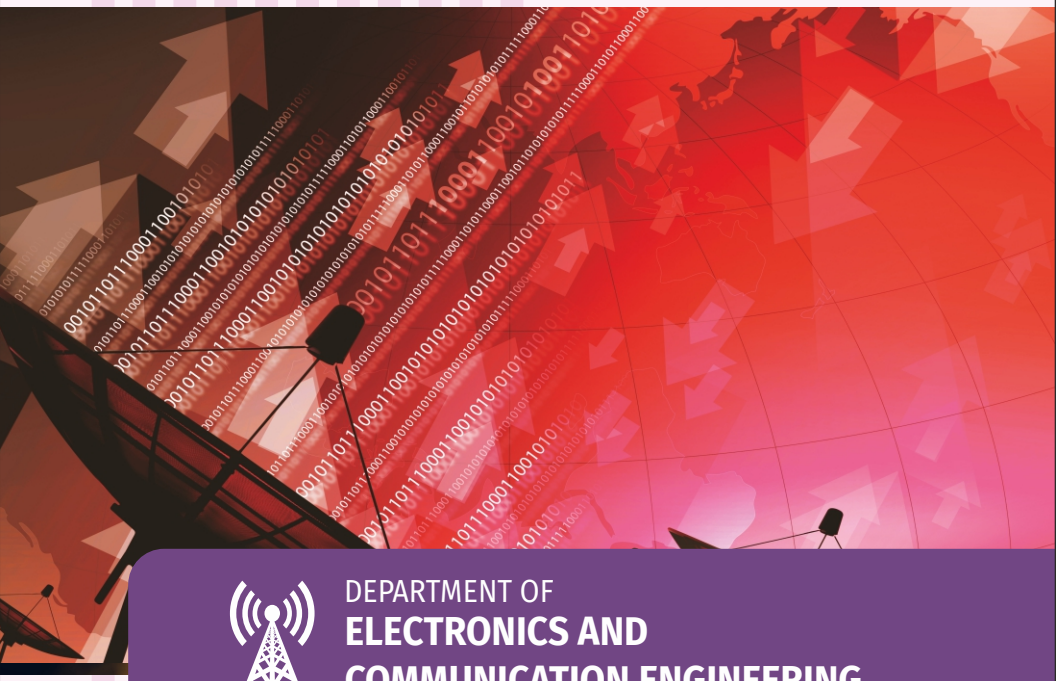
Sri SAI RAM ENGINEERING COLLEGE

An Autonomous Institution

West Tambaram, Chennai - 44

www.sairam.edu.in

*Approved by AICTE, New Delhi*
*Affiliated to Anna University*



DEPARTMENT OF

# ELECTRONICS AND COMMUNICATION ENGINEERING

**REGULATIONS**

**2024**

*Academic Year 2024-25 onwards*

**AUTONOMOUS**

**CURRICULUM AND**

# SYLLABUS

**I - II**

**SEMESTERS**

## SRI SAIRAM ENGINEERING COLLEGE

### VISION

To emerge as a ”Centre of excellence “ offering Technical Education and Research opportunities of very high standards to students, develop the total personality of the individual and instil high levels of discipline and strive to set global standards, making our students technologically superior and ethically stronger, who in turn shall contribute to the advancement of society and humankind.

### MISSION

We dedicate and commit ourselves to achieve, sustain and foster unmatched excellence in Technical Education. To this end, we will pursue continuous development of infra-structure and enhance state-of-the-art equipment to provide our students a technologically up-to date and intellectually inspiring environment of learning, research, creativity, innovation and professional activity and inculcate in them ethical and moral values.

### Educational Organization Management System (EOMS) Policy

We at Sri Sai Ram Engineering College are committed to empower our students not only to excel academically but also imbibe essential values, enabling them to become exemplary global citizens. We build a better nation by fostering excellence and innovative practices in Engineering, Technology and Management Education. We are dedicated to consistently enhancing our systems, infrastructure and services to meet the needs and expectations of all our stakeholders for sustainable growth

## DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGG.

### VISION

To emerge as a “centre of excellence” in the field of Electronics and Communication Engineering and to mould our students to become technically and ethically strong to meet the global challenges. The Students in turn contribute to the advancement and welfare of the society.

### MISSION

Department of Electronics and Communication Engineering, SRI SAIRAM ENGINEERING COLLEGE is committed to

**M1** Achieve, sustain and foster excellence in the field of Electronics and Communication Engineering.

**M2** Adopt proper pedagogical methods to maximize the knowledge transfer.

**M3** Enhance the understanding of theoretical concepts through professional society activities

**M4** Improve the infrastructure and provide conducive environment of learning and research following ethical and moral values

# AUTONOMOUS CURRICULA AND SYLLABI
## Regulations 2024

## SEMESTER I

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24BSMA101 | Matrices and Calculus | 3 | 1 | 0 | 4 | 4 |
| 2 | 24HSEN101 | Communicative English | 3 | 0 | 0 | 3 | 3 |
| 3 | 24BSPH101 | Engineering Physics | 3 | 0 | 0 | 3 | 3 |
| 4 | 24BSCY101 | Engineering Chemistry | 3 | 0 | 0 | 3 | 3 |
| 5 | 24ESCS101 | Problem Solving and Programming in C | 3 | 0 | 0 | 3 | 3 |
| 6 | 24ESGE101 | Engineering Graphics | 1 | 2 | 0 | 3 | 3 |
| 7 | 24HSTA101 | Heritage of Tamils | 1 | 0 | 0 | 1 | 1 |
| **PRACTICALS** | | | | | | | |
| 1 | 24BSPL101 | Physics and Chemistry Laboratory | 0 | 0 | 4 | 4 | 2 |
| 2 | 24ESPL101 | Programming in C Laboratory | 0 | 0 | 2 | 2 | 1 |
| **VALUE ADDITIONS - I** | | | | | | | |
| 1 | 24ENTP101 | Functional Life Skills | 0 | 0 | 2 | 2 | 1 |
| 2 | 24ESID101 | Idea Engineering Lab -I | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| | | Recommended by BoS | | | | | |
| | | | | | **Total** | **30** | **25** |

## SEMESTER II

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24BSMA202 | Differential Equations, Complex Variables and Transforms | 3 | 1 | 0 | 4 | 4 |
| 2 | 24HSEN201 | Professional English | 2 | 0 | 0 | 2 | 2 |
| 3 | 24BSPH201 | Physics of Electronic Devices | 3 | 0 | 0 | 3 | 3 |
| 4 | 24BSCY201 | Chemistry for Environment and Sustainability | 3 | 0 | 0 | 3 | 3 |
| 5 | 24ECPC201 | Circuit Analysis | 3 | 0 | 0 | 3 | 3 |
| 6 | 24HSTA201 | Tamils and Technology | 1 | 0 | 0 | 1 | 1 |
| 7 | 24HSNC201 | NCC Course Level 1* | 2* | 0 | 0 | 2* | 0 |
| **PRACTICALS** | | | | | | | |
| 3 | 24ESGE102 | Engineering Practices Lab | 0 | 0 | 4 | 4 | 2 |
| **VALUE ADDITIONS - II** | | | | | | | |
| 2 | 24ENTP201 | Digital Dynamics | 0 | 0 | 2 | 2 | 0 |
| 1 | 24ESID201 | Idea Engineering Lab - II | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| 1 | 24ESMC201 | MS Office (Mandatory - NC) | 0 | 0 | 0 | 0 | 0 |
| | | *only for NCC cadets | | | **Total** | **24** | **19** |

# AUTONOMOUS CURRICULA AND SYLLABI
## Regulations 2024

## SEMESTER III

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24BSMA301 | Statistics and Linear Algebra | 3 | 1 | 0 | 4 | 4 |
| 2 | 24ECPC301 | Signals and Systems | 3 | 0 | 0 | 3 | 3 |
| 3 | 24ECPC302 | Electromagnetic Fields and Waveguides | 3 | 0 | 0 | 3 | 3 |
| 4 | 24ECPC303 | Digital Circuits | 3 | 0 | 0 | 3 | 3 |
| 5 | 24ECPC304 | Electronic Circuits | 3 | 0 | 0 | 3 | 3 |
| 6 | 24HSMC301 | Universal Human Values - II | 3 | 0 | 0 | 3 | 3 |
| 7 | 24HSNC301 | NCC course Level 2* | 3* | 0 | 0 | 3* | 0 |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPL301 | Analog and Digital Circuits Laboratory | 0 | 0 | 2 | 4 | 2 |
| **VALUE ADDITIONS - III** | | | | | | | |
| 1 | 24ECTP301 | Aptitude skills | 0 | 0 | 2 | 2 | 1 |
| 2 | 24ECID301 | Innovative Design Lab - I | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| 1 | 24ESMC301 | Joy of Computing using Python (Mandatory - NC) | 0 | 2 | 0 | 2 | 0 |
| | | | | **Total** | | **29** | **23** |

## SEMESTER IV

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24BSMA401 | Probability Theory and Random Processes | 3 | 1 | 0 | 4 | 4 |
| 2 | 24ECPC401 | Transmission Lines and Antenna Theory | 3 | 0 | 0 | 3 | 3 |
| 3 | 24ECPC402 | Analog and Digital Communication | 3 | 0 | 0 | 3 | 3 |
| 4 | 24ESEE401 | Control Systems | 3 | 0 | 0 | 3 | 3 |
| 5 | 24xxOExxx | Open Elective - I# | 3 | 0 | 0 | 3 | 3 |
| 6 | 24HSNC401 | NCC course Level 3* | 3 | 0 | 0 | 3* | 0 |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPT401 | Microcontrollers and Embedded Lab with Theory | 1 | 0 | 4 | 5 | 3 |
| 2 | 24ECPT402 | Linear Integrated Circuits Lab with Theory | 1 | 0 | 4 | 5 | 3 |
| 3 | 24ECPL401 | Communication Systems Laboratory | 0 | 0 | 4 | 4 | 2 |
| **VALUE ADDITIONS - IV** | | | | | | | |
| 1 | 24ECTP401 | Aptitude skills | 0 | 0 | 2 | 2 | 0 |
| 2 | 24ECID401 | Innovative Design Lab - II | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| | Recommended by BoS (R-Programming) | | | **Total** | | **34** | **25** |

# Logistics Department Specific

# AUTONOMOUS CURRICULA AND SYLLABI
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## SEMESTER V

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24ECPC501 | VLSI Design | 3 | 0 | 0 | 3 | 3 |
| 2 | 24ECEL5xx | Professional Elective - I | 3 | 0 | 0 | 3 | 3 |
| 3 | 24ECEL5yy | Professional Elective - II | 3 | 0 | 0 | 3 | 3 |
| 4 | 24XXOEXXX | Open Elective - II# | 3 | 0 | 0 | 3 | 3 |
| 5 | 24HSMG501 | Principles of Engineering Management | 3 | 0 | 0 | 3 | 3 |
| 6 | 24MGMC501 | Constitution of India | 2 | 0 | 0 | 2 | 0 |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPL501 | VLSI Design Laboratory | 0 | 0 | 4 | 4 | 2 |
| 2 | 24ECPT501 | Digital Signal Processing Lab with Theory | 1 | 0 | 4 | 5 | 3 |
| **VALUE ADDITIONS - V** | | | | | | | |
| 1 | 24ECTP501 | Skill Enhancement | 0 | 0 | 2 | 2 | 1 |
| 2 | 24ECID501 | Prototype Development Lab - I | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| | | Recommended by BoS | **Total** | | | **30** | **22** |

# Digital Devices Security, Tools & Techniques for Cyber Security

## SEMESTER VI

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24ECPC601 | Communication Networks | 3 | 0 | 0 | 3 | 3 |
| 2 | 24ECPC602 | Wireless Communication | 3 | 0 | 0 | 3 | 3 |
| 3 | 24ECEL6xx | Professional Elective - III | 3 | 0 | 0 | 3 | 3 |
| 4 | 24ECEL6yy | Professional Elective - IV | 3 | 0 | 0 | 3 | 3 |
| 5 | 24ECEL6zz | Professional Elective - V | 3 | 0 | 0 | 3 | 3 |
| 6 | 24xxOE9xx | Open Elective - III | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPL601 | Communication Networks Laboratory | 0 | 0 | 4 | 4 | 2 |
| **VALUE ADDITIONS - II** | | | | | | | |
| 1 | 24ECTP601 | Technical Skill | 0 | 0 | 2 | 2 | 0 |
| 2 | 24ECID601 | Prototype Development Lab - II | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| | | Recommended by BoS | **Total** | | | **26** | **21** |

