGO ARCHITECTURE** 9

Django and Python - DJango stake on MVC: Models - Views and Template – Overall Django Architecture - 3 Core Files: models.py- urls.py- views.py – URL 's – Modeling HTTP: Requests ; Responses and Middleware – Views / Logic

**UNIT IV DJANGO FORMS AND APIS** 9

Templates – Forms - Validation – Authentication - Advanced Forms processing techniques - Django REST framework – Django piston.

**UNIT V APPLICATION ESSENTIALS** 9

Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

**TOTAL : 45 PERIODS**

**OUTCOMES:**

After completing this course- students will have a fundamental understanding of how to Implementing Python based applications

Safely model and store data in SQL databases

Use MVC (Models- Views & Templates)

Build and deploy robust Django web apps

Integrate with RESTful web services

Unit Testing and Debugging Django apps

**REFERENCES:**

1. Python Web Development with Django 1st Edition by Jeff Forcier ; Paul Bissex; Wesley Chun; Pearson Education; 2009

2. Think Python, 2nd Edition - How to Think Like a Computer Scientist - Allen B. Downey – 2nd Edition, Shroff / O'Reilly Publication, 2016.

3. Django for Beginners: Build websites with Python and Django Paperback, William S Vincent, Independently Published, 2018

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| 20150E76F | BLOCKCHAIN TECHNOLOGIES | L T P C<br>3 0 0 3 |
|---|---|---|

**OBJECTIVES:**

To decompose a blockchain system's fundamental components, how they fit together and examine a decentralization using blockchain.

To explain how Cryptocurreney works, from when a transaction is created to when it is considered part of the blockchain.

To explain the components of Ethereum and Programming Languages for Ethereum.

To study the basics Hyperledger and Web3.

To provide a details of alternative blockchain and blockchain projects in different perspective.

**UNIT I INTRODUCTION TO BLOCKCHAIN** 9

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.

**UNIT II INTRODUCTION TO CRYPTOCURRENCY** 9

Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin Limitations – Name Coin – Prime Coin – Zcash – Smart Contracts – Ricardian Contracts.

**UNIT III ETHEREUM** 9

The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

**UNIT IV WEB3 AND HYPERLEDGER** 9

Introduction to Web3 – Contract Deployment – POST Requests – Development frameworks – Hyperledger as a protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.

**UNIT V ALTERNATIVE BLOCKCHAINS AND NEXT EMERGING TRENDS** 9

Kadena – Ripple- Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous tools.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon Completion of the course, the students should be able to:

Understand the technology components of Blockchain and how it works behind-the scenes.

Aware of different approaches to developing decentralized applications.

Understand the Bitcoin and its limitations by comparing with other alternative coins.

Establish deep understanding of the Ethereum model, its consensus model, code execution.

Understand the architectural components of a Hyperledger and its development framework.

Come to know the Alternative blockchains and emerging trends in blockchain.

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**TEXT BOOK:**

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

**REFERENCES:**

1. Arshdeep Bahga, Vijay Madisetti, "Blockchain Applications: A Hands-On Approach", VPT, 2017.
2. Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bitcoin", O'Reilly Publishing, 2014.
3. Roger Wattenhofer, "The Science of the Blockchain" CreateSpace Independent Publishing Platform, 2016.
4. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
5. Alex Leverington, "Ethereum Programming", Packt Publishing, 2017.

**20150E81F** **RISK ANALYTICS** **L T P C**
**3 0 0 3**

**OBJECTIVES:**

- To develop a basic understanding of risk assessment and its role within the risk management process.
- To differentiate between risk assessment and risk management.
- To develop a basic understanding of how to conduct and evaluate an uncertainty analysis for a risk assessment

**UNIT I INTRODUCTION** **9**

Introduction, Fundamentals of Risk- Risk Planning, Assessment and Management Process and the Systems Approach-Types of Risk Assessment- Risk, Hazard, Performance and Engineering Risk Assessment

**UNIT II RISK IDENTIFICATION** **9**

Risk Identification- Historical data, comparative analysis, and checklist- Taxonomy based, risk breakdown structure, HHM, SWOT, root cause analysis, influence diagram- Expert/ user/ stakeholder-based elicitation (Delphi, brainstorming, interview), Scenario-based, experience based, objective-based analysis.

**UNIT III TOOLS AND METHODS FOR RISK ASSESSMENT** **9**

Preliminary Hazard Analysis (PHA), Hazards and Operability Analysis (HAZOP) - Job Safety Analysis (JSA) - Failure Modes and Effects Analysis (FMEA)- Fault Tree Analysis (FTA), Event Tree Analysis (ETA), Decision Trees- Cause-Consequence Analysis (CCA).

**UNIT IV RISK PRIORITIZATION & TREATMENT** **9**

Risk Probability and Impact Assessment, Risk Index and Risk Ranking - Risk Matrix, EV Analysis, Sensitivity and Tradeoff Analysis, Modeling and Simulation- Risk Attitude and Risk Tolerance, As Low As Reasonably Practicable (ALARP)- Avoidance, Separation, Reduction, Transfer, Acceptance- Detection, Control, Response and Recovery- Performance Monitoring.

**UNIT V SPECIAL TOPICS AND APPLICATION** **9**

ISO3100, Quality and Reliability- Supply Chain Risk Management- Project Risk ManagementPositive Risk/ Opportunities Management- Risk and TOC.

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**OUTCOME:**

Upon Completion of the course, the students should be able to:

- Identify the core types of project risks.
- Use qualitative and quantitative risk assessment methods.
- Competently use risk simulation techniques and other risk analysis tools/methods and work in a group to create a risk management plan based on the ISO 31000:2009.
- Identify a range of risk management issues/challenges and the risks as complex systems cascade and be competent to initiate potential actions in response;

**TEXTBOOKS:**

1. Marvin Rausand Stein Haugen, Risk Assessment: Theory, Methods, and Applications, John Wiley & Sons, 2020.
2. Vlasta Molak, Fundamentals of Risk Analysis and Risk Management, CRC Press.
3. Mohammad Modarres, Risk Analysis in Engineering Techniques, Tools and Trends, Taylor & Francis, CRC Press, 2016.

**REFERENCES:**

1. Marvin Rausand Stein Haugen, Risk Assessment: Theory, Methods, and Applications, Wiley, 2020.
2. Mohammad Modarres, Risk Analysis in Engineering Techniques, Tools, and Trends, CRC Press, 2006.

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**
**Minutes of the meeting of the Board of Studies (BoS)**

Date: 06.03.2023
Venue: CSE RCT CLASSROOM
Time: 10.30 a.m
**Members present:**
Chair: Prof.Dr. Dr.R.Latha, Ph.D., HOD/CSE

**(https://meet.google.com/qrs-xyxx-hmr)**

External Members

| S.No | Name/Degree/Designation | Institute/Organization/ Full address | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1 | Dr. S.A.SAHAAYA ARUL MARY | Professor and Head of CSE Department, Saranathan College of Engineering | Online | |
| 2 | Mr.V. PRASANNA VENKATESH | Senior Data Analyst STAPLES Inc, USA | Online | |

Internal Members

| S.No. | Name/Degree/Designation | Department | Online/ Physical | Signature (scan, if online) |
|---|---|---|---|---|
| 1. | Dr.R.Latha HOD/CSE | CSE | Physical | |
| 2. | Prof.Dr.S.Nithyanandam Ph.D | CSE | Physical | |
| 3. | Prof.S.JANCY SICKORY DAISY., M.Tech, Assistant Professor | CSE | Physical | |
| 4. | Prof.K.JAYANTHI, M.E., Assistant Professor | CSE | Physical | |
| 5. | Prof.Dr.L.S. Usharani Ph.D., Professor | CSE | Physical | |
| 6. | Prof.Dr.N.Arularasan Ph.D/ Associate Professor | CSE | Physical | |
| 7. | Prof.R.Tamizhselvan M.E., Dean | MECH | Physical | |
| 8. | Dr.K.Padmapriya Ph.D/ Associate Professor | CSE | Physical | |

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Invited Participants

| S.No. | Name/Degree/Designation | Department/Class<br>Institute/Organization/Address | Online/<br>Physical | Signature<br>(scan, if online |
|---|---|---|---|---|
| 1 | Mr.Naveen<br>B.E/ Data center Architect | TCS, Chennai | Physical |  |
| 2 | Mr.N.Mohamed Wasif | Student | Physical |  |

Agenda:

1. To Confirm the previous Meeting Minutes
2. To discuss the action taken on the previous Meeting Minutes
3. To scrutinize the stakeholder feed backs on B. Tech (FT/PT).
4. To Introduce new programme of B. Tech Artificial Intelligence and Data Science.
5. To recommend the panel of Examiners for B. Tech(FT/PT).
6. To recommended to value added courses conducting for B.Tech CSE & AIDS student.
7. To Introduce new courses for B.Tech (PT),M.Tech(PT&FT)

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**MINUTES OF THE MEETING**

At the outset, the Chairman BOS welcomed the members for attending the meeting of the Board of Studies. In her introductory remarks, she described the agenda items

| |
|---|
| Agendum 1 |
| Discussion: To confirm the previous BOS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes |
| Resolution: The chairman confirmed the previous meeting minutes of BoS and discussed the action taken on the previous BOS Meeting Minutes. |
| Agendum 2 |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabi for B.TECH-CSE (Full Time/Part Time) and M.Tech-Computer Science and Engineering(Full Time/Part Time) |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabi and the abstract of stakeholders feedback on B.TECH-CSE (Full Time/Part Time) and M.Tech-Computer Science and Engineering (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |
| Agendum 3: |
| Discussion: To introduce 12 new courses for B.Tech (PT), 8 new courses for M.Tech (FT) and also 8 new courses for M.Tech (PT) CSE |
| Resolution: The members of the board also scrutinized and updated the new courses. |
| Agendum 4: |
| Discussion: To Introduce a new programme of B.Tech Artificial Intelligence and Data Science. |
| Resolution: The members of the board have unanimously recommended to introduce the Introduce<br>new programme of B.Tech Artificial Intelligence and Data Science. |
| Agendum 5: |
| Discussion: To recommend the panel of Examiners for B.Tech(FT/PT) and for M.Tech-Computer Science and Engineering(FT/PT) |
| Resolution: The members of the board also scrutinized and updated the panel of examiners and recommended the panel of examiners for the B.TECH -CSE (FT/PT) & M.Tech-Computer Science and Engineering(FT/PT), and submitted the same for the Academic Council for its approval. |
| Agendum 6: |
| Discussion: To recommend the value added courses conducting for B.Tech CSE & AIDS student |
| B.Tech-CSE<br>➢ Virtual Reality<br>➢ Software Testing Automation<br>➢ Neural Networks<br>➢ Deep Learning<br>B.Tech-AI&DS<br>➢ Introduction to Java<br>➢ Web Development |

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List of new courses

| | | |
|---|---|---|
| B.Tech(PT) CSE | Problem Solving and Python Programming | 22150C15P |
| B.Tech(PT) CSE | Programming in C | 22150C22P |
| B.Tech(PT) CSE | Software Engineering Fundamentals | 22150H41P |
| B.Tech(PT) CSE | Internet Programming | 22150H42P |
| B.Tech(PT) CSE | Cryptography and Network Security | 22150H61P |
| B.Tech(PT) CSE | Grid and Cloud Computing | 22150H72P |
| B.Tech(PT) CSE | Data Warehousing and Data Mining | 22150E44BP |
| B.Tech(PT) CSE | Professional Ethics in Engineering | 22150E44CP |
| B.Tech(PT) CSE | Graph Theory And Applications | 22150E64CP |
| B.Tech(PT) CSE | Cyber Forensics | 22150E74DP |
| B.Tech(PT) CSE | Information Retrieval Techniques | 22150E74BP |
| B.Tech(PT) CSE | Ad hoc and Sensor Networks | 22150E54AP |
| M.Tech(FT) CSE | Machine Learning Techniques | 22250H13 |
| M.Tech(FT) CSE | Internet of Things | 22250H23 |
| M.Tech(FT) CSE | Web Engineering | 22250E16B |
| M.Tech(FT) CSE | Information Retrieval Techniques | 22250E24C |
| M.Tech(FT) CSE | Language Technologies | 22250E25C |
| M.Tech(FT) CSE | Speech Processing and Synthesis | 2225E32B |
| M.Tech(FT) CSE | Reconfigurable Computing | 22250E33B |
| M.Tech(FT) CSE | Bio-inspired Computing | 22250E34B |
| M.Tech(PT) CSE | Internet of Things | 22250H22P |
| M.Tech(PT) CSE | Machine Learning Techniques | 22250E32P |
| M.Tech(PT) CSE | Information Retrieval Techniques | 22250E23CP |
| M.Tech(PT) CSE | Speech Processing and Synthesis | 22250E51BP |
| M.Tech(PT) CSE | Reconfigurable Computing | 22250E52BP |
| M.Tech(PT) CSE | Bio-inspired Computin | 22250E53BP |
| M.Tech(PT) CSE | Web Engineerin | 22250E33BP |
| M.Tech(PT) CSE | Language Technologies | 22250E23DP |

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## SCHOOL OF ENGINEERING AND TECHNOLOGY

## DEPARTMENT OF
## ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

# PROGRAM HANDBOOK

## B.Tech – FULL TIME

## [Regulation 2022]

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# I - VIII SEMESTERS CURRICULUM

## SEMESTER I

| Sl. No. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22147IP | Induction Programme | - | - | - | 0 |
| 2. | 22147S11 | Professional English - I | 3 | 0 | 0 | 3 |
| 3. | 22148S12 | Matrices and Calculus | 3 | 1 | 0 | 4 |
| 4. | 22149S13 | Engineering Physics | 3 | 0 | 0 | 3 |
| 5. | 22149S14 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 6. | 22150S15 | Problem Solving and Python Programming | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7. | 22150L16 | Problem Solving and Python Programming Laboratory | 0 | 0 | 4 | 2 |
| 8. | 22149L17 | Physics and Chemistry Laboratory | 0 | 0 | 4 | 2 |
| 9. | 22147L18 | Communication Laboratory – I | 0 | 0 | 2 | 1 |
| | | **TOTAL** | 15 | 1 | 10 | **21** |

## SEMESTER II

| Sl. No. | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22147S21 | Professional English – II | 3 | 0 | 0 | 3 |
| 2. | 22148S22 | Statistics and Numerical Methods | 3 | 1 | 0 | 4 |
| 3. | 22149S23A | Physics for Information Science | 3 | 0 | 0 | 3 |
| 4. | 22154S24 | Engineering Graphics | 2 | 0 | 4 | 4 |
| 5. | 22153S25A | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 |
| 6. | 221AIDS26 | Data Structures Design | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7. | 22154L27 | Engineering Practices Laboratory | 0 | 0 | 4 | 2 |
| 8. | 221AIDL28 | Data Structures Design Laboratory | 0 | 0 | 4 | 2 |
| 9. | 22147L29 | Communication Laboratory – II | 0 | 0 | 4 | 2 |
| | | **TOTAL** | 17 | 1 | 16 | **26** |

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## SEMESTER III

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22148S31A | Discrete Mathematics | 3 | 1 | 0 | 4 |
| 2. | 221AIDS32 | *Digital Principles and Computer Organization | 3 | 0 | 2 | 4 |
| 3. | 221AIDC33 | Database Design and Management | 3 | 0 | 0 | 3 |
| 4. | 221AIDC34 | *Design and Analysis of Algorithm | 3 | 0 | 2 | 4 |
| 5. | 221AIDC35 | *Data Exploration and Visualization | 3 | 0 | 2 | 4 |
| 6. | 221AIDC36 | Artificial Intelligence | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7. | 221AIDL37 | Database Design and Management Laboratory | 0 | 0 | 4<br>4<br>3 | 2 |
| 8. | 221AIDL38 | Artificial Intelligence Laboratory | 0 | 0 | 3 | 2 |
| 9. | 221AIDL39 | Professional Development | 0 | 0 | 2 | 1 |
| | | **TOTAL** | 18 | 1 | 14 | **27** |

## SEMESTER IV

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22148S41A | Probability and Statistics | 3 | 1 | 0 | 4 |
| 2. | 221AIDC42 | *Operating Systems | 3 | 0 | 2 | 4 |
| 3. | 221AIDC43 | Machine Learning | 3 | 0 | 0 | 3 |
| 4. | 221AIDC44 | Fundamentals of Data Science and Analysis | 3 | 0 | 0 | 3 |
| 5. | 221AIDC45 | *Computer Networks | 3 | 0 | 2 | 4 |
| 6. | 22149S46 | Environmental Sciences and Sustainability | 2 | 0 | 0 | 2 |
| **PRACTICALS** | | | | | | |
| 7. | 221AIDL47 | Data Science and Analysis Laboratory | 0 | 0 | 4 | 2 |
| 8. | 221AIDL48 | Machine Learning Laboratory | 0 | 0 | 4 | 2 |
| | | **TOTAL** | 17 | 0 | 12 | **24** |

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## SEMESTER V

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 221AIDC51 | Deep Learning | 3 | 0 | 0 | 3 |
| 2. | 221AIDC52 | Data and Information Security | 3 | 0 | 0 | 3 |
| 3. | 221AIDC53 | Distributed Computing | 3 | 0 | 0 | 3 |
| 4. | 221AIDC54 | *Big Data Analytics | 2 | 0 | 2 | 3 |
| 5. | 221AIDC55_ | *Professional Elective I | 2 | 0 | 2 | 3 |
| 6. | 221AIDC56_ | *Professional Elective II | 2 | 0 | 2 | 3 |
| 7. | 22147MC57_ | Mandatory Course - I | 3 | 0 | 0 | 0 |
| **PRACTICALS** | | | | | | |
| 8. | 221AIDL58 | Deep Learning Laboratory | 0 | 0 | 4 | 2 |
| 9. | 221AIDL59 | Summer internship | 0 | 0 | 0 | 2 |
| | | **TOTAL** | 18 | 0 | 10 | **22** |

## SEMESTER VI

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22152S61 | *Embedded Systems and IOT Design | 3 | 0 | 2 | 4 |
| 2. | 221_ _OE62_ | Open Elective - I | 3 | 0 | 0 | 3 |
| 3. | 221AIDC63_ | *Professional Elective – III | 2 | 0 | 2 | 3 |
| 4. | 221AIDC64_ | *Professional Elective – IV | 2 | 0 | 2 | 3 |
| 5. | 221AIDC65_ | *Professional Elective – V | 2 | 0 | 2 | 3 |
| 6. | 221AIDC66_ | *Professional Elective – VI | 2 | 0 | 2 | 3 |
| 7. | **22147MC67_** | Mandatory Course - II | 3 | 0 | 0 | 0 |
| | | **TOTAL** | 17 | 0 | 10 | **19** |

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## SEMESTER VII

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1. | 22147S71 | Human Values and Ethics | 2 | 0 | 0 | 2 |
| 2. | 221_ _OE73_ | Open Elective – II | 3 | 0 | 0 | 3 |
| 3. | 221_ _OE74_ | Open Elective – III | 3 | 0 | 0 | 3 |
| 4. | 221_ _OE75_ | Open Elective – IV | 3 | 0 | 0 | 3 |
| 5. | 22160E75_ | Elective Management | 3 | 0 | 0 | 3 |
| | | TOTAL | 14 | 0 | 0 | **14** |

## SEMESTER VIII

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| **PRACTICALS** | | | | | | |
| 1. | 221AIDC81 | Project Work/ Internship | 0 | 0 | 20 | 10 |
| | | **TOTAL** | 0 | 0 | 20 | **10** |
| | | **TOTAL NO. OF CREDITS:** | | | | **163** |

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## LIST OF ELECTIVES

### ELECTIVE - I (SEMESTER V)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 221AIDC55A | Knowledge Engineering | 2 | 0 | 2 | 3 |
| 2. | 221AIDC55B | RecommenderSystems | 2 | 0 | 2 | 3 |
| 3. | 221AIDC55C | Soft Computing | 2 | 0 | 2 | 3 |
| 4. | 221AIDC55D | Text and Speech Analysis | 2 | 0 | 2 | 3 |
| 5. | 221AIDC55E | Business Analytics | 2 | 0 | 2 | 3 |
| 6. | 221AIDC55F | Image and video analytics | 2 | 0 | 2 | 3 |
| 7. | 221AIDC55G | Computer Vision | 2 | 0 | 2 | 3 |

### ELECTIVE – II (SEMESTER V)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 221AIDC56A | Cloud Computing | 2 | 0 | 2 | 3 |
| 2. | 221AIDC56B | App Development | 2 | 0 | 2 | 3 |
| 3. | 221AIDC56C | Cloud Services Management | 2 | 0 | 2 | 3 |
| 4. | 221AIDC56D | UI and UX Design | 2 | 0 | 2 | 3 |
| 5. | 221AIDC56E | Software Testing and Automation | 2 | 0 | 2 | 3 |
| 6. | 221AIDC56F | Web Application Security | 2 | 0 | 2 | 3 |
| 7. | 221AIDC56G | Dev-ops | 2 | 0 | 2 | 3 |
| 8. | 221AIDC56H | Principles of ProgrammingLanguages | 3 | 0 | 0 | 3 |

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## ELECTIVE – III (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 221AIDC63A | Cloud Computing | 2 | 0 | 2 | 3 |
| 2. | 221AIDC63B | Virtualization | 2 | 0 | 2 | 3 |
| 3. | 221AIDC63C | Cloud Services Management | 2 | 0 | 2 | 3 |
| 4. | 221AIDC63D | Data Warehousing | 2 | 0 | 2 | 3 |
| 5. | 221AIDC63E | Storage Technologies | 2 | 0 | 2 | 3 |
| 6. | 221AIDC63F | Software Defined Networks | 2 | 0 | 2 | 3 |
| 7. | 221AIDC63G | Stream Processing | 2 | 0 | 2 | 3 |
| 8. | 221AIDC63H | Security and Privacy in Cloud | 2 | 0 | 2 | 3 |

## ELECTIVE – IV (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22AIDC64A | Ethical Hacking | 2 | 0 | 2 | 3 |
| 2. | 22AIDC64B | Digital and Mobile Forensics works | 2 | 0 | 2 | 3 |
| 3. | 22AIDC64C | Social Network Security | 2 | 0 | 2 | 3 |
| 4. | 22AIDC64D | Modern Cryptography | 2 | 0 | 2 | 3 |
| 5. | 22AIDC64E | Engineering Secure Software Systems | 2 | 0 | 2 | 3 |
| 6. | 22AIDC64F | Cryptocurrency and Blockchain Technologies | 2 | 0 | 2 | 3 |
| 7. | 22AIDC64G | Network Security | 2 | 0 | 2 | 3 |
| 8. | 22AIDC64H | Security and Privacy in Cloud | 2 | 0 | 2 | 3 |

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## ELECTIVE - V (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 221AIDC65A | Augmented Reality/Virtual Reality | 2 | 0 | 2 | 3 |
| 2. | 221AIDC65B | Multimedia and Animation | 2 | 0 | 2 | 3 |
| 3. | 221AIDC65C | Video Creation and Editing | 2 | 0 | 2 | 3 |
| 4. | 221AIDC65D | UI and UX Design | 2 | 0 | 2 | 3 |
| 5. | 221AIDC65E | Digital marketing | 2 | 0 | 2 | 3 |
| 6. | 221AIDC65F | Multimedia Data Compression and Storage | 2 | 0 | 2 | 3 |
| 7. | 221AIDC65G | Game Development | 2 | 0 | 2 | 3 |
| 8. | 221AIDC65H | Visual Effects | 2 | 0 | 2 | 3 |

## ELECTIVE - VI (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 221AIDC66A | Augmented Reality/Virtual Reality | 2 | 0 | 2 | 3 |
| 2. | 221AIDC66B | Robotic Process Automation | 2 | 0 | 2 | 3 |
| 3. | 221AIDC66C | Neural Networks and Deep Learning | 2 | 0 | 2 | 3 |
| 4. | 221AIDC66D | Cyber security | 2 | 0 | 2 | 3 |
| 5. | 221AIDC66E | Quantum Computing | 2 | 0 | 2 | 3 |
| 6. | 221AIDC66F | Cryptocurrency and Blockchain Technologies | 2 | 0 | 2 | 3 |
| 7. | 221AIDC66G | Game Development | 2 | 0 | 2 | 3 |
| 8. | 221AIDC66H | 3D Printing and Design | 2 | 0 | 2 | 3 |

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## ELECTIVE - VII (SEMESTER VII)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22160E75A | Principles of Management | 3 | 0 | 0 | 3 |
| 2. | 22160E75B | Total Quality Management | 3 | 0 | 0 | 3 |
| 3. | 22160E75C | Industrial Management | 3 | 0 | 0 | 3 |

## LIST OF OPEN ELECTIVES

### SEMESTER VI
### OPEN ELECTIVE-I

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155OE61 | Climate Change and its Impact | 3 | 0 | 0 | 3 |
| 2 | 22153OE61 | Renewable Energy System | 3 | 0 | 0 | 3 |
| 3 | 22154OE61 | Introduction to Industrial Engineering | 3 | 0 | 0 | 3 |
| 4 | 22150OE61 | Graph Theory | 3 | 0 | 0 | 3 |
| 5 | 22152OE61 | Deep Learning | 3 | 0 | 0 | 3 |

### SEMESTER VII

### OPEN ELECTIVE-II

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155OE72 | IT in Agriculture System | 3 | 0 | 0 | 3 |
| 2 | 22153OE72 | Introduction to ControlEngineering | 3 | 0 | 0 | 3 |
| 3 | 22154OE72 | Aviation Management | 3 | 0 | 0 | 3 |
| 4 | 22150OE72 | Dev-Ops | 3 | 0 | 0 | 3 |
| 5 | 22152OE72 | Robotics Process Automation | 3 | 0 | 0 | 3 |

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## OPEN ELECTIVE-III

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22147OE73A | English for Competitive Examinations | 3 | 0 | 0 | 3 |
| 2 | 22153OE73A | Renewable Energy Technologies(EEE) | 3 | 0 | 0 | 3 |
| 3 | 22153OE73B | Electric and Hybrid Vehicle(EEE) | 3 | 0 | 0 | 3 |
| 4 | 22154OE73A | Introduction to non-destructive testing (MECHANICALENGINEERING) | 3 | 0 | 0 | 3 |
| 5 | 22154OE73B | Industrial Management | 3 | 0 | 0 | 3 |
| 6 | 22152OE73A | Biomedical Instrumentation (ECE) | 3 | 0 | 0 | 3 |
| 7 | 22152OE73B | Fundamentals of Electronic Devices and Circuits(ECE) | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE-IV

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22154OE74A | Additive Manufacturing (MECHANICAL ENGINEERING) | 3 | 0 | 0 | 3 |
| 2 | 22154OE74B | Industrial Safety (MECHANICAL ENGINEERING) | 3 | 0 | 0 | 3 |
| 3 | 22153OE74A | Sensors (EEE) | 3 | 0 | 0 | 3 |
| 4 | 22153OE74B | Electrical, Electronic and Magnetic materials(EEE) | 3 | 0 | 0 | 3 |
| 5 | 22152OE74A | Wearable devices (ECE) | 3 | 0 | 0 | 3 |
| 6 | 22152OE74B | Medical Informatics(ECE) | 3 | 0 | 0 | 3 |

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## LIST OF MANDATORY COURSES