# AUTONOMOUS CURRICULA AND SYLLABI
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## SEMESTER VII

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **THEORY** | | | | | | | |
| 1 | 24ECPC701 | RF and Microwave Engineering | 3 | 0 | 0 | 3 | 3 |
| 2 | 24ECPC702 | Optical Communication | 3 | 0 | 0 | 3 | 3 |
| 3 | 24ECEL7xx | Professional Elective - VI | 3 | 0 | 0 | 3 | 3 |
| 4 | 24ECEL7yy | Professional Elective - VII | 3 | 0 | 0 | 3 | 3 |
| 5 | 24XXOE9xx | Open Elective - IV | 3 | 0 | 0 | 3 | 3 |
| 6 | 24MGEL703 | Creative Innovation and Entrepreneurship | 2 | 0 | 0 | 2 | 2 |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPL701 | Advanced Communication Laboratory | 0 | 0 | 4 | 4 | 2 |
| 2 | 20ECPJ701 | Project Work - Phase I | 0 | 0 | 8 | 8 | 4 |
| **VALUE ADDITIONS - VII** | | | | | | | |
| 1 | 24ECTP701 | Company Specific Skills | 0 | 0 | 2 | 2 | 1 |
| **ONLINE SUPPLEMENTARY** | | | | | | | |
| | | Recommended by BoS | | **Total** | | **31** | **24** |

## SEMESTER VIII

| S. NO | COURSE CODE | COURSE TITLE | WEEK HOURS | | | TOTAL CONTACT HOURS | CREDITS |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| **PRACTICALS** | | | | | | | |
| 1 | 24ECPJ801 | Project Work - Phase II | 0 | 0 | 12 | 12 | 6 |
| **VALUE ADDITIONS - VIII** | | | | | | | |
| 1 | 24ECIN801 | Internship | 0 | 0 | 9 | 9 | 3 |
| | | | | **Total** | | **21** | **9** |

# AUTONOMOUS CURRICULA AND SYLLABI
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## PROFESSIONAL ELECTIVES - I

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL501 | Simulation of Communication Systems Using Matlab | 3 | WIRELESS |
| 2 | 24ECEL502 | Statistical Theory of Communication | 3 | WIRELESS |
| 3 | 24ECEL503 | Matlab Programming for Numerical Computation | 3 | WIRELESS |
| 4 | 24ECEL504 | Introduction to VLSI Lifecycle | 3 | VLSI & EMB |
| 5 | 24ECEL505 | Computer Organization and Design | 3 | VLSI & EMB |
| 6 | 24ECEL506 | Semiconductor Device Modeling | 3 | VLSI & EMB |
| 7 | 24ECEL507 | Introduction to photonics | 3 | RF & GREEN |
| 8 | 24ECEL508 | Principles and Techniques of Modern Radar Systems | 3 | RF & GREEN |
| 9 | 24ECEL509 | Introduction to Reliability Engineering | 3 | RF & GREEN |
| 10 | 24ECEL510 | Computer vision | 3 | SP & BM |
| 11 | 24ECEL511 | Soft Computing | 3 | SP & BM |
| 12 | 24ECEL512 | Medical Electronics | 3 | SP & BM |
| 13 | 24MGEL501 | Spirituality in Workplace | 3 | Mgmt |

## PROFESSIONAL ELECTIVES - II

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL513 | Information Theory | 3 | WIRELESS |
| 2 | 24ECEL514 | Introduction to Internet of Things | 3 | WIRELESS |
| 3 | 24ECEL515 | Introduction To Industry 4.0 and Industrial Internet of Things | 3 | WIRELESS |
| 4 | 24ECEL516 | Digital and Analog IC Design | 3 | VLSI & EMB |
| 5 | 24ECEL517 | Embedded system Design | 3 | VLSI & EMB |
| 6 | 24ECEL518 | Introduction to Microfabrication | 3 | VLSI & EMB |
| 7 | 24ECEL519 | Computational Electromagnetics | 3 | RF & GREEN |
| 8 | 24ECEL520 | Remote Sensing Essentials | 3 | RF & GREEN |
| 9 | 24ECEL521 | Green Communication and Networks | 3 | RF & GREEN |
| 10 | 24ECEL522 | Data Analytics with Python | 3 | SP & BM |
| 11 | 24ECEL523 | Digital Image Processing | 3 | SP & BM |
| 12 | 24ECEL524 | Sensors and Measurements | 3 | SP & BM |
| 13 | 24MGEL502 | Indian Ethos and values in Modern Management | 3 | Mgmt |

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## PROFESSIONAL ELECTIVES - III

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL601 | Signal Processing Techniques and its Applications | 3 | WIRELESS |
| 2 | 24ECEL602 | Fundamentals of MIMO Wireless Communication | 3 | WIRELESS |
| 3 | 24ECEL603 | Cognitive Radio | 3 | WIRELESS |
| 4 | 24ECEL604 | VLSI Subsystems Design and Evaluation | 3 | VLSI & EMB |
| 5 | 24ECEL605 | Sensors and Embedded systems | 3 | VLSI & EMB |
| 6 | 24ECEL606 | Semiconductor Equipment Design and Technology | 3 | VLSI & EMB |
| 7 | 24ECEL607 | Nanobiophotonics | 3 | RF & GREEN |
| 8 | 24ECEL608 | RF and Microwave Networks | 3 | RF & GREEN |
| 9 | 24ECEL609 | Microwave Integrated Circuits | 3 | RF & GREEN |
| 10 | 24ECEL610 | Deep Learning and its Application | 3 | SP & BM |
| 11 | 24ECEL611 | Advanced Digital Signal Processing | 3 | SP & BM |
| 12 | 24ECEL612 | Bio Signal and Image Processing | 3 | SP & BM |
| 13 | 24MGEL601 | Disaster Management | 3 | Mgmt |

## PROFESSIONAL ELECTIVES - IV

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL613 | Machine Learning and Deep Learning - Fundamentals and Applications | 3 | WIRELESS |
| 2 | 24ECEL614 | Principles of Modern CDMA / MIMO / OFDM Wireless Communications | 3 | WIRELESS |
| 3 | 24ECEL615 | Mobile Adhoc Networking | 3 | WIRELESS |
| 4 | 24ECEL616 | CAD for VLSI | 3 | VLSI & EMB |
| 5 | 24ECEL617 | Processors for Embedded System Design | 3 | VLSI & EMB |
| 6 | 24ECEL618 | Semiconductor Packaging and Testing | 3 | VLSI & EMB |
| 7 | 24ECEL619 | Photonic Integrated Circuits | 3 | RF & GREEN |
| 8 | 24ECEL620 | Semiconductor Optoelectronics | 3 | RF & GREEN |
| 9 | 24ECEL621 | Signal Processing for mm Wave communication | 3 | RF & GREEN |
| 10 | 24ECEL622 | Machine Learning Techniques | 3 | SP & BM |
| 11 | 24ECEL623 | Fuzzy Logic and Systems | 3 | SP & BM |
| 12 | 24ECEL624 | Medical informatics | 3 | SP & BM |
| 13 | 24MGEL602 | Fintech For Engineers | 3 | Mgmt |

# AUTONOMOUS CURRICULA AND SYLLABI
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## PROFESSIONAL ELECTIVES - V

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL625 | Real Time Digital Signal Processing | 3 | WIRELESS |
| 2 | 24ECEL626 | Applied Linear Algebra for Signal Processing, Data Analytics and Machine Learning | 3 | WIRELESS |
| 3 | 24ECEL627 | Telecommunication System Modelling and Simulation | 3 | WIRELESS |
| 4 | 24ECEL628 | Testing of VLSI Circuits | 3 | VLSI & EMB |
| 5 | 24ECEL629 | Programming Languages for Embedded Software | 3 | VLSI & EMB |
| 6 | 24ECEL630 | Nanoelectronics | 3 | VLSI & EMB |
| 7 | 24ECEL631 | Optical Engineering | 3 | RF & GREEN |
| 8 | 24ECEL632 | Ultra wideband communication | 3 | RF & GREEN |
| 9 | 24ECEL633 | Optical Wireless Communications for Beyond 5G Networks and IoT | 3 | RF & GREEN |
| 10 | 24ECEL634 | Learning Analytic Tools | 3 | SP & BM |
| 11 | 24ECEL635 | Speech Processing | 3 | SP & BM |
| 12 | 24ECEL636 | Telehealth Technology | 3 | SP & BM |
| 13 | 24MGEL603 | Total Quality Management | 3 | Mgmt |

## PROFESSIONAL ELECTIVES - VI

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL701 | Digital Communication using GNU Radio | 3 | WIRELESS |
| 2 | 24ECEL702 | Applied Optimization For Wireless, Machine Learning, Big Data | 3 | WIRELESS |
| 3 | 24ECEL703 | Advanced Technologies in Wireless Networks | 3 | WIRELESS |
| 4 | 24ECEL704 | VLSI Physical Design | 3 | VLSI & EMB |
| 5 | 24ECEL705 | Introduction to IoT and Embedded Computing | 3 | VLSI & EMB |
| 6 | 24ECEL706 | Flexible Electronics | 3 | VLSI & EMB |
| 7 | 24ECEL707 | Nano photonics, Plasmonics, And Metamaterials | 3 | RF & GREEN |
| 8 | 24ECEL708 | Millimeter Wave Technology | 3 | RF & GREEN |
| 9 | 24ECEL709 | EMI /EMC | 3 | RF & GREEN |
| 10 | 24ECEL710 | Natural Language Processing | 3 | SP & BM |
| 11 | 24ECEL711 | Medical Imaging Systems | 3 | SP & BM |
| 12 | 24ECEL712 | Robotics and Automation | 3 | SP & BM |
| 13 | 24MGEL701 | Foundation Skills in Integrated Product Development | 3 | Mgmt |

# AUTONOMOUS CURRICULA AND SYLLABI
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## PROFESSIONAL ELECTIVES - VII

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECEL713 | 5G and 6G Wireless Communication Systems | 3 | WIRELESS |
| 2 | 24ECEL714 | Wireless Systems and Networks | 3 | WIRELESS |
| 3 | 24ECEL715 | Broadband Communication Network | 3 | WIRELESS |
| 4 | 24ECEL716 | Low Power VLSI | 3 | VLSI & EMB |
| 5 | 24ECEL717 | Introduction to MEMS | 3 | VLSI & EMB |
| 6 | 24ECEL718 | Quantum Computing | 3 | VLSI & EMB |
| 7 | 24ECEL719 | RF Measurements and Signal Analysis in Wireless Systems | 3 | RF & GREEN |
| 8 | 24ECEL720 | RF Transceiver Design | 3 | RF & GREEN |
| 9 | 24ECEL721 | Mobile Antenna Systems | 3 | RF & GREEN |
| 10 | 24ECEL722 | Artificial Intelligence | 3 | SP & BM |
| 11 | 24ECEL723 | Brain Computer Interface and its Application | 3 | SP & BM |
| 12 | 24ECEL724 | Bio MEMS | 3 | SP & BM |
| 13 | 24MGEL702 | Professional Ethics and values | 3 | Mgmt |

## INDUSTRY CONNECTED PROFESSIONAL ELECTIVES
## L&T BASKET

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24ECIE501 | Cloud Adoption and Management Techniques | 3 | Cloud Computing |
| 2 | 24ECIE502 | Industrial Applications of Microcontrollers - A Practice based approach | 3 | Applied Microelectronics |
| 3 | 24ECIE503 | Applied Industrial IoT | 3 | Artificial Intelligence and Data Science |
| 4 | 24ECIE504 | Cyber Physical Systems for Industrial Applications | 3 | Applied Microelectronics |
| 5 | 24ECIE505 | Chip based VLSI Design for Industrial Applications | 3 | Applied Microelectronics |
| 6 | 24ECIE601 | AI and Edge Computing | 3 | Artificial Intelligence and Data Science |
| 7 | 24ECIE602 | Renewable Energy & Power Evacuation | 3 | Smart Grid Technology |
| 8 | 24ECIE603 | Digital Technologies for Industry 4.0 | 3 | Applied Microelectronics |
| 9 | 24ECIE604 | Integrated Approach to Building Services | 3 | Interdisciplinary |
| 10 | 24ECIE701 | Project Management for Professionals | 3 | Interdisciplinary |

## INDUSTRY CONNECTED PROFESSIONAL ELECTIVES
## HCL BASKET

| S. NO | COURSE CODE | COURSE TITLE | CREDIT | DOMAIN |
|---|---|---|---|---|
| 1 | 24EIIE611 | Embedded System For Connected Devices | 3 | Embedded |
| 2 | 24CSIE612 | C++ For Embedded Systems | 3 | Embedded |
| 3 | 24ITIE711 | Advanced C++ For Embedded Programming | 3 | Embedded |
| 4 | 24EIIE712 | Product Development Process | 3 | Embedded |
| 5 | 24ECIE712 | Project Phase-I | 4 | Embedded |
| 6 | 24ECIE811 | Internship | 3 | Embedded |
| 7 | 24ECIE812 | Project Phase-II | 6 | Embedded |

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**PEO1** Acquire strong foundation in Engineering, Science and Technology for a successful career in Electronics and Communication Engineering.