### MANDATORY COURSE – I (SEMESTER V)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22147MC57A | Introduction to Women and Gender Studies | 3 | 0 | 0 | 0 |
| 2. | 22147MC57B | Elements of Literature | 3 | 0 | 0 | 0 |
| 3. | 22147MC57C | Film Appreciation | 3 | 0 | 0 | 0 |
| 4. | 22147MC57D | Disaster Risk Reduction and Management | 3 | 0 | 0 | 0 |

### MANDATORY COURSE – II (SEMESTER VI)

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| 1. | 22147MC67A | Well Being with Traditional Practices (Yoga, Ayurveda and Siddha) | 3 | 0 | 0 | 0 |
| 2. | 22147MC67B | History of Science and Technology in India | 3 | 0 | 0 | 0 |
| 3. | 22147MC67C | Political and Economic Thought for a Humane Society | 3 | 0 | 0 | 0 |
| 4. | 22147MC67D | State, Nation Building and Politics in India | 3 | 0 | 0 | 0 |
| 5. | 22147MC67E | Industrial Safety | 3 | 0 | 0 | 0 |

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Enc:

1. Annexure –

    1. B.Tech (FT)- Artificial Intelligence and Data Science Value Added course.

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1.Introduction to JAVA

**Syllabus**

1. What is Core Java?
2. Java Editions
3. Types of Java Courses
4. Concepts Covered in Core Java
5. Core Java Syllabus
    - Basic of Java
    - Class, Objects, and Types of Classes
    - Packages in Java
    - Data Types in Java
    - Variables, Constraints, and Literals
    - Methods in Java
    - Constructor in Java
    - Modifiers in Java
    - Static Keyword
    - Final Keyword
    - Inner Class in Java
    - Super and this keyword
    - Encapsulation
    - Inheritance
    - Polymorphism
    - Abstraction
6. Complete Industrial Core Java Syllabus and Sub Topics
7. Core Java Vs. Advance Java
8. Different Types of Core Java Frameworks
    - Spring

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2.Web Development

1. Web Development Course Syllabus

    1.1 Basic Web Development Course Syllabus
    1.2 Advanced Web Development Course Syllabus

2. Web Development Course Topics

    2.1 Full Stack Web Development Course Syllabus
    2.2 Front-End Web Development Course Syllabus
    2.3 Back-End Web Development Course Syllabus
    2.4 Python for Web Development Syllabus
    2.5 JavaScript for Web Development Syllabus

3. cs50's Web Programming with Python and JavaScript Syllabus

4. Web Design and Web Development Course Syllabus

    4.1 Web Application Course Syllabus

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## SCHOOL OF ENGINEERING AND TECHNOLOGY

### DEPARTMENT OF CIVIL ENGINEERING

## MINUTES OF THE MEETING OF THE BOARD OF STUDIES (BOS)

**Board: Civil**

**The Meeting of Board of Studies (BOS) was held as given below:**

| | |
|---|---|
| Name of the Body | Board of Studies |
| Department | Civil Engineering |
| Meeting no | 12 |
| Date and Time | 06.05.2022 and 02.00 PM |
| Venue | A block Gallery Hall |
| Members Attended | The details are given in the ANNEXURE-I |

| | AGENDA |
|---|---|
| 1 | To confirm the minutes of the previous meetings. |
| 2 | To discuss the action taken on the previous meeting minutes. |
| 3 | To review the curriculum and syllabus of B.Tech(FT) 2021R, B.Tech (PT) 19R and M.Tech (FT&PT) 19R |
| 4 | To scrutinize the stakeholders feedback on B.Tech. (FT/PT) and M.Tech. (FT&PT) |
| 5 | To scrutinize the panel of Examiners |
| 6 | To discuss the value added courses. |
| 7 | To discuss internship/field trip |
| 8 | To discuss extension activities for 2022-2023 academic year |
| 9 | To discuss mandatory courses |
| 10 | Discussion on Coaching for Competitive Exams & Higher Education. |
| 11 | Any other matter. |

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# MINUTES OF THE BOARD OF STUDIES MEETING

**Board:Civil**

The Chairman of BOS welcomed all the panel members for the meeting. The item listed in the agenda were taken for discussion.

The following are the minutes of the meeting

| |
|---|
| Agendum 1: Confirmation of the previous Meeting Minutes |
| Discussion: To confirm the previous BoS Meeting Minutes and to discuss the action taken on the previous BoS Meeting Minutes. |
| Resolution: Board approved the same |
| Agendum 2: Action taken on the previous Meeting Minutes |
| Discussion: Changes in 19R of B.Tech. PT and M.Tech. FT and PT has been discussed. |
| Resolution: Carried out the advised changes in 19R of B.Tech. PT and M.Tech. FT and PT. |
| Agendum 3: Scrutiny of stakeholders' feedback on existing curriculum and syllabus. |
| Discussion: To scrutinize the abstract of stakeholders feedback on existing curriculum and syllabus for B.Tech.-Civil (Full Time/Part Time) and M.Tech.-Structural Engineering (Full Time/Part Time). |
| Resolution: The members of the Board thoroughly scrutinized the existing curriculum and syllabus and the abstract of stakeholder's feedback on B.Tech. -Civil (Full Time/Part Time) and M.Tech.-Structural Engineering (Full Time/Part Time) and resolved to revise the curriculum in the subsequent syllabus revision. |
| Agendum 4:Discuss the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) of B.Tech. (FT/PT) and M.Tech. (FT/PT). |
| Discussion: To discuss upon the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) of B.Tech. (FT/PT) and M.Tech. (FT/PT). |
| Resolution: The members of the Board scrutinized the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and resolved to continue with the same for BTech (FT/PT) and M.Tech.(FT/PT). |
| Agendum 5:Introduction of newly added Value added courses |
| Discussion: To introduce newly added value added courses as follows<br>i) Landscape Architecture<br>ii) ETABS<br>iii) Demolition Engineering<br>iv) Tekla structures<br>v) Sketchup |
| Resolution: The members of the Board scrutinized the syllabus contents of newly added value added courses and resolved to introduce the same. |
| Agendum 6: Discussed about the skills, cracking interviews and professional development of students towards the corporate futures |
| Discussion: Arrangement for professional development classes for the students of final year. |
| Resolution: Schedule of classes for the Professional development has been done. |
| Agendum 7: Discussed about the Department Academic plan |
| Discussion: To conduct Symposium, Conference, Industrial visit, IPT/ Internship, Seminars, |

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| |
|---|
| Socio Technical Projects. Workshops, FDP, Conduct of theory and Practical classes, Remedial classes. Internship, Placement Training. Coaching for Competitive Exams, Semester preparatory Courses, Bridge Courses, Add on courses. Elective courses, phase I projects for M.Tech, Conduct classes for B.Tech (PT) and M.Tech (PT) |
| Resolution: Planned the Symposium, Conference, Industrial visit, IPT/ Internship, Seminars, Technical Projects, Workshops, FDP, Conduct of theory and Practical classes, Remedial classes. Internship, Placement Training, Coaching for Competitive Exams, Semester preparatory Courses, Bridge Courses, Add on courses, Elective courses, for the students. |

The chairman of Board of Studies (BOS) thanked all the members for their active participation and cordially invited them for the next meeting.

After thorough scrutiny of the curriculum and Syllabi and the details of feedback on curriculum received from the Stake holders during the Year 2021-22, the members of the Board have unanimously passed the following resolutions:

Resolved to introduce the following courses in B.Tech (CIVIL Engineering)-Full Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem I:** Communication Laboratory - I - 2credits
**Sem-II:** Communication Laboratory- II-2 credits

Resolved to introduce the following courses in B.Tech (CIVIL Engineering)-Part Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem -I:** Strength of Materials I- 4 credits
**Sem -II:** Strength of Materials II - 4 credits

Resolved to introduce the following Elective courses in B.Tech (CIVIL Engineering)-Part Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem –IV: Hard Core Elective I**

| S.No | Name of the Subject |
|---|---|
| 1 | Total Station And GPS Surveying |
| 2 | Basic Construction Materials |
| 3 | Geographic Information System |
| 4 | Construction Methods and Equipment Management |

**Sem –V: Hard Core Elective II**

| S.No | Name of the Subject |
|---|---|
| 1 | Air Pollution and Control |
| 2 | Water and waste water treatment |
| 3 | Remote sensing & GIS for rural development |
| 4 | Soil Dynamics |

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**Sem –VI: Hard Core Elective III**

| S.No | Name of the Subject |
|---|---|
| 1 | Advanced Soil Mechanics |
| 2 | Advanced Foundation Engineering |
| 3 | Applied Environmental Microbiology |
| 4 | Engineering Hydrology |

**Sem –VII: Hard Core Elective IV**

| S.No | Name of the Subject |
|---|---|
| 1 | Applied Seismology for Engineers |
| 2 | Earthquake Resistant Design of Foundations |
| 3 | Retrofitting and Rehabilitation of Civil Infrastructure |
| 4 | Urban Transportation SystemPlanning |

Resolved to introduce the following courses in M.Tech (Structural Engineering)-Full Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem -I:** Experimental Techniques -4 credits

Resolved to introduce the following Elective courses in M.Tech (Structural Engineering)-Full Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem –I: Hard Core Elective I**

| S.No | Name of the Subject |
|---|---|
| 1 | Theory Of Plates |
| 2 | Water Resource Engineering |
| 3 | Soil Structural Interaction |
| 4 | Remote Sensing Essentials |

**Sem –II: Hard Core Elective II**

| S.No | Name of the Subject |
|---|---|
| 1 | Analysis And Design Of Tall Buildings |
| 2 | Soil Dynamics |
| 3 | Rock Engineering |
| 4 | Advanced Soil Mechanics |

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**Sem –II: Hard Core Elective III**

| S.No | Name of the Subject |
|---|---|
| 1 | Design of sub structure |
| 2 | Advanced Foundation Engineering |
| 3 | Development and Applications of Special Concretes |
| 4 | Vibration of Continuous Systems |

**Sem –III: Hard Core Elective IV**

| S.No | Name of the Subject |
|---|---|
| 1 | Optimization of Structures |
| 2 | Wind And Cyclone Effects On Structures |
| 3 | Urban Transportation System Planning |
| 4 | Applied Seismology for Engineers |

**Sem –III: Hard Core Elective V**

| S.No | Name of the Subject |
|---|---|
| 1 | Design Of Bridges |
| 2 | Surface Water Hydrology |
| 3 | Unsaturated Soil Mechanics |
| 4 | Remote Sensing and GIS for rural development |

**Sem –III: Hard Core Elective VI**

| S.No | Name of the Subject |
|---|---|
| 1 | Structural Dynamics |
| 2 | Water Supply Engineering |
| 3 | Water and waste water treatment |
| 4 | Applied Environmental Microbiology |

Resolved to introduce the following Elective courses in M.Tech (Structural Engineering)-Part Time curriculum with effect from 2022-23 as per the guidelines of the All India Council for Technical Education:

**Sem –II: Elective I**

| S.No | Name of the Subject |
|---|---|
| 1 | Theory Of Plates |
| 2 | Water Resource Engineering |
| 3 | Soil Structural Interaction |
| 4 | Remote Sensing Essentials |

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**Sem –III: Elective II**

| S.No | Name of the Subject |
|---|---|
| 1 | Analysis And Design Of Tall Buildings |
| 2 | Soil Dynamics |
| 3 | Rock Engineering |
| 4 | Advanced Soil Mechanics |

**Sem –IV: Elective III**

| S.No | Name of the Subject |
|---|---|
| 1 | Advanced Soil Mechanics |
| 2 | Advanced Foundation Engineering |
| 3 | Development and Applications of Special Concretes |
| 4 | Vibration of Continuous Systems |

**Sem –V: Elective IV**

| S.No | Name of the Subject |
|---|---|
| 1 | Optimization of Structures |
| 2 | Wind And Cyclone Effects On Structures |
| 3 | Urban Transportation System Planning |
| 4 | Applied Seismology for Engineers |

**Sem –V: Elective V**

| S.No | Name of the Subject |
|---|---|
| 1 | Design Of Bridges |
| 2 | Remote Sensing and GIS for rural development |
| 3 | Surface Water Hydrology |
| 4 | Unsaturated Soil Mechanics |

**Sem –V: Elective VI**

| S.No | Name of the Subject |
|---|---|
| 1 | Structural Dynamics |
| 2 | Water Supply Engineering |
| 3 | Water and waste water treatment |
| 4 | Applied Environmental Microbiology |

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Also the members of the board have unanimously recommended continuing with the existing curriculum of Regulation 2020 with addition of new open electives in 5th and 7th semester which is to be followed in the academic year 2022 – 2023 for B. Tech Civil (Full Time).