**PEO2** Apply their knowledge and skills acquired to solve the issues in real world Electronics and Communication sectors and to develop feasible and viable systems.

**PEO3** Be receptive to new technologies and attain professional competence through professional society activities.

**PEO4** Participate in lifelong learning, higher education efforts to emerge as expert researchers and technologists.

**PEO5** Practice the profession with ethics, integrity, leadership and social responsibilities.

## PROGRAM SPECIFIC OUTCOMES (PSOs)

**PSO 1** Design, implement and test Electronics and Communication systems using analytical knowledge and applying modern hardware and software tools

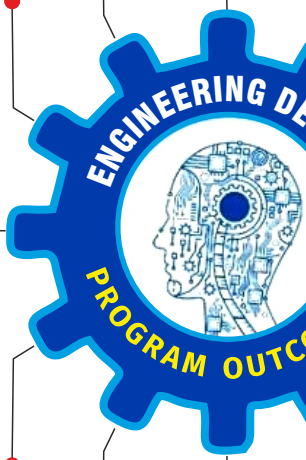
**PSO2** Develop their skills to solve problems and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

## COMPONENTS OF THE CURRICULUM (COC)

| Course Component | Curriculum Content (% of total number of credits of the program) | Total number of contact hours | Total Number of credits |
|---|---|---|---|
| Basic Sciences (BS) | 18 | 32 | 30 |
| Engineering Sciences (ES) | 7 | 15 | 12 |
| Humanities and Social Sciences (HS) | 8 | 13 | 13 |
| Professional Electives (EL) | 14 | 23 | 23 |
| Program Core + Program Lab (PC+PL) | 27 | 56 | 46 |
| Program theory with Lab (PW) / Program Lab With Theory (PT) | 5 | 15 | 9 |
| Open Elective (OE) | 7 | 12 | 12 |
| Training & Placement (TP) | 2 | 14 | 4 |
| Innovation & Development (ID) / Project (PJ) | 10 | 32 | 16 |
| Internships (IN) | 2 | 9 | 3 |
| Mandatory Courses (MC) | NA | 4 | NA |
| Total | | **225** | **168** |

# PROGRAMME OUTCOMES(POs)

**PROGRAM OUTCOME REPRESENTS THE KNOWLEDGE, SKILLS AND ATTITUDES THAT THE STUDENTS WOULD BE EXPECTED TO HAVE AT THE END OF THE 4 YEAR ENGINEERING DEGREE PROGRAM**




**01 Engineering knowledge**

Apply the basic principle and knowledge of mathematics, science and engineering principles to solve technical problems.

**02 Problem Analysis**

Identify and analyze complex engineering problems reaching logical conclusions using the basic principles of mathematics, science and engineering.

**03 Development of solutions**

Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs.

**04 Investigate complex problems**

Perform investigations, use research based knowledge and conduct experiments, analyze and interpret the results to provide valid conclusions.

**05 Modern tool usage**

Create, select and apply the latest techniques, resources and modern engineering / IT tools to develop appropriate solutions with an understanding of the limitations.

**06 The Engineer and Society**

Apply reasoning based on contextual knowledge to assess societal, legal and cultural issues with competency in professional engineering practices.

**07 Environment & Sustainability**

Demonstrate professional skills, knowledge and contextual reasoning to assess / environmental / societal issues for sustainable development.

**08 Apply ethical principles**

Apply ethical principles and commit to professional ethics and responsibilities based on the norms of professional engineering pratices.

**09 Individual & Teamwork**

Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary professional settings.

**10 Communicate effectively**

Communicate effectively amongst the engineering community, being able to comprehend & write effective reports, make presentations & give/receive clear instructions.

**11 Project management**

Demonstrate knowledge and apply the principles of engineering & management in their own / team projects in multidisciplinary environments.

**12 Life-long learning**

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

# SEMESTER - I

| 24BSMA101<br>SDG NO. 4 & 9 | MATRICES AND CALCULUS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- To understand and gain the knowledge of matrix algebra.
- To introduce the concepts of limits, continuity, derivatives, maxima and minima for functions of several variables.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To provide understanding of double integration, triple integration and their applications.
- To impart the knowledge of Fourier series..

**MODULE - I MATRICES** **12**

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem (without proof) – Symmetric and orthogonal matrices - Reduce the Quadratic to Canonical form using orthogonal transformation - Nature of Quadratic forms.

**MODULE - II FUNCTIONS OF SEVERAL VARIABLES** **12**

Limits, Continuity - Definitions - Partial derivatives -Taylor's series - Jacobians, Maxima and Minima - Method of Lagrange multipliers.

**MODULE - III VECTOR DIFFERENTIATION** **4**

Scalar and Vector valued functions- Gradient and Directional derivatives – Tangent plane - Divergence and Curl- Irrotational and Solenoidal vector fields - Scalar and Vector Potentials - Vector identities (without proof).

**MODULE - IV VECTOR INTEGRATION** **8**

Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Greens, Gauss divergence and Stoke's theorems -Verification and Application in evaluating line, Surface and Volume integrals. Problems involving Cube and Cuboids.

**MODULE - V MULTIPLE INTEGRALS** **12**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Change of variables from cartesian to polar coordinates-Triple integrals – Volume of solids - Change of variables from cartesian to Spherical and Cylindrical polar coordinates.

**MODULE - VI FOURIER SERIES** **12**

Fourier series – Convergence of Fourier series -Half range Sine and Cosine series – Parseval's theorem.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.

**REFERENCES:**

1. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
2. Engineering Mathematics for first year, T. Veerarajan, Tata McGraw-Hill, New Delhi, 2008.
3. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

**WEB REFERENCES:**

1. https://math.mit.edu/~gs/linearalgebra/ila0601.pdf
2. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter30/
3. https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/2.-partial derivatives/
4. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter31/

**ONLINE RESOURCES:**

1. https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear algebra-introduction-to-eigenvalues-and-eigenvectors
2. https://www.khanacademy.org/math/differential-calculus

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Diagonalize the matrix using orthogonal transformation and apply Cayley Hamilton Theorem to find the inverse and integral powers of a square matrix. (K3)
2. Evaluate the limit, examine the continuity and use derivatives to find extreme values for functions of several variables. (K3)

3. Compute the derivatives of scalar and vector point functions. (K3)
4. Use the vector point function to establish the relation between line, surface and volume integrals. (K3)
5. Apply double and triple integrals to find the area and the volume of a region. (K3)
6. Compute Fourier series expansion of a function. (K3)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO3 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO5 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO6 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |

# SEMESTER - I

| 24HSEN101<br>SDG NO. 4 | COMMUNICATIVE ENGLISH | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Develop the basic LSRW skills
- Acquire enhanced knowledge of English grammar
- Improve modern and technical vocabulary
- Enhance the communicative and cognitive skills
- Interpret the texts and write reviews critically

**MODULE - I COMMUNICATION PROCESS 8**

Listening – informal conversations - Speaking – basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve - Reading comprehension – skimming/ scanning/ predicting – question & answers – objective and descriptive answers - Writing – paragraph writing, personal notes - Language Development – parts of speech, prefix, suffix, word formation

**MODULE - II LANGUAGE BARRIERS, LEVELS AND CHANNELS 8**

Listening –interviews - Speaking – describing a simple process – asking and answering questions - Reading – critical reading – finding key information in a given text – ideation, mind mapping - Writing - dialogue,, instructions – Language Development – regular, irregular verbs, tenses, framing questions,

**MODULE - III NARRATION AND SUMMATION 8**

Listening - long texts - TED talks - extensive speech on current affairs - Speaking – role plays – asking about routine actions and expressing opinions - Reading- longer texts & making a critical analysis of the given text - Writing – essay (comparative / analytical), jumbled sentences, recommendations - Language Development – writing single sentence definitions, sequence words

**MODULE - IV WRITING MECHANICS 7**

Listening -debates and discussions – practicing multiple tasks –Speaking - self introduction about friends/ places/ hobbies - Reading -Making inference from the reading passage – Predicting the content of the reading passage - Writing – informal letters, e-mails - accuracy, coherence, brevity – Language Development- single word substitutes, compound words- conditionals

**MODULE - V INTERPRETATION SKILLS 7**

Listening- popular speeches and presentations - Speaking - impromptu speeches -Reading - articles – magazines - Writing – review writing, channel conversion – bar diagram/ table, poster/ picture interpretation - Language Development – modal verbs, collocations, 21st century vocabulary

**MODULE - VI COGENT EXPOSITIONS 7**

Listening - Motivational speeches - Speaking - Debates and discussion - Reading - analytical reading - newspapers - Writing - process description - Language Development - voices, sentences expressing purpose, synonyms & antonyms

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Board of Editors. Using English: A Coursebook for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015.
2. A Course in Technical English, D. Praveen Sam and K.N. Shoba, Cambridge University Press, 2020

**REFERENCES:**

1. Anderson, Paul V. Technical Communication: A Reader – Centered Approach. Cengage, New Delhi, 2008.
2. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason, USA, 2007.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.
4. Chauhan, Gajendra Singh and et.al.Technical Communication (Latest Revised Edition). Cengage Learning India Pvt. Limited, 2018.

**WEB REFERENCES:**

1. https://onlinecourses.nptel.ac.in/noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

**ONLINE RESOURCES:**

1. https://wwPearson.com/english/catalogue/business-english/technical-english.html
2. https://ww.cambridgeenglish.org/learning-english/free-resources/

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Improve understanding and application of listening, speaking, reading, and writing skills (K2)
2. Demonstrate the ability to write personal notes, clear and coherent paragraphs (K2)
3. Apply analytical skills to write essays, rearrange jumbled sentences, and formulate recommendations (K3)
4. Apply skills to develop email etiquette and construct professional emails and informal letters (K3)
5. Analyze and interpret data to write comprehensive and effective reviews (K3)
6. Enhance vocabulary, improve grammatical accuracy, and confidently engage in debates (K2)

**CO-PO, PSO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |

# SEMESTER - I

| 24BSPH101<br>SDG NO. 4 | ENGINEERING PHYSICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basic concepts of mechanics and its use in engineering applications.
- To illustrate the various laws of electromagnetic waves and its applications.
- To understand the concept of waves and lasers and its applications.
- To apply the concepts of quantum mechanics to engineering studies.
- To identify the basic principles involved in thermal physics and its applications.
- To understand the basics of crystal for engineering applications.

**MODULE - I PROPERTIES OF MATTER 8**

Elasticity – Hooke's law- Poisson's ratio - Stress - strain diagram and its uses - Twisting couple - shaft - Torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders.

**MODULE - II MECHANICAL WAVES AND LASERS 7**

Waves on a string – standing waves – traveling waves – Energy transfer of a wave – Reflection and refraction of light waves – interference –Theory of air wedge and experiment - Theory of laser – characteristics – Spontaneous and stimulated emission – Einstein's coefficients – population inversion – Nd-YAG laser, CO2 laser – Basic applications of lasers in industry.

**MODULE - III ELECTROMAGNETIC WAVES** **8**

The Maxwell's equations – wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field – properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter – polarization – Producing electromagnetic waves – Energy and momentum in EM - Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

**MODULE - IV BASIC AND APPLIED QUANTUM MECHANICS** **7**

Black body radiation – Planck's derivation – Electrons and matter waves –The Schrodinger equation (Time dependent and time independent forms) – significance of wave function – Normalization –Free particle – particle in a infinite potential well: 1D, 2D and 3D Boxes; - Barrier penetration and quantum tunneling (qualitative) – Scanning Tunneling Microscope.

**MODULE - V CRYSTAL PHYSICS** **8**

Single crystalline, Polycrystalline and Amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal - Miller indices - Interplanar distance - X-Ray diffraction - Calculation of number of atoms per unit cell - Atomic radius - Coordination number – packing. factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy. Crystal Growth: Chochralski technique - Molecular beam epitaxy.