The List of suggested subjects are:

| S.No | Name of the Subject |
|---|---|
| 1 | Software Architecture |
| 2 | Web Technology |
| 3 | Microprocessors and Microcontroller |
| 4 | Wireless communication |
| 5 | Computer Aided design of electrical apparatus |
| 6 | Power Electronics for renewable energy systems |
| 7 | Electronics and Microprocessors |
| 8 | Nuclear Engineering |

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ATTENDANCE OF THE BOARD OF STUDIES MEETING

**Board: CIVIL**

**Date: 15-05-2024 Time: 10.30 am**

**Venue: Gallery Hall, 'A' Block**

The following members were present for the Board of Studies meeting

| S.No. | Name/Degree/Designation | Institute/Organization/ Fulladdress | Online/ Physical | Signature |
|---|---|---|---|---|
| 1 | Dr.Ashutosh Das/ Professor/Civil | Prist University | Physical | |
| 2 | Mr.P.Vadivel/M.tech/ Divisional Engineer | Highways department, Trichy | Physical | |
| 3 | Mrs.V.Ramya/ M.tech/Assistant Professor | Government college of Engineering, Thanjavur | Physical | |
| 4 | Dr.IraiKarkuzhali | Prist University | Physical | |
| 5 | Dr.P.Paramaguru | Prist University | Physical | |
| 6 | Dr.R.Siva Samundy | Prist University | Physical | |
| 7 | D.Amal Colins | Prist University | Physical | |
| 8 | S.Ramakrishnan | Prist University | Physical | |
| 9 | D.Jeyakumar | Prist University | Physical | |
| 10 | A.Beliya Mary | Prist University | Physical | |
| 11 | K.Shanthi | Prist University | Physical | |
| 12 | J.Santhiyaa Jenifer | Prist University | Physical | |
| 13 | R.Devi | Prist University | Physical | |
| 14 | P.Venkateswaran | Prist University | Physical | |
| 15 | S.Ravishankar | Prist University | Physical | |
| 16 | M.Karpagam | Prist University | Physical | |
| 17 | T.Vidhudhalai | Prist University | Physical | |
| 18 | S.Vennila | Prist University | Physical | |

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## B.Tech.Civil Engineering-Part Time-2022R

### SEMESTER – I

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22148S11P | Transforms & Partial Differential Equations | S | 2 | 1 | 0 | 4 |
| 2 | 22155C12P | Strength of Materials I | C | 3 | 1 | 0 | 4 |
| 3 | 22155C13P | Fluid Mechanics I | C | 3 | 1 | 0 | 4 |
| 4 | 22155C14P | Plane and Geodetic Surveying | C | 3 | 1 | 0 | 4 |
| 5 | 22155C15P | Irrigation Engineering | C | 3 | 0 | 0 | 3 |
| TOTAL | | | | | | | 19 |

### SEMESTER – II

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22148S21P | Numerical Methods | S | 3 | 1 | 0 | 4 |
| 2 | 22155C22P | Strength of Materials II | C | 3 | 1 | 0 | 4 |
| 3 | 22155C23P | Fluid Mechanics II | C | 3 | 1 | 0 | 4 |
| 4 | 22155C24P | Concrete Technology | C | 3 | 1 | 0 | 4 |
| 5 | 22155C25P | Soil Mechanics | C | 3 | 1 | 0 | 3 |
| TOTAL | | | | | | | 19 |

### SEMESTER – III

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22148S31P | Probability & Statistics | S | 3 | 1 | 0 | 4 |
| 2 | 22155C32P | Design of Reinforced Concrete Structures-I | C | 3 | 1 | 0 | 4 |
| 3 | 22155C33P | Structural Analysis I | C | 3 | 1 | 0 | 4 |
| 4 | 22155C34P | Construction Materials And Practice | C | 3 | 1 | 0 | 3 |
| 5 | 22155L35P | Soil Mechanics laboratory | - | 0 | 0 | 3 | 2 |
| TOTAL | | | | | | | 17 |

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## SEMESTER – IV

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22155C41P | Design of Reinforced Concrete Structures-II | C | 3 | 1 | 0 | 4 |
| 2 | 22155C42P | Structural Analysis II | C | 3 | 1 | 0 | 4 |
| 3 | 22155C43P | Environmental Engineering | C | 3 | 1 | 0 | 4 |
| 4 | 22155E44-P | Hard Core Elective I | - | 3 | 1 | 0 | 4 |
| 5 | 22155L45P | Environmental Engineering Lab | - | 0 | 0 | 3 | 2 |
| TOTAL | | | | | | | 18 |

## SEMESTER – V

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22155C51P | Design of Steel Structures | C | 3 | 1 | 0 | 4 |
| 2 | 22155C52P | Foundation Engineering | C | 3 | 1 | 0 | 4 |
| 3 | 22155C53P | Waste Water Engineering | C | 3 | 1 | 0 | 4 |
| 4 | 22155E54-P | Hard Core Elective II | - | 3 | 1 | 0 | 4 |
| 5 | 22155L55P | Computer Aided Building Drawing Laboratory | L | 0 | 0 | 3 | 2 |
| | | | | | | | 18 |

## SEMESTER – VI

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22155C61P | Estimation & Cost Evaluation | C | 3 | 1 | 0 | 4 |
| 2 | 22155C62P | Ground Water Hydrology | C | 3 | 1 | 0 | 4 |
| 3 | 22155C63P | Construction Project Management | C | 3 | 1 | 0 | 4 |
| 4 | 22155E64-P | Hard Core Elective III | - | 3 | 1 | 0 | 4 |
| 5 | 22155L65P | Concrete &Transportation Engineering Laboratory | L | 0 | 0 | 3 | 2 |
| TOTAL | | | | | | | 18 |

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## SEMESTER – VII

| S. No | Sub. Code | Name of the Subject | Core | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 1 | 22155S71P | Total Quality Management | S | 3 | 0 | 0 | 3 |
| 2 | 22155C72P | Housing, Planning & Management | C | 3 | 1 | 0 | 4 |
| 3 | 22155C73P | Repair And Rehabilitation of Structures | C | 3 | 1 | 0 | 4 |
| 4 | 22155E74-P | Hard Core Elective IV | - | 3 | 1 | 0 | 4 |
| 5 | 22155P75P | Project Work | - | - | - | 12 | 6 |
| TOTAL | | | | | | | 21 |

## LIST OF ELECTIVES

### HARD CORE ELECTIVE I

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155E44AP | Total Station And GPS Surveying | 3 | 1 | 0 | 4 |
| 2 | 22155E44BP | Water Resource Engineering | 3 | 1 | 0 | 4 |
| 3 | 22155E44CP | Basic Construction Materials | 3 | 1 | 0 | 4 |
| 4 | 22155E44DP | Geographic Information System | 3 | 1 | 0 | 4 |
| 5 | 22155E44EP | Construction Methods and Equipment Management | 3 | 1 | 0 | 4 |

### HARD CORE ELECTIVE II

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155E54AP | Air Pollution and Control | 3 | 1 | 0 | 4 |
| 2 | 22155E54BP | Transportation Engineering | 3 | 1 | 0 | 4 |
| 3 | 22155E54CP | Water and waste water treatment | 3 | 1 | 0 | 4 |
| 4 | 22155E54DP | Remote sensing & GIS for rural development | 3 | 1 | 0 | 4 |
| 5 | 22155E54EP | Soil Dynamics | 3 | 1 | 0 | 4 |

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## HARD CORE ELECTIVE III

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155E64AP | Advanced Soil Mechanics | 3 | 1 | 0 | 4 |
| 2 | 22155E64BP | Advanced Foundation Engineering | 3 | 1 | 0 | 4 |
| 3 | 22155E64CP | Airport & Harbors | 3 | 1 | 0 | 4 |
| 4 | 22155E64DP | Applied Environmental Microbiology | 3 | 1 | 0 | 4 |
| 5 | 22155E64EP | Engineering Hydrology | 3 | 1 | 0 | 4 |

## HARD CORE ELECTIVE IV

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22155E74AP | Applied Seismology for Engineers | 3 | 1 | 0 | 4 |
| 2 | 22155E74BP | Pre Fabricated Structures | 3 | 1 | 0 | 4 |
| 3 | 22155E74CP | Earthquake Resistant Design of Foundations | 3 | 1 | 0 | 4 |
| 4 | 22155E74DP | Retrofitting and Rehabilitation of Civil Infrastructure | 3 | 1 | 0 | 4 |
| 5 | 22155E74EP | Urban Transportation System Planning | 3 | 1 | 0 | 4 |

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# M.Tech.Structural Engineering- Full Time-2022R

## SEMESTER – I

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22248S11E | Advanced Engineering Mathematics | 3 | 1 | 0 | 4 |
| 2 | 22255C12 | Quality Control &Assurance in Construction | 3 | 1 | 0 | 4 |
| 3 | 22255C13 | Theory of Plasticity and Elasticity | 3 | 1 | 0 | 4 |
| 4 | 22255C14 | Structural Dynamics | 3 | 1 | 0 | 4 |
| 5 | 22255C15 | Experimental Techniques | 3 | 1 | 0 | 4 |
| 6 | 22255E16A | Hard Core Elective I | 3 | 1 | 0 | 3 |
| 7 | 22255L17 | Core Practical (Computer Programming Lab) | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 26 |

## SEMESTER – II

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255C21 | Management Information System | 3 | 1 | 0 | 4 |
| 2 | 22255C22 | Finite Element Analysis | 3 | 1 | 0 | 4 |
| 3 | 22255C23 | Advanced Concrete Structural Design | 3 | 1 | 0 | 4 |
| 4 | 22255E24B | Hard Core Elective –II | 3 | 1 | 0 | 3 |
| 5 | 22255E25C | Hard Core Elective –III | 3 | 1 | 0 | 3 |
| 6 | 22255L26 | Core practical(Software Lab – Finite Element Analysis-ANSYS) | 0 | 0 | 3 | 3 |
| 7 | 222TECWR | Technical writing / Seminars | 0 | 0 | 3 | 3 |
| | | TOTAL | | | | 24 |

## SEMESTER – III

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255C31 | Advanced Steel Structures | 3 | 1 | 0 | 4 |
| 2 | 22255E32C | Hard Core Elective IV | 3 | 1 | 0 | 3 |
| 3 | 22255E33A | Hard Core Elective V | 3 | 1 | 0 | 3 |
| 4 | 22255E34B | Hard Core Elective VI | 3 | 1 | 0 | 3 |
| 6 | 22255P35 | Project Work Phase-I | 0 | 0 | 6 | 10 |
| | | TOTAL | | | | 23 |

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## SEMESTER – IV

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255P41 | Project Work Phase-II | 0 | 0 | 12 | 15 |
| TOTAL | | | | | | 15 |

## LIST OF ELECTIVES

### Hard Core Elective-I

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E16A | Prestressed Concrete Design | 3 | 1 | 0 | 3 |
| 2 | 22255E16B | Theory of Plates | 3 | 1 | 0 | 3 |
| 3 | 22255E16C | Water Resource Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E16D | Soil Structural Interaction | 3 | 1 | 0 | 3 |
| 5 | 22255E16E | Remote Sensing Essentials | 3 | 1 | 0 | 3 |

### Hard Core Elective – II

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E24 A | Analysis And Design Of Tall Buildings | 3 | 1 | 0 | 3 |
| 2 | 22255E24 B | Advanced Concrete Technology | 3 | 1 | 0 | 3 |
| 3 | 22255E24 C | Soil Dynamics | 3 | 1 | 0 | 3 |
| 4 | 22255E24 D | Rock Engineering | 3 | 1 | 0 | 3 |
| 5 | 22255E24 E | Advanced Soil Mechanics | 3 | 1 | 0 | 3 |

### Hard Core Elective - III

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E25A | Design of sub structure | 3 | 1 | 0 | 3 |
| 2 | 22255E25B | Advanced Foundation Engineering | 3 | 1 | 0 | 3 |
| 3 | 22255E25 C | Elements of Earthquake Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E25 D | Development and Applications of Special Concretes | 3 | 1 | 0 | 3 |
| 5 | 22255E25 E | Vibration of Continuous Systems | 3 | 1 | 0 | 3 |

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## Hard Core Elective-IV

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E32A | Optimization of Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E32B | Wind And Cyclone Effects On Structures | 3 | 1 | 0 | 3 |
| 3 | 22255E32C | A seismic Design of Structures | 3 | 1 | 0 | 3 |
| 4 | 22255E32D | Urban Transportation System Planning | 3 | 1 | 0 | 3 |
| 5 | 22255E32E | Applied Seismology for Engineers | 3 | 1 | 0 | 3 |

## Hard Core Elective – V

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E33A | Prefabricated Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E33B | Design Of Bridges | 3 | 1 | 0 | 3 |
| 3 | 22255E33C | Surface Water Hydrology | 3 | 1 | 0 | 3 |
| 4 | 22255E33D | Unsaturated Soil Mechanics | 3 | 1 | 0 | 3 |
| 5 | 22255E33E | Remote Sensing and GIS for rural development | 3 | 1 | 0 | 3 |

## Hard Core Elective – VI

| S. No | Subject Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E34A | Offshore Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E34B | Structural Dynamics | 3 | 1 | 0 | 3 |
| 3 | 22255E34C | Water Supply Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E34D | Water and waste water treatment | 3 | 1 | 0 | 3 |
| 5 | 22255E34E | Applied Environmental Microbiology | 3 | 1 | 0 | 3 |

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## M.Tech.Structural Engineering- Part Time-2022R

## SEMESTER– I

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22248S11EP | Advanced Engineering Mathematics | 3 | 1 | 0 | 4 |
| 2 | 22255C12P | Quality Control & Assurance in Construction | 3 | 1 | 0 | 4 |
| 3 | 22255C13P | Theory of Plasticity and Elasticity | 3 | 1 | 0 | 4 |
| 4 | 22255L14P | Computer Programming Lab | 0 | 0 | 3 | 3 |
| TOTAL | | | | | | 15 |

## SEMESTER– II

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255C21P | Management Information System | 3 | 1 | 0 | 4 |
| 2 | 22255C22P | Finite Element Analysis | 3 | 1 | 0 | 4 |
| 3 | 22255E23-P | Elective I | 3 | 1 | 0 | 3 |
| 4 | 22255L24P | Software Lab– ANSYS | 0 | 0 | 3 | 3 |
| 5 | 222TECWRP | Technical Writing/Seminars | 0 | 0 | 3 | 3 |
| TOTAL | | | | | | 17 |

## SEMESTER– III

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255C31P | Structural Dynamics | 3 | 1 | 0 | 4 |
| 2 | 22255C32P | Maintenance and Rehabilitation of Structures | 3 | 1 | 0 | 4 |
| 3 | 22255E33-P | Elective II | 3 | 1 | 0 | 3 |
| TOTAL | | | | | | 11 |

## SEMESTER– IV

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255C41P | Advanced Concrete Structural design | 3 | 1 | 0 | 4 |
| 2 | 22255C42P | Advanced Steel Structures | 3 | 1 | 0 | 4 |
| 3 | 22255E43-P | Elective III | 3 | 1 | 0 | 3 |
| 4 | 22255P44P | Project Work Phase I | 0 | 0 | 6 | 10 |
| Total Credits | | | | | | 21 |

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## SEMESTER- V

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E51-P | Elective IV | 3 | 1 | 0 | 3 |
| 2 | 22255E52-P | Elective V | 3 | 1 | 0 | 3 |
| 3 | 22255E53-P | Elective VI | 3 | 1 | 0 | 3 |
| TOTAL | | | | | | 9 |

## SEMESTER–VI

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255P61P | Project Work Phase II | 0 | 0 | 12 | 15 |
| Total Credits | | | | | | 15 |

## LIST OF ELECTIVES SEMESTER II

### ELECTIVE-I

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E23AP | Theory Of Plates | 3 | 1 | 0 | 3 |
| 2 | 22255E23BP | Advanced Concrete Technology | 3 | 1 | 0 | 3 |
| 3 | 22255E23CP | Water Resource Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E23DP | Soil Structural Interaction | 3 | 1 | 0 | 3 |
| 5 | 22255E23EP | Remote Sensing Essentials | 3 | 1 | 0 | 3 |

## SEMESTER III

### ELECTIVE- II

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E33AP | Prestressed Concrete Design | 3 | 1 | 0 | 3 |
| 2 | 22255E33BP | Analysis And Design Of Tall Buildin | 3 | 1 | 0 | 3 |
| 3 | 22255E33CP | Soil Dynamics | 3 | 1 | 0 | 3 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 22255E33DP | Rock Engineering | 3 | 1 | 0 | 3 |
| 5 | 22255E33EP | Advanced Soil Mechanics | 3 | 1 | 0 | 3 |

## SEMESTER IV

## ELECTIVE-III

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E43AP | Design of Sub Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E43BP | Advanced Foundation Engineering | 3 | 1 | 0 | 3 |
| 3 | 22255E43CP | Elements Of Earthquake Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E43DP | Development and Applications of Special Concretes | 3 | 1 | 0 | 3 |
| 5 | 22255E43EP | Vibration of Continuous Systems | 3 | 1 | 0 | 3 |

## SEMESTER V

## ELECTIVE-IV

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E51AP | Optimization of Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E51BP | Wind And Cyclone Effects On Structures | 3 | 1 | 0 | 3 |
| 3 | 22255E51CP | A seismic Design of Structures | 3 | 1 | 0 | 3 |
| 4 | 22255E51DP | Urban Transportation System Planning | 3 | 1 | 0 | 3 |
| 5 | 22255E51EP | Applied Seismology for Engineers | 3 | 1 | 0 | 3 |

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## ELECTIVE–V

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E52A | Prefabricated Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E52BP | Design of Bridges | 3 | 1 | 0 | 3 |
| 3 | 22255E52CP | Remote Sensing and GIS for rural development | 3 | 1 | 0 | 3 |
| 4 | 22255E52DP | Surface Water Hydrology | 3 | 1 | 0 | 3 |
| 5 | 22255E52EP | Unsaturated Soil Mechanics | 3 | 1 | 0 | 3 |

## ELECTIVE-VI

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 22255E53AP | Offshore Structures | 3 | 1 | 0 | 3 |
| 2 | 22255E53BP | Structural Dynamics | 3 | 1 | 0 | 3 |
| 3 | 22255E53CP | Water Supply Engineering | 3 | 1 | 0 | 3 |
| 4 | 22255E53DP | Water and waste water treatment | 3 | 1 | 0 | 3 |
| 5 | 22255E53EP | Applied Environmental Microbiology | 3 | 1 | 0 | 3 |

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## B.Tech-Civil Engineering – Full Time-2020R

### SEMESTER I

| Sl.No | Course Code | Course Title | Periods Per Week | | | Credit |
|---|---|---|---|---|---|---|
| | THEORY | | L | T | P | |
| 1 | 20147S11 | Communicative English | 4 | 0 | 0 | 4 |
| 2 | 20148S12 | Engineering Mathematics–I | 3 | 2 | 0 | 4 |
| 3 | 20149S13 | Engineering Physics | 3 | 0 | 0 | 3 |
| 4 | 20149S14 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 5 | 20154S15 | Engineering Graphics | 2 | 0 | 4 | 4 |
| 6 | 20150S16 | Problem Solving and Python Programming | 3 | 0 | 0 | 3 |
| PRACTICALS | | | | | | |
| 7 | 20150L17 | Problem Solving and Python Programming Laboratory | 0 | 0 | 3 | 2 |
| 8 | 20149L18 | Physics and Chemistry Laboratory | 0 | 0 | 3 | 2 |
| 9 | 201AGIT | Induction Training Programme | | | | 2 |
| | TOTAL | | | | | 25 |

### SEMESTER II

| Sl. No | COURSE CODE | COURSE TITLE | L | T | P | C |
|---|---|---|---|---|---|---|
| THEORY | | | | | | |
| 1. | 20147S21 | Technical English (All Branches ) | 4 | 0 | 0 | 4 |
| 2. | 20148S22A | Engineering Mathematics II (All Branches ) | 4 | 0 | 0 | 4 |
| 3. | 20149S23D | Physics for Civil Engineering | 3 | 0 | 0 | 3 |
| 4. | 20149S24A | Environmental Science And Engineering | 3 | 0 | 0 | 3 |
| 5. | 20153S25E | Basic Electrical And Electronics Engineering | 3 | 0 | 0 | 3 |
| 6. | 20154S26D | Engineering Mechanics | 3 | 2 | 0 | 4 |
| PRACTICALS | | | | | | |
| 7. | 20154L27 | Engineering Practices Laboratory | 0 | 0 | 3 | 2 |
| 8. | 20155L28E | Computer Aided Building Drawing Lab | 0 | 0 | 3 | 2 |
| 9. | 201AGIC | Indian Constitution | | | | 2 |
| 10. | 201ASBE | Basic Behavioral Etiquette | | | | 2 |
| | | TOTAL | 21 | 0 | 8 | 25 |

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## SEMESTER III

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20148S31C | Transforms and Partial Differential Equations | 4 | 0 | 0 | 4 |
| 2 | 20155C32 | Engineering Geology | 3 | 0 | 0 | 3 |
| 3 | 20155C33 | Construction Materials | 3 | 0 | 0 | 3 |
| 4 | 20155C34 | Strength of Materials–I | 3 | 0 | 0 | 3 |
| 5 | 20155C35 | Fluid Mechanics | 3 | 2 | 0 | 4 |
| 6 | 20155C36 | Surveying | 4 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7 | 20155L37 | Surveying Laboratory | 0 | 0 | 3 | 2 |
| 8 | 20155L38 | Construction Materials Laboratory | 0 | 0 | 3 | 2 |
| 9 | 20147L39 | Interpersonal Skills/Listening and Speaking | 0 | 0 | 2 | 1 |
| 10 | 201AGGS | Introduction to Gender Studies | | | | 2 |
| TOTAL | | | | | | 25 |

## SEMESTER IV

| S.No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20148S41C | Numerical Methods | 4 | 0 | 0 | 4 |
| 2 | 20155C42 | Construction Techniques and Practices | 3 | 0 | 0 | 3 |
| 3 | 20155C43 | Strength of Materials II | 4 | 0 | 0 | 4 |
| 4 | 20155C44 | Applied Hydraulic Engineering | 3 | 0 | 0 | 3 |
| 5 | 20155C45 | Concrete Technology | 3 | 0 | 0 | 3 |
| 6 | 20155C46 | Soil Mechanics | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7 | 20155L47 | Strength of Materials Lab | 0 | 0 | 3 | 2 |
| 8 | 20155L48 | Hydraulic Engineering Lab | 0 | 0 | 3 | 2 |
| 9 | 20147L49 | Advanced Reading & Writing | 0 | 0 | 2 | 1 |
| 10 | 20155CRS | Research Led Seminar | 0 | 0 | 2 | 1 |
| 11 | 201AGCE | Community Engagement | | | | 2 |
| 12 | 201ASGS | Technical, General Aptitude and Skill Set Development | | | | 2 |
| TOTAL | | | | | | 26 |

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## SEMESTER–V

| S. No | Sub.Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20155C51 | Design of Reinforced Cement Concrete Elements | 4 | 0 | 0 | 4 |
| 2 | 20155C52 | Structural Analysis I | 3 | 2 | 0 | 4 |
| 3 | 20155C53 | Water Supply Engineering | 3 | 0 | 0 | 3 |
| 4 | 20155FE54 | Open Elective I | 3 | 0 | 0 | 3 |
| 5 | 20155E55 | Elective I | 3 | 0 | 0 | 3 |
| 6 | 20155C56 | Foundation Engineering | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7 | 20155L57 | Soil Mechanics Lab | 0 | 0 | 3 | 2 |
| 8 | 20155L58 | Water and Waste Water Analysis Lab | 0 | 0 | 3 | 2 |
| 9 | 20155L59 | Survey Camp | 0 | 0 | 2 | 2 |
| 10 | 20155CRM | Research Methodology | 0 | 0 | 2 | 3 |
| 11 | 201AGIE | Innovation and Entrepreneurship | | | | 2 |
| TOTAL | | | | | | 29 |

## SEMESTER–VI

| S.No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20155C61 | Design of Steel Structural Elements | 3 | 0 | 0 | 3 |
| 2 | 20155C62 | Structural Analysis II | 3 | 2 | 0 | 4 |
| 3 | 20155C63 | Irrigation Engineering | 3 | 0 | 0 | 3 |
| 4 | 20155C64 | Highway Engineering | 3 | 0 | 0 | 3 |
| 5 | 20155C65 | Waste Water Engineering | 3 | 0 | 0 | 3 |
| 6 | 20155E66 | Elective II | 3 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 7 | 20155L67 | Highway Engineering Laboratory | 0 | 0 | 3 | 2 |
| 8 | 20155L68 | Irrigation and Environmental Engineering Drawing | 0 | 0 | 3 | 2 |
| 9 | 20147L69 | Professional Communication | 0 | 0 | 2 | 1 |
| 10 | 20155CBR | Participation in Bounded Research | 0 | 0 | 2 | 1 |
| 11 | 201ASTT | Technical Training | | | | 2 |
| TOTAL | | | | | | 25 |

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## SEMESTER–VII

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20155C71 | Estimation , Costing & Valuation Engineering | 4 | 0 | 0 | 4 |
| 2 | 20155C72 | Railways, Airports, Docks And Harbour Engineering | 3 | 2 | 0 | 4 |
| 3 | 20155C73 | Structural Design and drawing | 3 | 2 | 0 | 4 |
| 4 | 20155FE74 | Open Elective II | 4 | 0 | 0 | 3 |
| 5 | 20155E75 | Elective III | 4 | 0 | 0 | 3 |
| **PRACTICALS** | | | | | | |
| 6 | 20155L76 | Creative and Innovation project (activity based – subject related) | 0 | 0 | 4 | 2 |
| 7 | 20155L77 | Industrial Training ( 4 Weeks during VI th Sem Summer) | 0 | 0 | 0 | 2 |
| 8 | 20155L78 | Technical Seminar | 0 | 0 | 2 | 1 |
| 9 | 20155CSR | Design / Socio Technical Project | 0 | 0 | 4 | 3 |
| TOTAL | | | | | | 26 |

## SEMESTER–VIII

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E81 | Elective IV | 3 | 0 | 0 | 3 |
| 2 | 20155E82 | Elective V | 3 | 0 | 0 | 3 |
| 3 | 20155PW83 | Project Work | 0 | 0 | 30 | 10 |
| 4 | 20155PEE | Program Exit Exam | | | | 2 |
| 5 | 201AGPE | Professional Ethics and Human Values | | | | 2 |
| 6 | 201ASIM | Interview Skills Training and Mock Test | | | | 2 |
| TOTAL | | | | | | 18 |

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## LIST OF ELECTIVES

### SEMESTER – V

### ELECTIVE I

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E55A | Construction Equipment and Automation | 3 | 0 | 0 | 3 |
| 2 | 20155E55B | Principles of Architecture | 3 | 0 | 0 | 3 |
| 3 | 20155E55C | Geographic Information System | 3 | 0 | 0 | 3 |
| 4 | 20155E55D | Forensic Engineering & Rehabilitation | 3 | 0 | 0 | 3 |
| 5 | 20155E55E | Energy Efficient Buildings | 3 | 0 | 0 | 3 |

### SEMESTER – VI

### ELECTIVE II

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E66A | Energy and Environment | 3 | 0 | 0 | 3 |
| 2 | 20155E66B | Environmental Policies and Legislation | 3 | 0 | 0 | 3 |
| 3 | 20155E66C | Sustainable Urban Development Concepts and Strategies | 3 | 0 | 0 | 3 |
| 4 | 20155E66D | Instrumental Methods and Analysis of Environmental Pollutants | 3 | 0 | 0 | 3 |
| 5 | 20155E66E | Air pollution and control Engineering | 3 | 0 | 0 | 3 |

### SEMESTER – VI

### ELECTIVE III

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E75A | Building Automation & Management System | 3 | 0 | 0 | 3 |
| 2 | 20155E75B | Design of Prestressed concrete structures | 3 | 0 | 0 | 3 |
| 3 | 20155E75C | Pavement Design | 3 | 0 | 0 | 3 |
| 4 | 20155E75D | Town Planning | 3 | 0 | 0 | 3 |
| 5 | 20155E75E | Smart materials and smart structures | 3 | 0 | 0 | 3 |

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## SEMESTER – VIII
## ELECTIVE IV

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E81A | Environmental Economics | 3 | 0 | 0 | 3 |
| 2 | 20155E81B | Simulation and Modeling in Environmental Systems | 3 | 0 | 0 | 3 |
| 3 | 20155E81C | Membrane Separation for Water and Waste water | 3 | 0 | 0 | 3 |
| 4 | 20155E81D | Theory and Practice of Industrial Wastewater Treatment | 3 | 0 | 0 | 3 |
| 5 | 20155E81E | Geo-environmental Engineering | 3 | 0 | 0 | 3 |