**MODULE - VI THERMAL PHYSICS** **7**

Transfer of heat energy - Conduction, Convection and Radiation - Thermal conductivity, Forbe's method and Lee's disc method - Conduction through compound media - series and parallel methods - Heat exchangers - Refrigerators and Solar water heaters.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. D.K. Bhattacharya & T.Poonam, "Engineering Physics". Oxford University Press, 2015.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. B.K. Pandey & S.Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
4. V. Rajendran, "Engineering Physics", Mc Graw Hill Publications Ltd. New Delhi, 2014.
5. M.N. Avadhanulu And P.G. Kshirsagar, "A textbook of Engineering Physics", S. Chand & Co Ltd. 2016.

**REFERENCES:**


1. D. Halliday, Resnick & J. Walker, "Principles of Physics", Wiley, 2015.
2. R.A. Serway, & J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2010.
3. N.K. Verma," Physics for Engineers", PHI Learning Private Limited, 2014.
4. P.A. Tipler & G. Mosca "Physics for Scientists and Engineers", W.H.Freeman, 2020.
5. Brijlal and Subramanyam, "Properties of Matter", S. Chand Publishing, 2018.
6. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics", Pearson, 2018.
7. Arthur Beiser. "Concepts of Modern Physics", McGraw-Hill, 6th Edition. 2003.
8. Charles Kittel, "Introduction to Solid State Physics". John Wiely & Sons. 8th Edition, 2005.


**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Understand the mechanical properties of materials. (K2)
2. Express the knowledge of waves and to discuss about lasers and its applications (K2)
3. Understand the properties of electromagnetic waves and its propagation in different medium (K2)
4. Discuss the dual nature of matter and radiation and application of one dimensional Schrodinger's wave equations to a matter wave system (K3)
5. Understand the basics of crystal, its structure determination and different growth techniques. (K2)
6. Discuss the heat transfer in different media and its applications. (K2)

**CO-PO, PSO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | 2 | - | - | - | - | - | - | 1 |
| CO2 | 3 | 2 | 2 | 1 | 3 | - | - | - | - | - | - | 2 |
| CO3 | 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | 1 |
| CO4 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 1 |
| CO5 | 3 | 2 | 2 | 3 | 1 | - | - | - | - | - | - | 1 |
| CO6 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | 1 |

# SEMESTER - I

| 24BSCY101<br>SDG NO. 4,7,8,9, 11,12 & 17 | ENGINEERING CHEMISTRY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To enumerate the importance, synthesis, and applications of polymers.
- To impart basic knowledge of chemistry and the principles involved in electrochemistry, energy storage devices, and their commercial applications.
- To familiarize the fundamental laws and concepts of important photophysical and photochemical processes, as well as spectroscopy.
- To explore the fundamental concepts, laws, and principles of thermodynamics, and apply its derivations to optimize and innovate engineering processes across various disciplines.
- To comprehend the chemistry of fuels and combustion, and their applications across various engineering and industrial processes.
- To gain an understanding of the emergence and challenges of nanomaterials and nanotechnology across various scientific and technological disciplines.

**MODULE - I POLYMER CHEMISTRY 8**

**Polymers:** Definition, Degree of polymerization, Functionality of monomer, Classification of polymer with examples, Types of polymerization, Mechanism of addition polymerization (Free radical mechanism).

**Plastics:** Definition and Characteristics - Thermoplastics & Thermosets. Preparation, properties and engineering applications of plastics -PVC, Teflon, Kevlar and Bakelite.

**Fibers:** Characteristics fibers - Preparation, properties and applications of Nylon and Dacron. Biodegradable polymers & Conducting Polymers: Characteristics, Classification and their applications.

**MODULE - II ELECTROCHEMISTRY AND BATTERY TECHNOLOGY 7**

**Electrochemistry:** Types of Cells (Electrochemical and Electrolytic cell) – Redox reaction – Single and Standard electrode potential, Reference electrodes - SHE, Calomel electrode, Measurement of Single Electrode Potential, Nerns't equation (Derivation & Problems), Electrochemical series and its significance.

**Batteries:** Evolution of batteries – Primary and Secondary battery (Lead acid battery), Next Generation Battery Technology (NGBT) - Solid-state batteries (Lithium-ion), Sodium-ion batteries.

**MODULE - III PHOTOCHEMISTRY & SPECTROSCOPY** **7**

**Photochemistry:** Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency – determination-Photo processes - Jablonski diagram (Internal Conversion, Intersystem crossing, Fluorescence, Phosphorescence), Chemiluminescence and Photo-sensitization.

**Spectroscopy:** Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and Rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

**MODULE - IV CHEMICAL THERMODYNAMICS** **8**

Terminology of Thermodynamics - Laws of Thermodynamics – I law – Significance – Mathematical formulation and its applications. II law – Need for the II law. Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes, entropy of phase transitions; Clausius inequality. Helmholtz and Gibbs free energy functions, Criteria of spontaneity, Maxwell relations, Gibbs-Helmholtz equation, Van't Hoff Isotherm and Isochore.

**MODULE - V FUELS** **8**

**Fuels:** Introduction –Classification of fuels – Coal – Analysis of coal (proximate and ultimate). Carbonization – manufacture of metallurgical coke (Otto Hoffmann method) – Petroleum – manufacture of synthetic petrol (Bergius process). Knocking – Octane number and Cetane number – Gaseous fuels – Compressed natural gas (CNG), Liquefied petroleum gas (LPG). Biofuels – Gobar gas and Biodiesel.

**Combustion of fuels:** Introduction – Calorific value – Higher and Lower Calorific values- Theoretical calculation of Calorific value(Dulong formula) – Flue gas analysis (ORSAT Method).

**MODULE - VI NANOCHEMISTRY** **7**

Introduction - Types of nanomaterials - Emergence and challenges in nanotechnology- Synthesis routes for nanomaterials: Bottom-up and top-down approaches - Sol-gel, precipitation, Thermolysis, Laser ablation, Chemical Vapour Deposition (CVD), Electro deposition - Properties of nanomaterials- Mechanical properties, Chemical, Optical, Electrical and Magnetic properties-applications of nanomaterials (Gold nanoparticles as an example). Quantum Dots - concept, properties and applications.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand &CompanyLTD, New Delhi, 2015.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P)LTD, New Delhi, 2015.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD,New Delhi, 2013.
4. Ravikrishnan A, 'Engineering Chemistry', Sri Krishna Hitech Publishing Company Pvt. Ltd, New Edition 2024.

**REFERENCES:**

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi,2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.
4. Chemistry of Nanomaterials Vol.1 S.S.R Kumar Challa (Ed).
5. Advanced chemistry by Phillip Matthews Vol.1 and Vol.2.
6. Chemistry in Engineering and Technology Vol. 1 & 2, J.C. Kuriacose and J. Rajaram.
7. Applied chemistry - A textbook for Engineers and Technologists by H.D. Gesser.

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Explain the importance of polymers in science and technology, describe their roles in different applications and discuss their impacts on modern advancements. (K3)
2. Recognize the basic principles of electrochemistry and describe their application in battery technologies. (K3)
3. Apply the concepts of key photophysical and photochemical processes, as well as spectroscopy, to develop and optimize various applications. (K3)
4. Describe the principles of the second law of thermodynamics and its derivations to analyze engineering applications across all disciplines. (K3)
5. Categorize the chemistry of fuels and combustion and their applications at various levels. (K3)
6. Demonstrate the knowledge of nanomaterials, including their properties, behavior, interactions and applications across various disciplines of science and technology. (K3)

**CO-PO, Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |
| CO5 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO6 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 |

# SEMESTER - I

| 24ESCS101<br>SDG NO. 4 & 9 | PROBLEM SOLVING AND PROGRAMMING IN C | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- Interpret Mathematical problems using algorithms, flowchart and pseudocode.
- To understand about the programming language
- To develop C Programs using basic Programming Constructs, Loops, Arrays and Strings
- To develop applications in C using Functions, Pointers and Structures
- To perform I/O operations and File Handling in C

**MODULE - I INTRODUCTION TO PROGRAMMING AND ALGORITHMS FOR PROBLEM SOLVING 7**

Introduction to Problem Solving through programs- Algorithm-Flowchart–Pseudocode-Memory, Variables, Values, Instructions, Programs-compilation process-Syntax and Semantic Errors- The language of C : Phases of developing a running computer program in C - Character set – Constants – Keywords – Primitive data types –Declaration, Type Conversion

**MODULE - II BASICS OF C PROGRAMMING 7**

Sequential- Arithmetic Operators, Relational Operators, Logical Operators, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, selective – If Else-If, Switch- repetitive structures-for, while, do while, Nested loops, go to, break, continue –Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD and LCM, Prime number generation

**MODULE - III ARRAYS AND STRINGS** **8**

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 - Linear and Binary Search.

**MODULE - IV FUNCTIONS AND POINTERS** **9**

Introduction to Functions: Function Prototype, Function Definition, Function Call, Built-in Functions (String Functions, Math Functions) – Recursion – Example Program: Computation of Sine Series - Scientific Calculator using Built-in Functions - Binary Search using Recursive Functions - Factorial and Fibonacci Generation - Towers of Hanoi problem - – 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 using Pass by Reference.

**MODULE - V STRUCTURES** **7**

Structure - Nested Structures – Pointer and Structures – Array of Structures – Example Program using Structures and Pointers – Self Referential Structures – Dynamic Memory Allocation - Singly Linked List – Typedef.

**MODULE - VI FILE PROCESSING** **7**

Files – Types of File Processing: Sequential Access, Random Access – Sequential Access File - Example Program: Finding Average of Numbers stored in Sequential Access File - Random Access File - Example Program: Transaction Processing Using Random Access Files – Command Line Arguments.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. R.G. Dromey, "How to solve it by Computers", Reprint, PHI Publishers, 2011.
2. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2018.
3. Kernighan, B.W and Ritchie D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

**REFERENCES:**

1. Yashwant Kanetkar, "Let us C", 18th Edition, BPB Publications, 2021.
2. Byron Gottfried, "Programming with C", Fourth Edition, Tata McGraw Hill Education, 2018.
3. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh edition, Pearson Publication, 2015.
4. Jeri R. Hanly & Elliot B.Koffman, “Problem Solving and Program Design in C”, Pearson Education, 2013.
5. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
6. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
7. Hanly J R & Koffman E.B, “Problem Solving and Programme design in C”, Pearson Education, 2009.

**WEB REFERENCES:**

1. https://www.learn-c.org/
2. https://codeforwin.org/
3. https://www.cprogramming.com

**ONLINE RESOURCES:**

1. https://www.linuxtopia.org/online_books/programing_books/gnu_c_programming_tutorial
2. https://nptel.ac.in/courses/106105171
3. https://swayam.gov.in/nd1_noc19_cs42/preview

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Understand the concepts of algorithms for solving a problem.(K2)
2. Illustrate the various constructs in C to develop simple applications.(K3)
3. Understand the concepts of Array & Strings.(K2)
4. Demonstrate the usage of Functions and Pointers.(K3)
5. Explain the Structure and union concepts.(K2)
6. Describe the file manipulation and its organisation.(K2)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 | 2 | 2 |
| CO2 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 2 | 2 |
| CO4 | 2 | 2 | - | 2 | 2 | - | - | - | - | - | 1 | - | 3 | 2 |
| CO5 | 2 | 2 | - | - | 1 | - | - | - | - | - | 1 | - | 3 | 3 |
| CO6 | 2 | 2 | - | - | 2 | - | - | - | - | - | 1 | - | 3 | 3 |

# SEMESTER - I

| 24ESGE101<br>SDG NO. 4,6,7,9, 12,14 & 15 | ENGINEERING GRAPHICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 2 | 0 | 3 |

**OBJECTIVES:**

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To visualize the job in three dimensions.
- To have a clear conception and appreciation of the shape, size, proportion and design.
- To expose the student community to existing national standards related to technical drawings.

**MODULE - I PLANE CURVES** **6+4**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – Drawing of tangents and normal to the above curves.

**MODULE - II PROJECTION OF POINTS, LINES AND PLANES** **6+4**

Projection of Points (Concept only). Projection (Elevation and Plan) of straight lines, inclined to both reference planes by rotating line method. Projection of plane surfaces, inclined to one of the reference planes by rotating object method.

**MODULE - III PROJECTION OF SOLIDS** **6+4**

Projection of regular solids (Prisms, Pyramids, Cylinder and cone) in first quadrant, by rotating object method when the axis is inclined to one of the reference planes.

**MODULE - IV ORTHOGRAPHIC PROJECTION 6+4**

Orthographic Projection - Principles of orthographic projections, Orthographic projection of objects from pictorial view.

**MODULE - V SECTION AND DEVELOPMENT OF LATERAL SURFACE 6+4**

Projection of sectioned solids (Prisms, Pyramids, Cylinder and cone) and true shape of the sections, when the axis of the solid is perpendicular to HP alone and cutting plane inclined to HP only. Development of lateral surfaces of sectioned regular vertical solids (Prisms, Pyramids, Cylinder and Cone) with cutting plane inclined to HP only.

**MODULE - VI ISOMETRIC PROJECTIONS 6+4**

Isometric projection – Principle, isometric scale, Isometric views and Isometric projections of truncated solids - Prisms, Pyramids, Cylinder and Cone in simple vertical positions only.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.

**REFERENCES:**

1. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
3. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

**WEB REFERENCES:**

1. https://archive.nptel.ac.in/courses/112/102/112102304/

**ONLINE RESOURCES:**

1. https://nptel.ac.in/courses/105/104/105104148/
2. https://nptel.ac.in/courses/112/103/112103019/

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Perform free hand drawing of conical sections and cycloids. (K3)
2. Sketch the orthographic projection of lines and plane surfaces of rectangle, square, pentagon and Hexagon. (K3)
3. Draw the orthographic projection of regular solids like prism, pyramids, cylinder and cone using change of position method. (K3)
4. Draw plan, elevation and side views for the 3dimensional isometric drawing by using the concepts of orthographic projection. (K3)
5. Draw the section and development of lateral surfaces for the regular solids like Prism, Pyramid, Cylinder and Cone for the axis perpendicular to HP. (K3)
6. Draw the isometric view, projection for regular and truncated solids like Prism, Pyramid, Cylinder and Cone. (K3)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |
| CO2 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |
| CO3 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |
| CO4 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |
| CO5 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |
| CO6 | 3 | - | - | - | - | - | - | 2 | - | 2 | - | - | 3 | 2 |

# SEMESTER - I

| 24HSTA101<br>SDG NO. 4 | HERITAGE OF TAMILS | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**OBJECTIVES:**

- Develop interest for classical language and literature to promote Tamil heritage
- Understand the ancient Tamil sculptures, folk and martial arts and contribution of Tamil to the freedom of India

**UNIT - I LANGUAGE AND LITERATURE 3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**UNIT - II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

**UNIT - III FOLK AND MARTIAL ARTS 3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

**UNIT - IV THINAI CONCEPT OF TAMILS 3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

**UNIT - V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

**TOTAL : 15 PERIODS**

**TEXT-CUM-REFERENCE BOOKS**


1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2 கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3 கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

# தமிழர் மரபு

**அலகு - I மொழி மற்றும் இலக்கியம்: 3**

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**அலகு - II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை: 3**

நடுகல் முதல் நவீன சிற்பங்கள் வளர - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - கதர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**அலகு - III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலொட்டம், தொல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**அலகு - IV தமிழர்களின் திறைக் கோட்பாடுகள்: 3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்கொப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**அலகு - V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்ப்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

**TOTAL : 15 PERIODS**

**TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

**OUTCOMES:**

**Upon completion of the course, the learners will be able to:**

1. Understand Tamil as a classical language & Literature (K2)
2. Explore about Tamil Heritage & Sculptures,Role of temples (K2)
3. Appreciate Sports and games of Tamils (K2)
4. Perceive Thinai concept of Tamils (K2)
5. Comprehend Education and literacy during Sangam Age (K2)
6. Understand the Contribution of Tamils to National Movement & Indian Culture (K2)

**CO- PO, PSO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO3 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO4 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO5 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO6 | - | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |

# SEMESTER - I

| 24BSPL101<br>SDG NO. 4,6,11, 12 & 17 | PHYSICS AND CHEMISTRY LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**PHYSICS LABORATORY (Any Five Experiments to be conducted)**

**OBJECTIVES:**

- Demonstrate the wave nature of light using diffraction and interference properties.
- Study the thermal conductivity of a bad conductor.
- Verify experimentally the elastic properties of materials.

| Sl.No. | Name of the Experiment |
|---|---|
| 1 | (a) Determination of wavelength of Laser<br>(b) Determination of numerical aperture and acceptance angle in an optical fiber.<br>(c) Determination of particle size using laser source. |
| 2 | Determination of thermal conductivity of a bad conductor – Lee's Disc method. |
| 3 | Determination of Young's modulus by non-uniform bending method. |
| 4 | Determination of the period of oscillation of a given torsional pendulum for a fixed length and find the rigidity modulus of the wire. |
| 5 | Find out the thickness of the given wire by air wedge method. |
| 6 | Calculation of lattice cell parameter – X-ray diffraction method. |
| 7 | Determination of Planck's constant. |
| 8 | Determination of wavelength of mercury spectrum – spectrometer grating. |

| | |
|---|---|
| 9 | Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer. |
| 10 | Determination of band gap of a semiconductor. |
| 11 | Determination of Hall coefficient by Hall Effect experiment. |
| 12 | Determination of solar cell characteristics. |

**CHEMISTRY LABORATORY (Any Five Experiments to be conducted)**

**OBJECTIVES:**

- To acquaint students with practical knowledge of the basic concepts of chemistry that they will encounter during their studies and in the industry and engineering fields.
- To acquaint students with the determination of the molecular weight of a polymer by viscometry.
- To develop and understand the basic concepts of acidic and basic nature using pH.

| Sl.No. | Name of the Experiment |
|---|---|
| 1 | Conductometric titration of strong acid vs strong base. |
| 2 | Determination of chloride content of water sample by Argentometric method. |
| 3 | Determination of strength of acids in a mixture of acids using conductivity meter. |
| 4 | Determination of total, temporary & permanent hardness of water by EDTA method. |
| 5 | Estimation of iron content of the given solution using potentiometer. |
| 6 | Determination of DO content of water sample by Winkler's method. |
| 7 | Determination of strength of given hydrochloric acid using pH meter. |
| 8 | Estimation of iron content of the water sample using spectrophotometer (1,10- Phenanthroline / thiocyanate method). |
| 9 | Estimation of Sodium and Potassium in the given sample of water using Flame Photometer. |
| 10 | Determination of molecular weights of polymer samples using Ostwald's Viscometer. |
| 11 | Synthesis of nano-CdS by precipitation. (Demonstration only) |
| 12 | Corrosion experiment-weight loss method. |

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Engineering Physics Lab, Dr. G. SenthilKumar, VRB publishers. (2019)
2. Engineering Physics Practical, Dr. P. Mani, Dhanam Publications. (2020)

**TEXTBOOK:**

1. Vogel's Textbook of Quantitative Chemical Analysis (8th edition,2014).
2. Practical Physical chemistry by B. Viswanathan, P. S. Raghavan (Vivabooks), 2009.
3. Foundation of Experimental Chemistry by Jubaraj B. Baruah, ParikshitGogoi, 2010.

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Demonstrate the wave nature of light using diffraction and interference properties. (K3)
2. Study the thermal conductivity of a bad conductor. (K3)
3. Verify experimentally the elastic properties of materials. (K3)
4. Describe multiple measurement techniques, including volumetric titrations, conductivity, pH, redox potential and optical density measurements, used to estimate the amount of substance present in a solution. (K3)
5. Apply spectroscopic techniques to determine the concentration of metal ions in solutions and use viscometry to determine the molecular weight of a polymer. (K3)
6. Demonstrate the ability to synthesize nanoparticles using simple chemical or physical methods and apply the weight loss method to study and analyze the corrosion behavior of materials in different environments.(K3)

**CO-PO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 |
| CO2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 |
| CO4 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO5 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO6 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |

# SEMESTER - I

| 24ESPL101<br>SDG NO. 4 & 9 | PROGRAMMING IN C LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To develop programs in C using basic Programming Constructs
- To develop applications in C using Arrays and Strings
- To design and implement applications in C using Functions, Structures
- To develop applications in C using Files

**LIST OF EXPERIMENTS**

1. Write a program using I/O statements and expressions.
2. Write programs using decision-making constructs.
3. Write a program to find whether the given year is a leap year or not? (Hint: not every century is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Write a program to perform the Calculator operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Write a program to check whether a given number is an Armstrong number or not?
6. Write a program to check whether a given number is odd or even?
7. Write a program to find the factorial of a given number.
8. Write a program to find out the average of 4 integers.
9. Write a program to print half pyramid of *.
10. Write a program to display array elements using two dimensional arrays.
11. Write a program to perform swapping using a function.
12. Write a program to display all prime numbers between two intervals using functions.
13. Write a program to solve towers of Hanoi using recursion.
14. Write a program to get the largest element of an array using the function.
15. Write a program to concatenate two strings.
16. Write a program to find the length of String.
17. Write a program to find the frequency of a character in a string.
18. Write a program to store Student Information in Structure and Display it.

19. The annual examination is conducted for 10 students for five subjects. Write a program to read the data and determine the following:

(a) Total marks obtained by each student.

(b) The highest marks in each subject and the marks of the student who secured it.

(c) The student who obtained the highest total marks.

20. Write a program to demonstrate file operations (e.g. count the number of characters, words and lines in a file, replace a specific word with the given word in the same file).

**TOTAL: 30 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Stand alone desktops with C compiler 30 Nos. (Or)
   Server with C compiler supporting 30 terminals or more.

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Illustrate C programs for simple applications making use of basic constructs, arrays, strings, functions and recursion.(K2)
2. Demonstrate C programs involving pointers, and structures. (K3)
3. Interpret applications using sequential and random access files. (K3)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 3 | 1 | 2 |
| CO2 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 3 | 2 | 1 |
| Co3 | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 3 | 3 | 2 |

# SEMESTER - I

| 24ENTP101<br>SDG NO. 4 | FUNCTIONAL LIFE SKILLS | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- Resolve common communication problems
- Observe the effectiveness of nonverbal messages
- Communicate precisely through the digital media
- Understand the importance of empathetic listening
- Explore reading and speaking processes

**MODULE - I LISTENING** **5**

Techniques of effective listening
Listening and comprehending
Probing questions
Barriers to listening
Reflection from listening

**MODULE - II SPEECH MECHANICS** **5**

Pronunciation
Enunciation
Vocabulary
Fluency
Common errors

**MODULE - III READING SKILLS** **5**

Techniques of effective reading
Kinds of reading
Gathering ideas and information from the text
Evaluating the ideas and information
Interpreting the text from multiple angles

**MODULE - IV WRITING ASPECTS** **5**

Writing process
Effective writing strategies
Different modes of writing
Optimizing the use of resources
Editing

**MODULE - V PRESENTATION SKILLS** **5**

Types of presentations
Nonverbal communication
Understanding the purpose and the audience
Beginning and closure of presentations
Presentation tools and strategies

**MODULE - VI ARTICULATION ASPECTS** **5**

Perform exercises
Slow speeches

Long speeches
Monologues, Dialogues and Conversation
Feedback necessity

**TOTAL : 30 PERIODS**

**REFERENCES:**

1. Sen, Madhuchanda.2010, An Introduction to Critical Thinking, Delhi, Pearson.
2. Effective Communication Skills Strategies for Success. Edited by Nitin Bhatnager and Mamta Bhatnager. 2023, Pearson
3. Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. Oxford University Press, 2015

**WEB REFERENCES:**

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Utilize various listening techniques effectively (K1)
2. Demonstrate the ability to speak spontaneously in different contexts (K1)
3. Comprehend and interpret written texts accurately (K2)
4. Exhibit the ability to write freely with sufficient and relevant content (K1)
5. Articulate explanations clearly and concisely (K1)
6. Understand and present convincing speeches/ arguments effectively (K2)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |

# SEMESTER - I

| 24ESID101<br>SDG NO. 1-17 | IDEA ENGINEERING LAB - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To understand the significance of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) of the United Nations
- To familiarize with SDG targets and indicators
- To identify the Constitutional implementation pertaining to SDGs in Panchayat Raj
- To acquire knowledge of the State and the Central government welfare schemes
- To recognise the role of educational institutions' in community development
- To develop critical thinking skills to address complex societal challenges through an immersion program

**MODULE - I United Nations Sustainability and the Sustainable Development Agenda** **3**

- Introduction to Sustainability
- Indian Rural Environment: Necessity and Sustainability
- Millennium Development Goals (MDGs)
- United Nations Sustainable Development Goals (SDGs) & the Agenda
- Overview of the Sustainable Development Goals (SDGs)

**MODULE - II Universal SDG Targets** **4**

- SDG Framework
- Key Components
- Pillars of the SDGs
- Targets of the Goals
- Indicators of the Targets

**MODULE - III SDG and Indian Gram Panchayat** **3**

- Gram Panchayat
- Salient Features of Constitutional Amendments
- Transition from SDGs to LSDGs (Localizing Sustainable Development Goals)

**MODULE - IV Government Schemes** **4**

- Introduction to State and Central Government Schemes
- Overview of Government Schemes
- Localization and Implementation at the Regional Level
- Impact on Local Communities

**MODULE - V Community Engagement** **4**

- Key Recommendations of the National Education Policy
- Guidelines for Fostering Social Responsibility:
- Awareness
- Participation
- Collaboration

**MODULE - VI Idea Generation** **12**

- Immersion Program
- Focus Areas:
- Channelizing Ideas
- Forming Working Teams for SDGs (Sustainable Development Goals)

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Joy Elamon and Ms. Mariamma Sanu George,"The Handbook on Sustainable Development Goals and Gram Panchayats" , State Institute for Rural Development (SIRD).
2. Dr.C.R.Rene Robin, Dr.PA.Shanthi , Dr.B.Thanuja & Dr.V.Yuvaraj ,"Sairam SDG Idea Engineering Lab I", Sri Sairam Engineering College.