## ELECTIVE V

| S. No | Sub. Code | Name of the Subject | L | T | P | C |
|---|---|---|---|---|---|---|
| 1 | 20155E82A | Airport & Waterways Engineering | 3 | 0 | 0 | 3 |
| 2 | 20155E82B | Surface Hydrology | 3 | 0 | 0 | 3 |
| 3 | 20155E82C | Prefabricated structures | 3 | 0 | 0 | 3 |
| 4 | 20155E82D | Contracts Management | 3 | 0 | 0 | 3 |
| 5 | 20155E82E | Sustainable Construction methods | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE-I

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 20150FE54A | Database Management Systems (CSE) | 3 | 0 | 0 | 3 |
| 2 | 20150FE54B | Cloud Computing (CSE) | 3 | 0 | 0 | 3 |
| 3 | 20150FE54C | Software Architecture (CSE) | 3 | 0 | 0 | 3 |
| 4 | 20152FE54A | Basic of Bio Medical Instrumentation (ECE) | 3 | 0 | 0 | 3 |
| 5 | 20152FE54B | Sensor and Transducers (ECE) | 3 | 0 | 0 | 3 |
| 6 | 20152FE54C | Microprocessors and Microcontroller (ECE) | 3 | 0 | 0 | 3 |
| 7 | 20153FE54A | Industrial Nano Technology (EEE) | 3 | 0 | 0 | 3 |
| 8 | 20153FE54B | Energy Conservation and Management (EEE) | 3 | 0 | 0 | 3 |
| 9 | 20153FE54C | Computer Aided design of electrical apparatus (EEE) | 3 | 0 | 0 | 3 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 20154FE54A | Renewable Energy Sources (MECH) | 3 | 0 | 0 | 3 |
| 11 | 20154FE54B | Automotive Systems (MECH) | 3 | 0 | 0 | 3 |
| 12 | 20154FE54C | Electronics and Microprocessors (MECH) | 3 | 0 | 0 | 3 |

## OPEN ELECTIVE-II

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 20150FE74A | Introduction to C Programming (CSE) | 3 | 0 | 0 | 3 |
| 2 | 20150FE74B | Data Structures & Algorithms (CSE) | 3 | 0 | 0 | 3 |
| 3 | 20150FE74C | Web Technology(CSE) | 3 | 0 | 0 | 3 |
| 4 | 20152FE74A | Robotics (ECE) | 3 | 0 | 0 | 3 |
| 5 | 20152FE74B | Electronic Devices (ECE) | 3 | 0 | 0 | 3 |
| 6 | 20152FE74C | Wireless Communication (ECE) | 3 | 0 | 0 | 3 |
| 7 | 20153FE74A | Basic Circuit Theory (EEE) | 3 | 0 | 0 | 3 |
| 8 | 20153FE74B | Introduction to Renewable Energy Systems (EEE) | 3 | 0 | 0 | 3 |
| 9 | 20153FE74C | Power Electronics for Renewable energy systems (EEE) | 3 | 0 | 0 | 3 |
| 10 | 20154FE74A | Industrial Safety (MECH) | 3 | 0 | 0 | 3 |
| 11 | 20154FE74B | Testing of Materials (MECH) | 3 | 0 | 0 | 3 |
| 12 | 20154FE74C | Nuclear Engineering (MECH) | 3 | 0 | 0 | 3 |

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22255E16C WATER RESOURCE ENGINEERING L T P C

4 0 0 4

**COURSE OBJECTIVES:** To introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment and disposal and deign of intake structures and sewerage system.

**UNIT I WATER SUPPLY** 12

Estimation of surface and subsurface water resources - Predicting demand for water- Impurities of water and their significance - Physical, chemical and bacteriological analysis - Waterborne diseases - Standards for potable water. Intake of water: Pumping and gravity schemes.

**UNIT II WATER TREATMENT** 12

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clarifloccuator - Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - softening, removal of iron and manganese - Defluoridation - Softening - Desalination process - Residue Management - Construction, Operation and Maintenance aspects

**UNIT III WATER STORAGE AND DISTRIBUTION** 12

Storage and balancing reservoirs - types, location and capacity. Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations - House service connections

**UNIT IV PLANNING AND DESIGN OF SEWERAGE SYSTEM** 12

Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control - Sewage pumping-drainage in buildings - Plumbing systems for drainage

**UNIT V SEWAGE TREATMENT AND DISPOSAL** 12

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance aspects. - Discharge standards-sludge treatment -Disposal of sludge

**TOTAL: 60 PERIODS**

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**COURSE OUTCOMES**: On completion of the course, the student is expected to

CO1 Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission

CO2 Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations

CO3 Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process

CO4 Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.

CO5 Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage

**TEXTBOOKS:**


1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010.

2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2016.

3. Garg, S.K., Environmental Engineering Vol.II, Khanna Publishers, New Delhi, 2015.

4. Duggal K.N., "Elements of Environmental Engineering" S. Chand and Co. Ltd., New Delhi, 2014.

5. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.


REFERENCES:


1. Punmia B.C, Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010.

2. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

3. Syed R. Qasimand Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.

4. Of Urban Development, Government of India, New Delhi, 2013.

5. Metcalf and Eddy Waste water Engineering Treatment and Reuse, Tata Mc. Graw Hill Company, New Delhi, 2010.


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22255E16D SOIL STRUCTURAL INTERACTION L T P C

3 0 0 3

**OBJECTIVE:**

To study the concept of soil-structure – interaction in the analysis and design of structures.

**UNIT I SOIL-FOUNDATION INTERACTION 9**

Introduction to soil-foundation interaction problems – Soil behaviour – Foundation behaviourInterface behaviour- Scope of soil foundation interaction analysis- soil response models–Elastic continuum- Two parameter elastic models- Elastic-plastic behaviour- Time dependent behaviour.

**UNIT II BEAM ON ELASTIC FOUNDATION- SOIL MODELS 9**

Infinite beam – Two-parameters models – Isotropic elastic half space model – Analysis of beams of finite length – combined footings.

**UNITIII PLATES ON ELASTIC CONTINUUM 9**

Thin and thick rafts – Analysis of finite plates - Numerical analysis of finite plates.

**UNIT IV ANALYSIS OF AXIALLY AND LATERALLY LOADED PILES AND PILE GROUPS 9**

Elastic analysis of single pile – Theoretical solutions for settlement and load distributions – Analysis of pile group – Interaction analysis – Load distribution in groups with rigid cap – Load deflection prediction for laterally loaded piles – Subgrade reaction and elastic analysis – Interaction analysis – Pile-raft system.

**UNIT V GROUND-FOUNDATION-STRUCTURE INTERACTION 9**

Effect of structure on ground-foundation interaction – Static and dynamic loads- Contact pressure and its estimation – Estimation of the settlement from the constitutive laws – Free-field response – Kinetic interaction – Inertial interaction

**TOTAL: 45 PERIODS**

**OUTCOMES:** On completion of the course, the student is expected to be able to

CO1 Explain the concept of soil structure interaction.

CO2 Do a static analysis of infinite and finite beams resting on elastic foundation

CO3 Analyse finite thin and thick plates

CO4 Do a static and dynamic analysis of soil structure interaction problems

CO5 Analyze ground foundation and structure interaction problems

**REFERENCES:** 1. John P. Wolf, (1985) Soil-structure interaction, Prentice Hall, 1987.

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2. Bowels, J.E., "Analytical and Computer methods in Foundation" McGraw Hill Book Co., New York., 1974

3. Desai C.S. and Christian J.T., "Numerical Methods in Geotechnical Engineering" McGraw Hill Book Co. New York, 1977.

4. Soil Structure Interaction, the real behaviour of structures, Institution of Structural Engineers, 1989.

5. A.P.S. Selvadurai, Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg.vol-17, Elsevier Scientific Publishing Co., 1979.

6. Prakash, S., and Sharma, H. D., "Pile Foundations in Engineering Practice."John Wiley & Sons, New York, 1990.

7. Rolando P. Orense, Nawawi Chouw& Michael J. Pender – Soil-Foundation-Structure Interaction.

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22255E16E REMOTE SENSING ESSENTIALS L T P C

3 0 0 3

**COURSE OBJECTIVES:**

- To introduce the concepts of remote sensing processes and its components.
- To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

**UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION** 9

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities

**UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL 9**

Standard atmospheric profile – main atmospheric regions and its characteristics – interaction ofradiation with atmosphere – Scattering, absorption and refraction – Atmospheric windows - Energy balance equation – Specular and diffuse reflecters – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.

**UNIT III ORBITS AND PLATFORMS** 9

Motions of planets and satellites – Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Legrange Orbit.

**UNIT IV SENSING TECHNIQUES** 9

Classification of remote sensors – Resolution concept : spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners – Optical-infrared sensors – Thermal sensors – microwave sensors – Calibration of sensors - High Resolution Sensors - LIDAR , UAV – Orbital and sensor characteristics of five Indian earth observation satellites

**UNIT V DATA PRODUCTS AND INTERPRETATION** 9

Photographic and digital products – Types, levels and open source satellite data products – selection and procurement of data – Visual interpretation: basic elements and interpretation keys - Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:** On completion of the course, the student is expected to be able to

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CO1 understand the concepts and laws related to remote sensing

CO2 understand the interaction of electromagnetic radiation with atmoshphere and earth material

CO3 acquire knowledge about satellite orbits and different types of satellites

CO4 understand the different types of remote sensors

CO5 gain knowledge about the concepts of interpretation of satellite imagery

**TEXTBOOKS:** 1. Thomas M.Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York,2015.

2. George Joseph and C Jeganathan, Fundamentals of Remote Sensing,Third Edition Universities Press (India) Private limited, Hyderabad, 2018

**REFERENCES:** 1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.1, AmericanSociety of Photogrametry, Virginia, USA, 2002.

2. Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995

3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 1988.

4. Introduction to Physics and Techniques of Remote Sensing , Charles Elachi and JacobVan Zyl, 2006 Edition II, Wiley Publication.

5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011 CRC Press, Taylor & Francis Group, London, UK, 2010

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## 22255E24A ANALYSIS AND DESIGN OF TALL BUILDINGS

L T P C
3 0 0 3

**OBJECTIVE**

At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). He should know the rudimentary principles of designing tall buildings as per the existing course.

**UNIT I INTRODUCTION** 9

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading – Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

**UNIT II THE VERTICAL STRUCTURE PLANE** 9

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

**UNIT III COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOURUNDER LOAD** 9

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

**UNIT IV APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS** 9

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure -The Hollow Tube Structure.

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**UNIT V OTHER HIGH-RISE BUILDING STRUCTURE** 9

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

**TOTAL: 45 PERIODS**

**TEXT BOOKS**

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons, New York 1976.

2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

**REFERENCES**

1. COULL, A. and SMITH, STAFFORD, B. " Tall Buildings ", Pergamon Press, London, 1997.

2. LinT.Y. and Burry D.Stotes. " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.

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22255E24C **SOIL DYNAMICS** L T P C

3 0 0 3

**COURSE OBJECTIVE:** To design different types of machine foundations based on the dynamic properties of soils and to get an exposure on vibration isolation techniques.

**UNIT I THEORY OF VIBRATION** 9

Introduction – Nature of dynamic loads – Basic definitions – Simple harmonic motion – Fundamentals of vibration – Single degree and multi degree of freedom systems – Free vibrations of spring – Mass systems – Forced vibrations – Resonance – Viscous damping – Principles of vibrations measuring systems – Effect of transient and pulsating loads.

**UNIT II DYNAMIC SOIL PROPERTIES** 9

Dynamic stress-strain characteristics – Principles of measuring dynamic properties – Laboratory techniques – Field tests – Block vibration test – Factors affecting dynamic properties – Typical values. Mechanism of liquefaction – Influencing factors – Evaluation of liquefaction potential – Analysis from SPT test – Dynamic bearing capacity – Dynamic earth pressure.

**UNIT III MACHINE FOUNDATIONS** 9

Introduction – Types of machine foundations – General requirements for design of machine foundations – Design approach for machine foundation – Vibration analysis – Elastic Half-Space theory – Mass-spring-dashpot model – Permissible amplitudes – Permissible bearing pressures.

**UNIT IV DESIGN OF MACHINE FOUNDATION** 9

Evaluation of design parameters – Types of Machines and foundations – General requirements – their importance – Analysis and design of block type and framed type machine foundations – Modes 135 of vibration of a rigid foundation – Foundations for reciprocating machines, impact machines, Two – Cylinder vertical compressor, Double-acting steam hammer – Codalrecommendations – Emprical approach – Barken's method – Bulb of pressure concept – Pauw's analogy – Vibration table studies.

**UNIT V VIBRATION ISOLATION** 9

Vibration isolation – Types of isolation – Transmissibility – Passive and active isolation – Methods of isolation – Use of springs and damping materials – Properties of isolating materials – Vibration control of existing machine foundation.

**TOTAL:45 PERIODS**

**COURSE OUTCOMES:** On completion of the course, the student is expected to be able to;

CO1 Acquire knowledge to apply theories of vibration to solve dynamic soil problems.

CO2 Evaluate the dynamic properties of soil using laboratory and field tests.

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CO3 Acquire basic knowledge about machine foundations and design various types of machine foundation.

CO4 To know and capable of selecting the types of vibration isolation materials.

CO5 To apply vibration isolation techniques for various field problems.

**REFERENCES:**


1. KameswaraRao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing, New Delhi, 2000.

2. Prakash, S and Puri, V.K., Foundations for machines, McGraw Hill, 1987.

3. Moore, P.J.,Analysis and Design of Foundations for Vibrations, Oxford and IBH, 1985.

4. Vaidyanathan, C.V., and Srinivasalu, P., Handbook of Machine Foundations, McGraw Hill, 1995.

5. Arya, S., O'Nelt; S., Design of Structures and Foundations for Vibrating Machines, Prentice Hall, 1981.

6. Major, A., Vibration Analysis and Design of Foundations for Machines and Turbines, Vol. I. II and III Budapest, 1964.

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8. Swami Saran, Soil Dynamics and Machine Foundation, Galgotia publications Pvt. Ltd. New Delhi 2010.