**WEB REFERENCES**

1. UN Sustainable Development Goals
2. https://srmuniv.digimat.in/nptel/courses/video/109106200/L30.html
3. https://avcce.digimat.in/nptel/courses/video/109106200/L26.html

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Understand the United Nations Agenda of MDGs and SDGs (K1)
2. Summarize the targets and indicators of SDGs (K2)
3. Interpret the constitutional amendments of LSDG in Gram Panchayat (K2)
4. Classify various localized and regional government schemes (K2)

5. Understand social responsibility in community development (K1)
6. Implement viable projects in SDGs through the immersion program (K3)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |
| CO2 | - | - | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |
| CO3 | - | - | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |
| CO4 | - | - | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |
| CO5 | - | - | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |
| CO6 | 2 | 2 | - | - | - | 2 | 2 | - | 2 | - | 2 | 2 |

# SEMESTER - II

| 24BSMA202<br>SDG NO. 4 | DIFFERENTIAL EQUATIONS, COMPLEX VARIABLES AND TRANSFORMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equations, Complex variables, Z - Transforms, Fourier Transforms and Laplace transforms. It aims to equip the students to deal with advanced levels of mathematics and applications that would be essential for their disciplines.

**MODULE - I ORDINARY DIFFERENTIAL EQUATIONS** **12**

Second and Higher order linear differential equations with constant coefficients - Method of variation of Parameters -Homogeneous equation of Euler's and Legendre's type - System of simultaneous first order linear differential equations with constant coefficients.

**MODULE- II COMPLEX VARIABLES** **9**

Analytic functions – Necessary and sufficient conditions for analyticity in cartesian and polar coordinates (without proof)- Properties- Harmonic Conjugate-Construction of analytic functions-Conformal mapping -Bilinear transformation ($w = 1/z$).

**MODULE - III COMPLEX INTEGRATION** **9**

Cauchy- Goursat theorem (without proof) - Cauchy Integral formula (without proof) - Zeroes of Analytic functions - Singularities - Laurent's Series - Residues – Cauchy Residue theorem (without proof).

**MODULE - IV LAPLACE TRANSFORMS** **12**

Existence conditions – Transforms of elementary functions – Transform of Unit step function and Unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives – Transform of Periodic functions - Inverse Laplace Transforms - Initial and Final value theorems – Convolution theorem (excluding proof) –– Application of solution of linear second order ordinary differential equations with constant coefficients.

**MODULE - V FOURIER TRANSFORMS** **9**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Convolution theorem – Parseval's identity.

**MODULE - VI Z-TRANSFORMS** **9**

Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, Erwin Kresizg, 9th Edition, John Wiley & Sons, 2006.
2. Advanced Modern Engineering Mathematics, Glyn James, 3rd Edition, Pearson Education, 2010.

**REFERENCES:**

1. Higher Engineering Mathematics, Dass, H.K., and Er. Rajnish Verma, S. Chand Private Ltd., 2011.
2. Higher Engineering Mathematics, B.S. Grewal, 44th Edition, Khanna Publishers, 2023.
3. Advanced Engineering Mathematics, Peter V. O'Neil, 7th Edition, Cengage learning, 2012.
4. An Introduction to Ordinary Differential Equations, E. A. Coddinton, Prentice Hall, 1961.
5. Higher Engineering Mathematics, Ramana. B.V., 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
6. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, Reprint 2008.

**WEB COURSES:**

1. http://archive.nptel.ac.in/courses/111/106/111106100/
2. https://nptel.ac.in/courses/111105134/ (Week-3 Complex Differentiation)
3. https://nptel.ac.in/courses/111105134 (Week 4 Complex Integration)
4. https://archive.nptel.ac.in/courses/111/106/111106111/
5. http://www.nptelvideos.com/course.php?id=90

**ONLINE RESOURSES:**

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/lecture-1-introduction/
2. https://ocw.mit.edu/courses/18-04-complex-variables-with-applications-spring-2018/

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Solve ordinary differential equations of second and higher order with constant coefficients, variable coefficients and simultaneous linear differential equations. (K3)
2. Construct an analytic function and apply the properties of analytic functions to check for harmonic and orthogonal functions and find the images of circle and straight lines under the standard transformations. (K3)
3. Use Cauchy's integral theorem, formula and Cauchy's Residue theorem to evaluate complex and real integrals, find the Taylor's and Laurent's series expansion. (K3)
4. Apply Laplace and inverse Laplace Transforms to solve the linear ordinary differential equations with constant coefficients. (K3)
5. Find Fourier transforms and Fourier sine and cosine transforms of simple functions. (K3)
6. Solve difference equations using Z-transforms. (K3)

**CO-PO, MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO3 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO4 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO6 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - |

# SEMESTER - II

| 24HSEN201<br>SDG NO. 4 | PROFESSIONAL ENGLISH | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**OBJECTIVES:**

- Acquire techniques for comprehending and critically analyzing passages
- Improve the communicative competence
- Enhance learners' ability to read and write complex texts, summaries, definitions and reports
- Write effective formal letters and reports

- Develop skills for preparing effective job application

**MODULE - I EFFECTIVE COMMUNICATION 6**

Listening – Listening to conversations – Speaking – making conversations in real life occurrences – Reading - short stories, happenings - Writing – autobiographical writing, preparation of checklist – communication and types of communication – Language Development –- subject - verb agreement, commonly confused words – spellings

**MODULE - II BASICS OF TECHNICAL WRITING 5**

Listening – listening to advertisements and products – Speaking - creating greetings/wishes/excuses and thanks – Reading – articles/novels - Writing - summary of articles, writing modes, formats, compositions - Language Development - reported speech, numerical adjectives

**MODULE - III REPORT WRITING 4**

Listening – listening to podcasts – Speaking - practicing telephonic conversations – observing and responding. Reading – regular columns of newspapers/magazines - Writing – reports – feasibility, accident, preparation of agenda and minutes – Language Development - cause & effect expressions, discourse markers

**MODULE - IV DIVERSE WRITING SKILLS 5**

Listening – documentaries, anecdotes and short stories - Speaking – expressing opinions using verbal and non-verbal communication – Reading biographies/autobiographies, travelog, – Writing – formal letters – inviting guests – acceptance/declining letters - Language Development- degrees of comparison – embedded sentences - acronyms and abbreviations

**MODULE - V CAREER COMPETENCIES 6**

Listening – expert talks – recommending suggestions & solutions – Speaking – Debate- participating in a group discussion – learning GD strategies – Reading – innovations, ideations - Writing – Job application, resume, – proposals – Language Development – verbal analogies – phrasal verbs

**MODULE - VI LEXICAL ENHANCEMENT 4**

Listening - technical and general talks - Speaking - oral presentation with visual aids - Reading - successful stories/autobiographies - Writing - writing blogs - Language Development - common errors in English, idiomatic expressions

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad 2016.
2. Raman, Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford University Press.

**REFERENCES:**

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. Routledge, New York,2011.
2. Raman, Meenakshi, Sharma, Sangeeta. Technical Communication. Principles and Practice. Oxford University Press, New Delhi, 2014.
3. Muralikrishnan & Mishra Sunitha, Communication skills for Engineers 2nd ed. Pearson, Tamil Nadu, India 2011. P. Kiranmai and Rajeevan, Geetha. Basic Communication Skills, Foundation Books, New Delhi, 2013.
4. Vesilind Aarne P., Public Speaking and Writing Skills for Engineering Students (2nd Ed), Lakeshore press, 2007
5. Richards, Jack C. Interchange Students' Book – 2. Cambridge University Press, New Delhi, 2015.

**WEB REFERENCES:**

1. https://swayam.gov.in/nd1_noc20_hs21/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/109106122/lec1.pdf
3. https://takelessons.com/en-in/search?service=English&sort=1&utm_

**ONLINE RESOURCES:**

1. https://www.coursera.org/specializations/improve-english?
2. https://www.fluentu.com/blog/educator-english/business-english-conversation-topics/

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Demonstrate an understanding of various types of communication and prepare effective checklists.(K2)
2. Summarize articles/ write ups (K2)
3. Construct feasibility reports, accident reports, survey reports and meeting minutes (K3)
4. Apply skills to compose official letters with emphasis and clarity (K3)

5. Compose job applications and technical proposals (K3)
6. Demonstrate the ability to express opinions in both oral and written forms of communication (K2)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | 3 | - | 3 | - | - |

# SEMESTER - II

| 24BSPH201<br>SDG NO. 4 | PHYSICS OF ELECTRONIC DEVICES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To acquaint the electrical properties of materials.
- To introduce the Optical properties of Materials
- To present the principles of semiconductor physics and its applications.
- To illustrate the properties and applications of nano devices
- To educate the properties of magnetic and dielectric materials and their uses.
- To acquaint the applications of switching and display devices

**MODULE - I ELECTRICAL PROPERTIES OF MATERIALS 8**

Classical free electron theory - Expression for electrical conductivity - Thermal conductivity expression - Wiedemann-Franz law - Success and failures - electrons in metals - Particle in a three dimensional box - degenerate states - Fermi- Dirac statistics - Density of energy states - Electron in periodic potential- Energy bands in solids – Electron effective mass- concept of hole.

**MODULE - II OPTICAL PROPERTIES OF MATERIALS 7**

Classification of optical materials- optical absorption and emission Process in Material charge generation and recombination- optical absorption loss and gain.– Optoelectronic devices-Solar cells –LED –Nonlinear optics- Modulators, switching devices Plasmonics (Qualitative)

**MODULE - III SEMICONDUCTOR AND TRANSPORT PHYSICS 8**

Semiconductors – Energy band diagram – direct and indirect band gap semiconductors –Intrinsic semiconductor– Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – PN -Junction Diode -Construction ,Working and Characteristics -Carrier transport in Semiconductors:, Mobility ,Drift and Diffusion Current densities.

**MODULE - IV NANO DEVICES 7**

Quantum Confinement-Quantum structures-Density of states in quantum well, wires, and dots(Quantitative)- Band Gap of Nano materials- Tunnelling-Single electron phenomena-Single electron transistor- Quantum DOT lasers-Conductivity of metallic nano wires-Carbon Nano Tubes(CNT):Structures, Properties and applications.

**MODULE - V MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS8**

Magnetism in materials - Magnetic field and induction - Magnetization - permeability and susceptibility - Types of magnetic materials - microscopic classification of magnetic materials Ferromagnetism-Domain Theory - Hysteresis phenomenon-solid state storage devices-Dielectric materials –Introduction-Types of Polarization (qualitative) - internal field - Clausius-Mossotti relation –dielectric loss - dielectric breakdown (definitions)-Dielectric constant measurement by Schering bridge method.

**MODULE - VI SWITCHING AND DISPLAY DEVICES 7**

Transistor - NPN, PNP working-Early effect-Current equations-Input and Output Characteristics of CB, CE and CC configurations-JFET and its characteristics-MOSFET and its characteristics- Construction and Working of D-MOSFET-UJT,SCR-CCD and Optocoupler. IoT concept and use in industry.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.

2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.
4. Dr.P.Mani. Physics for Electronic Devices, Dhanam Publications, 2024.

**REFERENCES:**

1. Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Education (Indian Edition), 2019.
3. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
4. N.Gershenfeld. The Physics of Information Technology. Cambridge University Press, 2011.