9. Das B.M., Principles of Soil Dynamics, McGraw Hill, 1992.

10.Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, International series, Pearson Education (Singapore) Pvt Ltd, 2004.

11.KameswaraRao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998.


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| 22255E24D | ROCK ENGINEERING | L T P C |
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| | | 3 0 0 3 |

**COURSE OBJECTIVES:** Students are expected to classify, understand stress-strain characteristics, failure criteria, and influence of in-situ stress in the stability of various structures and various technique to improve the in-situ strength of rocks.

**UNIT I CLASSIFICATION OF ROCKS** 9

Types of Rocks - Index properties and classification of rock masses, competent and incompetent rock - value of RMR and ratings in field estimations.

**UNIT II STRENGTH CRITERIA OF ROCKS** 9

Behaviour of rock under hydrostatic compression and deviatric loading - Modes of rock failure planes of weakness and joint characteristics - joint testing, Mohr - Coulomb failure criterion and tension cutoff. Hoek and Brown Strength criteria for rocks with discontinuity sets.

**UNIT III INSITU STRESSES IN ROCKS** 9

In-situ stresses and their measurements, Hydraulic fracturing, flat jack, over coring and under coring methods - stress around underground excavations - Design aspects of openings in rocks.

**UNIT IV SLOPE STABILITY AND BEARING CAPACITY OF ROCKS** 9

Rock slopes - role of discontinuities in slop failure, slope analysis and factor of safety - remedial measures for critical slopes - Bearing capacity of foundations on rocks.

**UNIT V ROCK STABILIZATION** 9

Stabilization of rocks-rock support and rock reinforcement-active and passive supports-ground response curve-support reaction curve-reinforcement of fractured and joined rocks-Shotcreting bolting-anchoring-installation methods.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:** On completion of the course, the student is expected to be able to

CO1 Classify the Rock mass and rate the quality of rock for tunnelling and foundations works and suggest the safer length of tunnelling and stand-up time.

CO2 Apply the knowledge of engineering and understand the stress - strain characteristics and failure criteria of rock and apply them to arrive at the shear strength parameters of rocks to be used for the design of structures resting on rock and also for the design of underground excavation in rocks.

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CO3 Apply the knowledge of engineering and assess the influence of in-situ stress in the stability of various underground excavations and also acquire the knowledge of design of opening in rocks.

CO4 Apply the knowledge on rock mechanics and analyze the stability of rock slopes and arrive at the bearing capacity of shallow and deep foundations resting on rocks considering the presence of joints, design the foundations resting on rocks. Able to carry-out suitable foundation for the structure resting on rock.

CO5 Improve the in-situ strength of rocks by various methods such as rock reinforcement and rock support. Able to select suitable support system considering the interaction between rock and support. Also capable of executing the same in the field.

**REFERENCES:**


1. Goodman, R.E., Introduction to rock mechanics, John Willey and Sons, 1989.

2. Hudson, A. and Harrison, P., Engineering Rock mechanics An introduction to the principles, Pergamon publications, 1997.

3. Hoek, E and Bray, J., Rock slope Engineering, Institute of Mining and Metallurgy, U.K. 1981.

4. Hoek, E and Brown, E.T., Underground Excavations in Rock, Institute of Mining and Metallurgy, U.K. 1981.

5. Obvert, L. and Duvall, W., Rock Mechanics and the Design of structures in Rock, John Wiley, 1967.

6. Bazant, Z.P., Mechanics of Geomaterials Rocks, Concrete and Soil, John Wiley and Sons, Chichester, 1985.Wittke, W., Rock Mechanics. Theory and Applications with case Histories, Springerverlag, Berlin, 1990.

7. Waltham, T., Foundations of Engineering Geology, Second Edition, Spon Press, Taylor & Francis Group, London and New York, 2002.

8. Ramamurthy T., "Engineering in Rocks for Slopes Foundations and Tunnels", PHI Learning, Pvt. Ltd., 2007


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22255E33B DESIGN OF BRIDGES L T P C

3 0 0 3

**OBJECTIVE:** To study the loads, forces on bridges and design principles of several types of bridges.

**UNIT I INTRODUCTION** 9

Introduction-Selection of Site and Initial Decision Process - Classification of Bridges- General Features of Design- Standard Loading for Bridge Design as per different codes - Road Bridges - Railway Bridges - Design Codes - Working Stress Method- Limit State Method of Design

**UNIT II SUPERSTRUCTURES** 9

Selection of main bridge parameters, design methodologies -Choices of superstructure types - Orthotropic plate theory, load distribution techniques - Grillage analysis - Finite element analysis Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge - Transverse Analysis of Bridge

**UNIT III BRIDGE DESIGN PRINCIPLES** 9

Analysis and Design of RCC solid slab culverts -Design of RCC Tee beam and slab bridges - Design principles of continuous girder bridges, box girder bridges, balanced cantilever bridges – Arch bridges – Box culverts Segmental bridges -Design principles only

**UNIT IV SUBSTRUCTURE, BEARINGS AND DECK JOINTS** 9

Design of bridge bearings and substructure

**UNIT V PRESTRESSED CONCRETE BRIDGES & STEEL BRIDGES** 9

Design principles of PSC bridges PSC girders Design principles of steel bridges - Plate girder bridges - Box girder bridges Truss bridges Vertical and Horizontal stiffeners.

**TOTAL : 45 PERIODS**

**OUTCOMES:** On completion of this course, student will be able to

CO1 Explain the different types of bridges and design philosophies

CO2 Design an RC solid slab culvert bridge

CO3 Design an RC Tee Beam and Slab bridge

CO4 Design the bridge bearings and substructure

CO5 Explain the design principles of PSC bridges, box girder bridges, truss bridges

**REFERENCES:**

1. Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Second Edition, Prentice Hall of India Pvt. Ltd. 2009.

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2. Johnson Victor, D. "Essentials of Bridge Engineering", Sixth Edition, Oxford and IBH Publishing Co. New Delhi, 2019.

3. Ponnuswamy, S., "Bridge Engineering", Third Edition, Tata McGraw Hill, 2017.

4. Raina V.K." Concrete Bridge Practice" Tata McGraw Hill Publishing Company, New Delhi,2014.

5. Design of Highway Bridges, Richard M. Barker & Jay A. Puckett, John Wiley & Sons, Inc., 2021

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22255E23CP **WATER RESOURCE ENGINEERING** L T P C

4 0 0 4

**COURSE OBJECTIVES**: To introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment and disposal and deign of intake structures and sewerage system.

**UNIT I WATER SUPPLY** 12

Estimation of surface and subsurface water resources - Predicting demand for water- Impurities of water and their significance - Physical, chemical and bacteriological analysis - Waterborne diseases - Standards for potable water. Intake of water: Pumping and gravity schemes.

**UNIT II WATER TREATMENT** 12

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation -- Clariflocculator - Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - softening, removal of iron and manganese - Defluoridation - Softening - Desalination process - Residue Management - Construction, Operation and Maintenance aspects

**UNIT III WATER STORAGE AND DISTRIBUTION** 12

Storage and balancing reservoirs - types, location and capacity. Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations - House service connections.

**UNIT IV PLANNING AND DESIGN OF SEWERAGE SYSTEM** 12

Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control – Sewage pumping-drainage in buildings - Plumbing systems for drainage

**UNIT V SEWAGE TREATMENT AND DISPOSAL** 12

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance aspects. - Discharge standards-sludge treatment -Disposal of sludge

**TOTAL: 60 PERIODS**

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**COURSE OUTCOMES**: On completion of the course, the student is expected to

CO1 Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission

CO2 Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations

CO3 Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process

CO4 Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.

CO5 Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage

**TEXTBOOKS:**


1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010.

2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2016.

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2. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

3. Syed R. Qasimand Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.

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22255E23DP SOIL STRUCTURAL INTERACTION L T P C

3 0 0 3

**OBJECTIVE:**

To study the concept of soil-structure – interaction in the analysis and design of structures.

**UNIT I SOIL-FOUNDATION INTERACTION 9**

Introduction to soil-foundation interaction problems – Soil behaviour – Foundation behaviourInterface behaviour- Scope of soil foundation interaction analysis- soil response models–Elastic continuum- Two parameter elastic models- Elastic-plastic behaviour- Time dependent behaviour.

**UNIT II BEAM ON ELASTIC FOUNDATION- SOIL MODELS 9**

Infinite beam – Two-parameters models – Isotropic elastic half space model – Analysis of beams of finite length – combined footings.

**UNITIII PLATES ON ELASTIC CONTINUUM 9**

Thin and thick rafts – Analysis of finite plates - Numerical analysis of finite plates.

**UNIT IV ANALYSIS OF AXIALLY AND LATERALLY LOADED PILES AND PILE GROUPS 9**

Elastic analysis of single pile – Theoretical solutions for settlement and load distributions – Analysis of pile group – Interaction analysis – Load distribution in groups with rigid cap – Load deflection prediction for laterally loaded piles – Subgrade reaction and elastic analysis – Interaction analysis – Pile-raft system.

**UNIT V GROUND-FOUNDATION-STRUCTURE INTERACTION 9**

Effect of structure on ground-foundation interaction – Static and dynamic loads- Contact pressure and its estimation – Estimation of the settlement from the constitutive laws – Free-field response – Kinetic interaction – Inertial interaction

**TOTAL: 45 PERIODS**

**OUTCOMES**: On completion of the course, the student is expected to be able to

CO1 Explain the concept of soil structure interaction.

CO2 Do a static analysis of infinite and finite beams resting on elastic foundation

CO3 Analyse finite thin and thick plates

CO4 Do a static and dynamic analysis of soil structure interaction problems

CO5 Analyze ground foundation and structure interaction problems

**REFERENCES:** 1. John P. Wolf, (1985) Soil-structure interaction, Prentice Hall, 1987.

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22255E23EP REMOTE SENSING ESSENTIALS L T P C

3 0 0 3

**COURSE OBJECTIVES:**

- To introduce the concepts of remote sensing processes and its components.
- To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

**UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION 9**

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities

**UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL 9**

Standard atmospheric profile – main atmospheric regions and its characteristics – interaction ofradiation with atmosphere – Scattering, absorption and refraction Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water solid surface scattering in microwave region.

**UNIT III ORBITS AND PLATFORMS 9**

Motions of planets and satellites – Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Legrange Orbit.

**UNIT IV SENSING TECHNIQUES 9**

Classification of remote sensors – Resolution concept : spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners – Optical-infrared sensors – Thermal sensors – microwave sensors – Calibration of sensors - High Resolution Sensors - LIDAR , UAV – Orbital and sensor characteristics of five Indian earth observation satellites

**UNIT V DATA PRODUCTS AND INTERPRETATION 9**

Photographic and digital products – Types, levels and open source satellite data products – selection and procurement of data– Visual interpretation: basic elements and interpretation keys - Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**: On completion of the course, the student is expected to be able to

CO1 understand the concepts and laws related to remote sensing

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CO2 understand the interaction of electromagnetic radiation with atmoshphere and earth material

CO3 acquire knowledge about satellite orbits and different types of satellites

CO4 understand the different types of remote sensors

CO5 gain knowledge about the concepts of interpretation of satellite imagery

**TEXTBOOKS:** 1. Thomas M.Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York,2015.

2. George Joseph and C Jeganathan, Fundamentals of Remote Sensing,Third Edition Universities Press (India) Private limited, Hyderabad, 2018

**REFERENCES:** 1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, AmericanSociety of Photogrametry, Virginia, USA, 2002.

2. Verbyla, David. Satellite Remote Sensing of Natural Resources. CRC Press, 1995

3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 1988.

4. Introduction to Physics and Techniques of Remote Sensing , Charles Elachi and JacobVan Zyl, 2006 Edition II, Wiley Publication.

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22255E33BP ANALYSIS AND DESIGN OF TALL BUILDINGS L T P C
3 0 0 3

**OBJECTIVE**

At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). He should know the rudimentary principles of designing tall buildings as per the existing course.

**UNIT I INTRODUCTION** 9

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading – Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

**UNIT II THE VERTICAL STRUCTURE PLANE** 9

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel - Frame Systems - Multistory Box Systems.

**UNIT III COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOURUNDER LOAD** 9

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

**UNIT IV APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS** 9

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure -The Hollow Tube Structure.

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**UNIT V OTHER HIGH-RISE BUILDING STRUCTURE** 9

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

**TOTAL: 45 PERIODS**

**TEXT BOOKS**

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons, New York 1976.
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

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1. COULL, A. and SMITH, STAFFORD, B. " Tall Buildings ", Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.
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| 22255E33CP | SOIL DYNAMICS | L T P C |
|---|---|---|
| | | 3 0 0 3 |

**COURSE OBJECTIVE:** To design different types of machine foundations based on the dynamic properties of soils and to get an exposure on vibration isolation techniques.

## UNIT I THEORY OF VIBRATION 9

Introduction – Nature of dynamic loads – Basic definitions – Simple harmonic motion – Fundamentals of vibration – Single degree and multi degree of freedom systems – Free vibrations of spring – Mass systems – Forced vibrations – Resonance – Viscous damping – Principles of vibrations measuring systems – Effect of transient and pulsating loads.

## UNIT II DYNAMIC SOIL PROPERTIES 9

Dynamic stress-strain characteristics – Principles of measuring dynamic properties – Laboratory techniques – Field tests – Block vibration test – Factors affecting dynamic properties – Typical values. Mechanism of liquefaction – Influencing factors – Evaluation of liquefaction potential – Analysis from SPT test – Dynamic bearing capacity – Dynamic earth pressure.

## UNIT III MACHINE FOUNDATIONS 9

Introduction – Types of machine foundations – General requirements for design of machine foundations – Design approach for machine foundation – Vibration analysis – Elastic Half-Space theory – Mass-spring-dashpot model – Permissible amplitudes – Permissible bearing pressures.

## UNIT IV DESIGN OF MACHINE FOUNDATION 9

Evaluation of design parameters – Types of Machines and foundations – General requirements – their importance – Analysis and design of block type and framed type machine foundations – Modes 135 of vibration of a rigid foundation – Foundations for reciprocating machines, impact machines, Two – Cylinder vertical compressor, Double-acting steam hammer Codalrecommendations - Emprical approach – Barken's method – Bulb of pressure concept – Pauw's analogy – Vibration table studies.

## UNIT V VIBRATION ISOLATION 9

Vibration isolation – Types of isolation – Transmissibility – Passive and active isolation – Methods of isolation – Use of springs and damping materials – Properties of isolating materials – Vibration control of existing machine foundation.

**TOTAL:45 PERIODS**

**COURSE OUTCOMES:** On completion of the course, the student is expected to be able to;

CO1 Acquire knowledge to apply theories of vibration to solve dynamic soil problems.

CO2 Evaluate the dynamic properties of soil using laboratory and field tests.

CO3 Acquire basic knowledge about machine foundations and design various types of machine foundation.

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CO4 To know and capable of selecting the types of vibration isolation materials.

CO5 To apply vibration isolation techniques for various field problems.

**REFERENCES:**


1. KameswaraRao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing, New Delhi, 2000.

2. Prakash, S and Puri, V.K., Foundations for machines, McGraw Hill, 1987.

3. Moore, P.J.,Analysis and Design of Foundations for Vibrations, Oxford and IBH, 1985.

4. Vaidyanathan, C.V., and Srinivasalu, P., Handbook of Machine Foundations, McGraw Hill, 1995.

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6. Major, A., Vibration Analysis and Design of Foundations for Machines and Turbines, Vol. I, II and III Budapest, 1964.

7. Barkan, D.D., Dynamics of Basis of Foundation, McGraw Hill, 1974.

8. Swami Saran, Soil Dynamics and Machine Foundation, Galgotia publications Pvt. Ltd. New Delhi 2010.

9. Das B.M., Principles of Soil Dynamics, McGraw Hill, 1992.

10.Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, International series, Pearson Education (Singapore) Pvt Ltd, 2004.

11.KameswaraRao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998.


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22255E33DP ROCK ENGINEERING L T P C

3 0 0 3

**COURSE OBJECTIVES:** Students are expected to classify, understand stress-strain characteristics, failure criteria, and influence of in-situ stress in the stability of various structures and various technique to improve the in-situ strength of rocks.

## UNIT I CLASSIFICATION OF ROCKS 9

Types of Rocks - Index properties and classification of rock masses. competent and incompetent rock - value of RMR and ratings in field estimations.

## UNIT II STRENGTH CRITERIA OF ROCKS 9

Behaviour of rock under hydrostatic compression and deviatric loading - Modes of rock failure planes of weakness and joint characteristics - joint testing, Mohr - Coulomb failure criterion and tension cutoff. Hoek and Brown Strength criteria for rocks with discontinuity sets.

## UNIT III INSITU STRESSES IN ROCKS 9

In-situ stresses and their measurements, Hydraulic fracturing, flat jack, over coring and under coring methods - stress around underground excavations – Design aspects of openings in rocks.

## UNIT IV SLOPE STABILITY AND BEARING CAPACITY OF ROCKS 9

Rock slopes - role of discontinuities in slop failure, slope analysis and factor of safety - remedial measures for critical slopes Bearing capacity of foundations on rocks.

## UNIT V ROCK STABILIZATION 9

Stabilization of rocks-rock support and rock reinforcement-active and passive supports-ground response curve-support reaction curve-reinforcement of fractured and joined rocks-Shotcreting bolting-anchoring-installation methods.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:** On completion of the course, the student is expected to be able to

CO1 Classify the Rock mass and rate the quality of rock for tunnelling and foundations works and suggest the safer length of tunnelling and stand-up time.

CO2 Apply the knowledge of engineering and understand the stress – strain characteristics and failure criteria of rock and apply them to arrive at the shear strength parameters of rocks to be used for the design of structures resting on rock and also for the design of underground excavation in rocks.

CO3 Apply the knowledge of engineering and assess the influence of in-situ stress in the stability of various underground excavations and also acquire the knowledge of design of opening in rocks.

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CO4 Apply the knowledge on rock mechanics and analyze the stability of rock slopes and arrive at the bearing capacity of shallow and deep foundations resting on rocks considering the presence of joints. design the foundations resting on rocks. Able to carry-out suitable foundation for the structure resting on rock.

CO5 Improve the in-situ strength of rocks by various methods such as rock reinforcement and rock support. Able to select suitable support system considering the interaction between rock and support. Also capable of executing the same in the field.

**REFERENCES:**


1. Goodman, R.E., Introduction to rock mechanics, John Willey and Sons, 1989.

2. Hudson, A. and Harrison, P., Engineering Rock mechanics – An introduction to the principles, Pergamon publications, 1997.

3. Hoek, E and Bray, J., Rock slope Engineering, Institute of Mining and Metallurgy, U.K. 1981.

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6. Bazant, Z.P., Mechanics of Geomaterials Rocks, Concrete and Soil, John Wiley and Sons, Chichester, 1985.Wittke. W., Rock Mechanics. Theory and Applications with case Histories, Springerverlag, Berlin, 1990.

7. Waltham, T, Foundations of Engineering Geology, Second Edition, Spon Press, Taylor & Francis Group, London and New York, 2002.

8. Ramamurthy T., "Engineering in Rocks for Slopes Foundations and Tunnels", PHI Learning Pvt. Ltd., 2007


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22255E52BP **DESIGN OF BRIDGES** **L T P C**

**3 0 0 3**

**OBJECTIVE:** To study the loads, forces on bridges and design principles of several types of bridges.

## UNIT I INTRODUCTION 9

Introduction-Selection of Site and Initial Decision Process - Classification of Bridges- General Features of Design- Standard Loading for Bridge Design as per different codes - Road Bridges – Railway Bridges - Design Codes - Working Stress Method- Limit State Method of Design

## UNIT II SUPERSTRUCTURES 9

Selection of main bridge parameters, design methodologies -Choices of superstructure types - Orthotropic plate theory, load distribution techniques - Grillage analysis - Finite element analysis Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge - Transverse Analysis of Bridge

## UNIT III BRIDGE DESIGN PRINCIPLES 9

Analysis and Design of RCC solid slab culverts -Design of RCC Tee beam and slab bridges - Design principles of continuous girder bridges, box girder bridges, balanced cantilever bridges – Arch bridges – Box culverts – Segmental bridges -Design principles only

## UNIT IV SUBSTRUCTURE, BEARINGS AND DECK JOINTS 9

Design of bridge bearings and substructure

## UNIT V PRESTRESSED CONCRETE BRIDGES & STEEL BRIDGES 9

Design principles of PSC bridges – PSC girders -Design principles of steel bridges - Plate girder bridges – Box girder bridges – Truss bridges – Vertical and Horizontal stiffeners.

**TOTAL: 45 PERIODS**

**OUTCOMES:** On completion of this course, student will be able to

CO1 Explain the different types of bridges and design philosophies

CO2 Design an RC solid slab culvert bridge

CO3 Design an RC Tee Beam and Slab bridge

CO4 Design the bridge bearings and substructure

CO5 Explain the design principles of PSC bridges, box girder bridges, truss bridges

**REFERENCES:**

1. Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Second Edition, Prentice Hall of India Pvt. Ltd. 2009.

2. Johnson Victor, D. "Essentials of Bridge Engineering", Sixth Edition, Oxford and IBH Publishing Co. New Delhi, 2019.

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3. Ponnuswamy, S., "Bridge Engineering", Third Edition, Tata McGraw Hill, 2017.

4. Raina V.K." Concrete Bridge Practice" Tata McGraw Hill Publishing Company, New Delhi,2014.

5. Design of Highway Bridges, Richard M. Barker & Jay A. Puckett, John Wiley & Sons, Inc., 2021

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# ANNEXURE II
# VALUE ADDED COURSES

## LANDSCAPE ARCHITECTURE

| S.NO | TOPICS | MINIMUM |
|---|---|---|
| 1. | Introduction to Landscape. | 5 hrs |
| 2. | Categories and Materials in Landscape. | 5 hrs |
| 3. | Objective and Professional Scope of Landscape Design. | 5 hrs |
| 4. | Introduction to History of Landscape Design. | 5 hrs |
| 5. | Behavioral Principle. | 5 hrs |
| 6. | Landform Design. | 5 hrs |
| 7. | Planting Design. | 5 hrs |
| 8. | Assess Landscape Sites. | 5 hrs |
| 9. | Prepare Estimates, Quotes and Tenders. | 5 hrs |

**Duration of the Course: 45 hours.**

**Learning outcomes:**

1. Identify appropriate methods of design inquiry and problem solving processes to produce creative solutions to identified problems and questions.
2. Identify, collect, and analyze necessary information using appropriate technologies and analytical techniques as they relate to the identified problem or question.
3. Explore and critically analyze alternative design or planning solutions to the identified problem or question.
4. Engage in assessment and evaluation practices throughout the entire design process.

## ETABS

| S.No | Topics | Minimum |
|---|---|---|
| 1. | Introduction. | 5hrs |
| 2. | Installing Etabs.(Modeling Features, Analysis Features, Design Features, Detailing Features.) | 5hrs |
| 3. | The Etabs System.( Overview of the Modeling Process, Properties.) | 5hrs |
| 4. | ETABS Modeling Techniques. | 5hrs |
| 5. | Live Load Reduction. | 5hrs |
| 6. | Section Designer. | 5hrs |
| 7. | ETABS Analysis Techniques. | 5hrs |
| 8. | Linear Time History Analysis. | 5hrs |
| 9. | Buckling Analysis. | 5hrs |

**Duration of the Course: 45 hours**

**Learning outcomes:**

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(Institution Deemed to be University
U/s 3 of the UGC Act 1956 )
THANJAVUR - 613 403, TAMILNADU.

REGISTRAR
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| | | |
|---|---|---|
| 8. | Extract data from a single source of truth: Drawings, Reports, Model, Production Data, Other software. | 5 hrs |
| 9. | Automated Structural Analysis And Design. | 5 hrs |

**Duration of the Course: 45 hours.**

**Learning outcomes:**

1. Tekla Structures is a software used in the construction industry to create and manage 3D models of concrete and steel structures. Users can learn to create models, analyze and design them.
2. The software enables users to create and manage 3D structural models in concrete or steel, and guides them through the process from concept to fabrication.
3. Tekla Structures empowers engineers to create highly detailed, accurate 3D models of structures, ensuring precision in design and construction. This precision minimizes errors and rework, ultimately saving time and resources.

**SKETCHUP**

| S.NO | TOPICS | MINIMUM |
|---|---|---|
| 1. | Introduction For Sketchup. | 5 hrs |
| 2. | Modeling of Entities. | 5 hrs |
| 3. | Components & Groups. | 5 hrs |
| 4. | Interior Designer, Landscape Designer, Sketchup 3D Design Specialist. | 5 hrs |
| 5. | Modeling From Dwg,Model Visualization, model Documentation, Organic Design, | 5 hrs |
| 6. | Urban Design, Environment Modeling, Landscape Design. | 5 hrs |
| 7. | Architectural Designer, Space Illustrator, Sketchup Artist. | 5 hrs |
| 8. | Presenting Your Model. | 5 hrs |
| 9. | 3D Model to 2D Documentation. | 5 hrs |

**Duration of the Course: 45 hours**

**Learning outcomes:**

1.Learn about how to use different type of SketchUp tools and option settings from absolute beginner level.

2.Learn how to manipulate different type of essential tools and options at beginner level in SketchUp.

3. Learn how to use certain Sketchup Plugins to take your modeling skills to the next level.

Head of the Department
Department of Civil Engineering
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1. **Modeling:** How to create models in less time and interpret the results while working with the physi member based objects.
2. **Concrete Frame Design & Detailing:** Applicable to line objects and the program determines the appropriate design procedure when the analysis is run.
3. **Steel Frame Design & Detailing:** How to detail steel member selection, drift optimization and stres checking processes using various design code algorithms.
4. **Steel Connection Design:** Design of steel connections is seamlessly integrated into the program.
5. **Composite Beam:** To composite beams for determining their sizes for analysis, auto select-section property can be defined.

## DEMOLITION ENGINEERING

| S.NO | TOPICS | MINIMUM |
|---|---|---|
| 1. | Bridge Demolition Engineering. | 5 hrs |
| 2. | Manuals and Specifications For Demolition. | 5 hrs |
| 3. | Equipment and tools for Bridge Demolition. | 5 hrs |
| 4. | Demolition with Explosives. | 5 hrs |
| 5. | Understand the Application of Case Studies in Demolition. | 5 hrs |
| 6. | Excavations: Hazard Recognition in Trenching and shoring. | 5 hrs |
| 7. | Analyze the different safety practices involved in demolition construction. | 5 hrs |
| 8. | Develop a supplemental Demolition plan based on a job-site visit. | 5 hrs |
| 9. | Evaluate and discuss the benefits of Obtaining Knowledge On Demolition. | 5 hrs |

## TEKLA STRUCTURES

| S.NO | TOPICS | MINIMUM |
|---|---|---|
| 1. | Open the Software and Choose Appropriate Roles and Configurations. | 5 hrs |
| 2. | Open and Navigate in a model. | 5 hrs |
| 3. | Identify and use Basic commands on the Ribbon, side pane and file menu. | 5 hrs |
| 4. | Find the information you need for a particular task with the help OF selection switches, tooltips and Instructor pane. | 5 hrs |
| 5. | Visualize information and render it: 3D model, view filters and representation settings, visualizer. | 5 hrs |
| 6. | Define parameters connected to modeled objects. | 5 hrs |
| 7. | Create and manage General arrangement and fabrication drawings. | 5 hrs |

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