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Know basics of electrical properties of conducting materials (K2)
2. Acquire knowledge of optical properties of materials and devices (K2)
3. Understand the concepts of semiconductor physics and transport phenomena (K2)
4. Appreciate the importance of nanotechnology and nanodevices (K2)
5. Gain knowledge on the magnetic and dielectric properties of materials and their applications (K2)
6. Understanding the concept and working of Switching and Display Devices (K2)

**CO-PO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 3 |
| CO5 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 |
| CO6 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 |

# SEMESTER - II

| 24BSCY201<br>SDG NO. 4 | CHEMISTRY FOR ENVIRONMENT AND SUSTAINABILITY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To gain a comprehensive understanding of environmental science, the intricate relationships within ecosystems, and the crucial role of biodiversity conservation..
- To introduce the structure and components of the atmosphere, and provide an overview of the photochemical reactions involved.
- To foster a sound understanding of water quality parameters and water treatment techniques.
- To explore the various components of soil and understand the steps involved in Solid Waste Management (SWM).
- To advocate the benefits of renewable energy and promote awareness of sustainable energy practices. .
- To implement the principles of Green Chemistry in alignment with the Sustainable Development Goals (SDGs).

**MODULE - I INTRODUCTION TO ENVIRONMENTAL SCIENCE 8**

**Environment:** Definition, concept of environment and its components - scope and importance of environment – need for public awareness.

**Ecosystem:** Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, food chains and food webs. Biogeochemical cycles(C,N&P), Ecological succession.

**Biodiversity and its conservation:** Definition, types, importance of biodiversity, values and threats to biodiversity. Endangered and endemic species - concept and basis of identification of 'Hotspots'; hotspots in India. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation.

**MODULE - II ATMOSPHERIC CHEMISTRY 7**

Atmospheric Chemistry - Composition and structure of atmosphere. Climate change - greenhouse effect - role of greenhouse gases ($CO_2$, $CH_4$, $N_2O$, CFCs) on global warming. Chemical and photochemical reactions in the atmosphere - Formation of smog, PAN, acid rain (causes, effect and control measures). Oxygen and ozone chemistry - Ozone layer depletion (causes, effect and control measures).

**MODULE - III WATER CHEMISTRY** **8**

Importance and scope of water chemistry - Sources and impurities in water - Water Quality Parameters - Specifications as per WHO/BIS standards. Hardness of water, types, numerical problems on hardness of water. Softening of water - Internal treatment (Lime-soda, Phosphate, Calgon, Sodium Aluminate and Colloidal conditioning). External treatments: Ion exchange and Zeolite processes. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water by Reverse osmosis. Sustainable water management practices (water recycling and rainwater harvesting)

**MODULE - IV SOIL CHEMISTRY AND SOLID WASTE MANAGEMENT** **7**

**Soil Chemistry:** Chemical composition of soil, Acid-Base and Ion-Exchange Reactions in Soil, Soil acidity and salinity. Importance of NPK in Soil Fertility. Modern agriculture - Impacts of both excessive and insufficient fertilizer use, alongside the effects of pesticides on soil chemistry and the environment. Sustainable agriculture - Approaches to improve soil salinity (leaching, soil amendments, crop rotation), Design and use of green pesticides for sustainable farming.

**Solid Waste Management System:** Sources and types of solid waste, Elements of solid waste management, Methods of residential and commercial waste collection, Treatment / processing - Incineration, Composting, Landfill - Dumpsite rehabilitation.

**MODULE - V ENERGY AND ENVIRONMENT** **8**

Energy sources – Renewable and non-renewable energy sources. Principle and generation of solar energy (solar collectors, photo-voltaic modules, solar ponds), wind energy, geothermal energy; tidal energy, OTEC energy from biomass, biofuels, Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor – principles and types. Need for energy efficiency, Energy conservation and sustainability - action strategies for sustainable energy management from a future perspective.

**MODULE - VI GREEN CHEMISTRY AND SUSTAINABILITY** **7**

**Green Chemistry:** Introduction to green chemistry, Principles of Green Chemistry (12-principles), the concept of atom economy and chemical synthesis, Important techniques used in green chemistry. Application of green chemistry, viz. replacement of ozone depleting substances including CFCs, manufacture of biodegradable polymers, use of H2O2 as benign bleaching agents in the paper industry.

**Sustainable Development:** Definition and concepts of sustainable development, Need for sustainable development; Sustainable development

goals – 17 SDG goals.

**Sustainable practices:** Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment and Environmental Impact Assessment.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. Ravikrishnan A, 'Environmental Science and Engineering', Sri Krishna Hitech Publishing Company Pvt. Ltd, Revised Edition 2020.
4. Vogel's Textbook of Quantitative Chemical Analysis (8th edition,2014).

**REFERENCES:**

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies'', Universities Press(I) PVT, LTD, Hyderabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
4. Chemistry for Environmental Engineering, Clair N. Sawyer, Perry L. Mc Carty, Gene F. Parkin, 4th Edition, McGraw-Hill.

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Develop a foundational understanding of environmental science, the interactions within ecosystems, the significance of biodiversity, and the importance of conservation strategies for maintaining ecological balance. (K3)
2. Identify the primary components of the atmosphere, explain the causes of atmospheric pollution, and propose basic strategies to promote a sustainable and clean atmosphere. (K3)
3. Demonstrate complex water quality parameters, and develop innovative methods for producing cost-effective soft water suitable for both industrial use and potable consumption. (K3)
4. Describe the composition and functions of soil components, analyze the sources and characteristics of solid wastes, and evaluate the methods and strategies employed in solid waste management (SWM). (K3)

5. Explain renewable and non-renewable resources, describe various methods for harnessing energy from different sources and explain their applications in various contexts. (K3)
6. Illustrate a comprehensive understanding of green chemistry principles and their alignment with sustainable development goals, preparing them to contribute to environmentally friendly and sustainable practices in their future careers.(K3)

**CO-PO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 1 |
| CO5 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO6 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |

# SEMESTER - II

| 24ECPC201<br>SDG NO. 4 & 9 | CIRCUIT ANALYSIS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To learn the basic concepts and behavior of DC and AC circuits.
- To understand various methods of circuit analysis using network theorems, duality and topology.
- To learn the concept of coupling in circuits.
- To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
- To learn the concepts of two port networks.

**MODULE I BASIC CIRCUIT ANALYSIS 9**

Ohm's Law – Kirchhoff's laws –Mesh current and node voltage method of analysis for D.C and A.C. circuits.

**MODULE II NETWORK TOPOLOGY 5**

Network reduction: voltage and current division, source transformation – star delta conversion.Network terminology – Graph of a network - Incidence and reduced incidence matrices – Trees –Cut sets - Fundamental cut sets – Cut set matrix – Tie sets - Link currents and Tie set schedules -Twig voltages and Cut set schedules, Duality and dual networks.

**MODULE III NETWORK THEOREMS FOR DC AND AC CIRCUITS 9**

Network theorems -Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem.

**MODULE IV RESONANCE AND COUPLED CIRCUITS 7**

Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency -Variation in current through and voltage across L and C with frequency – Bandwidth - Q factor -Selectivity. Self-inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multi-winding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

**MODULE V TRANSIENT ANALYSIS 9**

Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation.

**MODULE VI TWO PORT NETWORKS 6**

Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks.

**TOTAL PERIODS : 45**

**TEXT BOOKS:**

1. William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", McGraw Hill Science Engineering, 8th Edition, 11th Reprint, 2016.
2. Joseph Edminister and Mahmood Nahvi, "Electric Circuits||, Schaum's Outline Series", Tata McGraw Hill Publishing Company, New Delhi, 5th Edition Reprint 2016.

**REFERENCES:**

1. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", 5th Edition, McGraw Hill, 9th Reprint, 2015.

2. A.Bruce Carlson, "Circuits: Engineering Concepts and Analysis of Linear Electric Circuits", Cengage Learning, India Edition, 2nd Indian Reprint, 2009.
3. Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, 5th Edition, 1st Indian Reprint, 2013.
4. EuoF.F., "Network Analysis and Synthesis", Wiley International Edition, 2nd Edition, 1996.
5. Sudhakar and Shyammohan,"Network Analysis & Synthesis".

**WEB RESOURCES:**

1. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic
2. http://homepages.wmich.edu/~miller/ECE2100.html
3. https://engineering.purdue.edu/~ee202https://engineering.purdue.edu/~ee202

**ONLINE RESOURCES:**

1. https://onlinecourses.nptel.ac.in/noc17_ee13/preview
2. https://www.coursera.org/learn/linear-circuits-dcanalysis
3. https://onlinecourses.nptel.ac.in/noc17_ee15/preview
4. https://swayam.gov.in/course/218-networks-and-systems

**OUTCOMES:**

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

1. Analyze and solve both DC and AC circuits using Ohm's Law, Kirchhoff's Laws, Mesh Current Method, and Node Voltage Method to determine voltages, currents, and power in electrical circuits.(K3)
2. Apply network reduction techniques and network topology principles to analyze electrical circuits, including voltage and current division, source transformations, star-delta conversions, and graphical network representations. (K2)
3. Apply the concepts of Superposition, Thevenin's, Norton's, Reciprocity, Mill man andMaximum power transfer theorems to analyze various dc and ac electric circuits. (K3)
4. Characterize the frequency response of series & parallel resonance circuits, single and double tuned circuits and apply the concept of inductance, coupling to solve electric circuits. (K3)
5. Characterize the transient response analysis of RL, RC and RLC circuits for standardtest signals like step, impulse, exponential and sinusoidal signals. (K2)

6. Implement two port Z, Y, ABCD and h parameter equivalent models for electriccircuits and compare the symmetrical properties of T and π Networks. (K3)

**CO – PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO4 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO5 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |
| CO6 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 |

# SEMESTER - II

| 24HSTA201<br>SDG NO. 4 | TAMILS AND TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**OBJECTIVES:**

- Understand the techniques that help for a better livelihood
- Identify the methods used for scientific Tamil computing

**UNIT - I WEAVING AND CERAMIC TECHNOLOGY 3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT - II DESIGN AND CONSTRUCTION TECHNOLOGY 3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**UNIT - III MANUFACTURING TECHNOLOGY 3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

**UNIT - IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

**UNIT - V SCIENTIFIC TAMIL & TAMIL COMPUTING 3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

**TOTAL : 15 PERIODS**

**TEXT-CUM-REFERENCE BOOKS**


1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2 கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3 கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.


# தமிழர் மரபு

**அலகு - I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: 3**

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

**அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: 3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க கொலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும்

நடுகல்லும் ___ சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் கொலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

**அலகு - III உற்பத்தித் தொழில் நுட்பம்: 3**

கப்பல் கட்டும் கலை -உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணொடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**அலகு - IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: 3**

அணை, ஏரி, குளங்கள், மதகு -சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் ___ பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

**அலகு - V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: 3**

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூ லகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

**TOTAL : 15 PERIODS**

**TEXT-CUM-REFERENCE BOOKS**


1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

**OUTCOMES:**

**Upon completion of the course, the learners will be able to:**

1. Understand Weaving and Ceramic Technology during Sangam Age (K2)
2. Explore about Design & Construction of House and Temples during Sangam Age (K2)
3. Appreciate Manufacturing Technology of Tamils (K2)
4. Perceive Agriculture and Agro-processing during Sangam Age (K2)
5. Comprehend Ancient Knowledge of Ocean & Fisheries(K2)
6. Understand the Scientific Tamil & Tamil Computing (K2)

**CO- PO, PSO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO2 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO3 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO4 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO5 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |
| CO6 | 3 | - | - | - | - | 3 | - | - | - | - | - | 3 | - | - |

# SEMESTER - II

| 24HSNC201<br>SDG NO. 4 | NCC COURSE LEVEL 1 | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 |

**ARMY WING**

**NCC GENERAL** **6**

| | | |
|---|---|---|
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |

**NATIONAL INTEGRATION AND AWARENESS** **4**

| | | |
|---|---|---|
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |

**PERSONALITY DEVELOPMENT** **7**

| | | |
|---|---|---|
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |

**LEADERSHIP** **5**

| | | |
|---|---|---|
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |

**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** **8**

| | | |
|---|---|---|
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL: 30 PERIODS**

**NAVAL WING**

| | | |
|---|---|---|
| **NCC GENERAL** | | **6** |
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |
| **NATIONAL INTEGRATION AND AWARENESS** | | **4** |
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |
| **PERSONALITY DEVELOPMENT** | | **7** |
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |
| **LEADERSHIP** | | **5** |
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |
| **SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** | | **8** |
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL: 30 PERIODS**

**ARMY WING**

| | | |
|---|---|---|
| **NCC GENERAL** | | **6** |
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |

| | | |
|---|---|---|
| **NATIONAL INTEGRATION AND AWARENESS** | | **4** |
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |
| **PERSONALITY DEVELOPMENT** | | **7** |
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |
| **LEADERSHIP** | | **5** |
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |
| **SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** | | **8** |
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL: 30 PERIODS**

# SEMESTER - II

| 24ESGE102<br>SDG NO. 4,9,12 | ENGINEERING PRACTICES LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To provide exposure to the students with hands-on experience on various basic engineering practices in Electrical and Electronics Engineering, Civil and Mechanical Engineering.

**ELECTRICAL ENGINEERING PRACTICE**

1. Residential house wiring using switches, fuse, indicator, lamp, and energy meter.

2. Fluorescent lamp wiring.
3. Staircase wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

**ELECTRONICS ENGINEERING PRACTICE**

1. Study of Electronic components and equipment – Resistor- colour coding, measurement of AC signal parameter (peak-peak RMS, period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR, and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices, and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of Half Wave Rectifier and Full Wave Rectifier.
6. Simulation of Half Wave Rectifier and Full Wave Rectifier using TinkerCAD.

**CIVIL ENGINEERING PRACTICE**

**Buildings:**

Study of plumbing and carpentry components of residential and industrial buildings, safety aspects.

**Plumbing Works:**

1. Study of pipeline joints, its location and functions: valves, taps, couplings,unions, reducers, elbows in household fittings.
2. Study of pipe connections requirements for pumps and turbines.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
5. Demonstration of plumbing requirements of high-rise buildings.

**Carpentry using Power Tools only:**

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

**MECHANICAL ENGINEERING PRACTICE**

**Welding:**

1. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
2. Gas welding demo practice.

**Basic Machining:**

1. Simple Turning and Taper turning.
2. Drilling Practice.

**Sheet Metal Work:**

1. Forming & Bending.
2. Model making – Trays and funnels.
3. Different type of joints.

**Demonstration on:**

1. Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models.

**TOTAL: 60 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

**ELECTRICAL**

| | |
|---|---|
| 1. Assorted electrical components for house wiring | 15 Sets |
| 2. Electrical measuring instruments | 10 Sets |
| 3. Study purpose items: | |
| Iron box, fan and regulator, emergency lamp | 1 Each |
| 4. Megger (250V/500V) | 1 No |
| 5. Power Tools: | |
| Range Finder | 2 Nos |
| Digital Live-wire detector | 2 Nos |

**ELECTRONICS**

| | |
|---|---|
| 1. Soldering guns | 10 Nos |
| 2. Assorted electronic components for making circuits | 50 Nos |

| | |
|---|---|
| 3. Small PCBs | 10 Nos |
| 4. Multimeters | 40 Nos |

**CIVIL**

| | |
|---|---|
| 1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. | 15 Sets |
| 2. Carpentry vice (fitted to work bench). | 15 Nos |
| 3. Standard woodworking tools. | 15 Sets |
| 4. Models of industrial trusses, door joints, furniture joints | 5 each |
| 5. Power Tools: | |
| Rotary Hammer | 2 Nos |
| Demolition Hammer | 2 Nos |
| Circular Saw | 2 Nos |
| Planner | 2 Nos |
| Hand Drilling Machine | 2 Nos |
| Jigsaw | 2 Nos |

**MECHANICAL**

| | |
|---|---|
| 1. Arc welding transformer with cables and holders | 5 Nos |
| 2. Arc welding transformer with cables and holders | 5 Nos |
| 3. Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 Sets |
| 4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. | 2 Nos |
| 5. Centre lathe. | 2 Nos |
| 6. Hearth furnace, anvil and smithy tools. | 2 Sets |
| 7. Moulding table, foundry tools. | 2 Sets |
| 8. Power Tool: Angle Grinder. | 2 Nos |
| 9. Study-purpose items: centrifugal pump, air-conditioner. | 1 each |

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Infer the values of resistance, peak to peak RMS values, time period, frequency. [K2]
2. Outline the logic gates, rectifier, timer circuits and soldering practices. [K2]
3. Demonstrate the measurement of electrical parameters such as voltage, current, resistance, power and energy. (K2)

4. Illustrate the residential wiring, staircase wiring and fluorescent lamp wiring.[K2]
5. Prepare the carpentry and plumbing joints. (K2)
6. Perform the basic operations of welding, sheet metal work and basic machining operations in Lathe and Drilling (K2)

**CO-PO, PSO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - | 3 | 2 |
| CO2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - | 3 | 2 |
| CO3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - | 3 | 2 |
| CO4 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 3 | 2 |
| CO5 | 2 | - | - | - | - | - | - | 2 | - | - | - | - | 2 | 2 |
| CO6 | 2 | - | - | - | - | - | - | 2 | - | - | - | - | 2 | 2 |

# SEMESTER - II

| 24ENTP201<br>SDG NO. 4 | DIGITAL DYNAMICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 |

**OBJECTIVES:**

- Explore online communication
- Master computer skills
- Use virtual platforms
- Understand digital ethics and cyber security
- Observe and follow do's and don'ts

**MODULE - I DIGITAL CULTURE AND SOCIETY** **6**

Adapting to changes
Importance in today's digital landscape
Digital identity and self- presentation
Online communities and forums
Digital divide and consequences
Online collaboration and collective action

**MODULE - II DIGITAL LITERACY AND ACCESS TO TECHNOLOGY 5**

Computer skills
Social and cultural understanding
Social media campaign and Activism
Netiquettes
Trending Technologies
Digital tools and softwares

**MODULE - III DIGITAL ETHICS 3**

Digital ethics and moral panics
The art of protecting secrets
Overview of digital tools

**MODULE - IV CYBER SECURITY 3**

Threats, vulnerability and consequences
Data making and usage practice
Importance of security

**MODULE - V DIGITAL NETWORKING 7**

Remote work and virtual teams
Authenticity in digital interactions
Engaging content creation
Tools and and techniques for insightful usage
Balancing online and offline interactions
Collaboration for research and innovation

**MODULE - VI BUREAU OF INDIAN STANDARDS (BIS): BASIC CONCEPTS, STANDARDS FORMATION PROCESS AND CHALLENGES 6**

**Standardization –Basic Concepts:**

Basic concepts of standardization

Purpose of standardization, marking and certification of articles and processes

Importance of standards to industry, policy makers, trade, sustainability and innovation

**Standards Formulation Process and Challenges:**

Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO/ IEC Directives

WTO Good Practices for Standardization

**World of Standards:**

Important Indian and International Standards

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Communication Skills and Soft Skills – an Integrated Approach. Edited by E. Sureshkumar, P. Sreehari and J. Savithri, Pearson.
2. Silvia. P.J.2007. How to Read a Lot. Washington DC, American Psychological Association.

**WEB REFERENCES:**

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Demonstrate basic understanding of effective online communication techniques (K1)
2. Show and utilize fundamental computer skills (K1)
3. Comprehend and apply the use of virtual platforms to enhance communication reachability (K2)
4. Understand and implement principles of digital ethics (K2)
5. Use basic technologies for securing data and maintaining information integrity (K1)
6. Understand the importance of standardization and adhere to BIS (K2)

**CO-PO, PSO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - | - |

# SEMESTER - II

| 24ESID201<br>SDG NO. 1-17 | IDEA ENGINEERING LAB - II | L | T | P | CP | C |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 2 | 1 |

**OBJECTIVES:**

To impart the basics of technologies that are used to identify sustainable solutions to societal problems

- To Provide awareness on Printed Circuit Board (PCB) design using ORCAD software.
- To Raise awareness of at least three Internet of Things (IoT) projects and their applications.
- To Upskill learners through practical experience with 3D printing and scanning technologies.
- To prepare the learners to correctly align the ideas to SDGs
- To comprehensive knowledge on entrepreneurship and effective idea presentation techniques.
- To evaluate the effectiveness and implementation strategy of SDGs through SCOUT for SDGs

**MODULE-1 BASICS OF DESIGN THINKING IN ELECTRICAL AND ELECTRONIC COMPONENTS 4**

- Awareness Session on Basics of Design Thinking
- Study of Active & Passive Electronic Components
- Study of Basic AC & DC Electrical Circuits
- Study of Microprocessors & Microcontrollers
- Demonstration of Arduino Board, ESP 32 Board ,Raspberry Pi Board & PCB design software-Eagle
- Demonstration of PCB design using the software's Orcad, Eagle etc.

**MODULE-2 EMBEDDED SYSTEMS, IOT AND ROBOTICS 4**

- Study of sensors and transducers
- Study of embedded protocols
- Study of IOT protocols
- Demonstration of applications using embedded C
- Demonstration of robotic models
- Demonstration of drone models

**MODULE-3 BASICS OF MECHANICAL ENGINEERING 4**

- Study of mechanical modeling using fusion 360
- Demonstration of 3D scanner
- Demonstration of 3D printer
- Demonstration of laser cutter and RD works software
- Study of slicer software
- Study of master cam software

**MODULE 4 ALIGNMENT AND MAPPING OF IDEAS 4**

- Project Title: Problem Statement, solution and justification for SDG and SAP

**MODULE-5 ENTREPRENEURSHIP SKILLS 4**

- Startup Awareness
- Entrepreneurship Opportunities
- Mock Presentations
- Innovation
- Novelty Feasibility
- Presentation Skills

**MODULE-6 SCOUT for SDGs 4**

History of Scouting and Guiding - Introduction to Rovering and Rangering - Education objectives - Different Sections of Scouting- Bunnies, Cubs-Bulbuls, Scouts-Guides, Rovers-Ranger

**Promise and Law:** Scouting and Guiding with meaning to each point-how a boy and girl implement it on the daily life, saving life, Duties as citizens.

**Leadership Skills:** Mindsets of Leadership, Carrier Council. Community Service: Meaning, Types, duration, difference between community Service and Community Development.

**Sairam SDG Ideathon 6**

- Preparedness of Ideathon
- Idea Pitching

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education,2019
3. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan

Publishing House 4. Basic Mechanical Engineering by Pravin Kumar, Pearson Education
5. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
6. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2017.
7. JohnJ.Craig ,Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.
8. Scouts Hand Book

**WEB REFERENCES**

1. https://onlinecourses.nptel.ac.in/noc24_ee112/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs115/preview
3. https://onlinecourses.nptel.ac.in/noc24_me104/preview
4. https://onlinecourses.nptel.ac.in/noc24_me88/preview
5. http://sdgs.scout.org

**OUTCOMES:**

**Upon completion of the course, the student will be able to:**

1. Gain the knowledge on Basic Electronics & Electrical Circuits (K2)
2. Understand the Basics of Embedded systems, IOT & Robotics (K1)
3. Explore the Basics of Mechanical Modeling (K2)
4. Interpret the mapping of SDGs to ideas. (K2)
5. Comprehend the guidance for the Idea presentation and to Innovate the ideas for market opportunities (K2)
6. Understand the scouting as a way of life for community development and illustrate the ideas for Ideathon event emphatically (K4)

**CO-PO, PSO MAPPING:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | Po11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | 2 | 2 | - | 2 | - | 2 |
| CO2 | 3 | - | - | - | - | 2 | 2 | - | 2 | - | 2 |
| CO3 | 3 | - | - | - | - | 2 | 2 | - | 2 | - | 2 |
| CO4 | 3 | - | - | - | - | 2 | 2 | - | 2 | - | 2 |
| CO5 | 3 | - | - | - | - | 2 | 2 | - | 2 | - | 2 |
| CO6 | 2 | 2 | - | - | 2 | 2 | 2 | - | 2 | - | 2 |

*Imagine the Future and*

# *Make it happen!*

Together let's build a better world where there is NO POVERTY and ZERO HUNGER.

We have GOOD HEALTH AND WELL BEING QUALITY EDUCATION and full GENDER EQUALITY everywhere.

There is CLEAN WATER AND SANITATION for everyone. AFFORDABLE AND CLEAN ENERGY

which will help to create DECENT WORK AND ECONOMIC GROWTH. Our prosperity shall be fuelled

by investments in INDUSTRY, INNOVATION AND INFRASTRUCTURE that will help us to

REDUCE INEQUALITIES by all means. We will live in SUSTAINABLE CITIES AND COMMUNITIES.

RESPONSIBLE CONSUMPTION AND PRODUCTION will help in healing our planet.

CLIMATE ACTION will reduce global warming and we will have abundant,

flourishing LIFE BELOW WATER, rich and diverse LIFE ON LAND.

We will enjoy PEACE AND JUSTICE through STRONG INSTITUTIONS

and will build long term PARTNERSHIPS FOR THE GOALS.

*For the goals to be reached, everyone needs to do their part: governments, the private sector, civil society and* **People like you.**

*Together we can...*

Sai Prakash Leo Muthu

*Chairman & CEO – Sairam Institutions*

*We build a Better nation*
*through Quality education.*

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