# K.L.N. COLLEGE OF ENGINEERING

## Pottapalayam-630612, Sivagangai District

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

**Estd: 1994**

# FIRST AND SECOND YEAR

# CURRICULUM AND SYLLABUS

## REGULATIONS 2024

## For Under Graduate Program

# B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

## CHOICE BASED CREDIT SYSTEM

**(For the students admitted from the Academic Year 2025 - 2026 onwards)**

Dr.S.M.KANNAN,
Professor & Head,
Department of Electrical & Electronics Engineering,
K.L.N. College of Engineering,
Pottapalayam, Sivaganga – 630612

# K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**

## VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society

## MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry**.**

## VISION OF THE DEPARTMENT

To become high standard of excellence in education, training, and research in the field of Electrical and Electronics Engineering and allied applications.

## MISSION OF THE DEPARTMENT

1. To create graduates possessing excellent knowledge in the fundamentals of Electrical and Electronics Engineering.
2. To produce industry-ready and employable graduates capable of undertaking high-quality research.
3. To emphasize ethics and professional conduct for societal development.

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## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**PEO1** To excel in industrial practice or graduate studies in Electrical and Electronics Engineering and allied fields.

**PEO2** To practice their profession in accordance with ethical values and environmentally friendly policies.

**PEO3** To work effectively in international and multidisciplinary environments.

**PEO4** To successfully adapt to evolving technologies and remain current in their professional careers.

## PROGRAM SPECIFIC OUTCOMES(PSOs)

**PSO1** Apply the fundamentals of mathematics, science, and engineering knowledge to identify, formulate, design, and investigate complex engineering problems related to electric circuits, analog and digital electronic circuits, electrical machines, and power systems.

**PSO2** Apply appropriate techniques and modern engineering hardware and software tools in power systems to engage in lifelong learning and successfully adapt to multidisciplinary environments.

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## Knowledge and Attitude Profile (WK)

**WK1:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

**WK2:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

**WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

**WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice are as in the engineering discipline; much is at the forefront of the discipline.

**WK5:** Knowledge, Including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

**WK6:** Knowledge of engineering practice (technology) in the practice is as in the engineering discipline.

**WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

**WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

**WK9:** Ethics, inclusive behavior and conduct - Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

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## Program Outcomes (POs)

**PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

**PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

**PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

**PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

**PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

**PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

**PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

**PO8: Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

**PO10:Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**PO11:Life-LongLearning:**
Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

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# REGULATIONS 2024

## For Under Graduate Program

## B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

## CHOICE BASED CREDIT SYSTEM

### CATEGORY OF COURSES

i. **Humanities Social Sciences and Management (HSM) courses** include Technical English, Foreign Language, Engineering Ethics and Human Values, Communication skills, Entrepreneurship, Physical Education and Environmental Sciences and Sustainability

ii. **Basic Sciences (BS) courses** include Mathematics, Physics, Chemistry, etc.

iii. **Engineering Sciences (ES) courses** include Industrial Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering, Instrumentation etc.

iv. **Professional Core (PC) courses** include the core courses relevant to the chosen specialization/branch.

v. **Professional Elective (PE) courses** include the elective courses relevant to the chosen specialization / branch.

vi. **Open Elective (OE) courses** include the courses from other branches which a student can choose from the list specified in the curriculum of B.E. / B. Tech. Programmes.

vii. **Employability Enhancement Courses (EEC)** include Project Work, Internship, Creative and Innovative Project, Seminar, Professional Practices, Industrial/Practical Training.

viii. **Mandatory Courses (MC)** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

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## REGULATIONS 2024
## CHOICE BASED CREDIT SYSTEM
## B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

### SEMESTER I

(Common to all B.E/B.Tech Programmes)

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| | | **Induction program** | | | | | | |
| **THEORY** | | | | | | | | |
| 1. | 24HS101 | Professional English - I | HS | 2 | 2 | 0 | 0 | 2 |
| 2. | 24BS101 | Engineering Mathematics | BS | 4 | 3 | 1 | 0 | 4 |
| 3. | 24BS102 | Engineering Physics | BS | 3 | 3 | 0 | 0 | 3 |
| 4. | 24BS103 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 5. | 24GE101 | Problem solving and C Programming | ES | 3 | 3 | 0 | 0 | 3 |
| 6. | 24GE102 | Engineering Graphics | ES | 3 | 2 | 1 | 0 | 3 |
| 7. | 24HST01 | தமிழர்மரபு /Heritage of Tamils | HS | 1 | 1 | 0 | 0 | 1 |
| **PRACTICAL** | | | | | | | | |
| 8. | 24BS1L1 | Basic Science Laboratory | BS | 4 | 0 | 0 | 4 | 2 |
| 9. | 24GE1L1 | C Programming laboratory | ES | 4 | 0 | 0 | 4 | 2 |
| 10. | 24HS1L1 | English Laboratory | HS | 2 | 0 | 0 | 2 | 1 |
| **TOTAL** | | | | **29** | **17** | **2** | **10** | **24** |

### SEMESTER II

| S.No | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 24BS201 | Advanced Calculus (Common to B.E. Mech, EEE & ECE) | BS | 4 | 3 | 1 | 0 | 4 |
| 2. | 24BS203 | Physics for Electronics and Devices | BS | 3 | 3 | 0 | 0 | 3 |
| 3. | 24HS202 | Environmental Sciences and Sustainability | HS# | 2 | 2 | 0 | 0 | 2 |
| 4. | 24GE201 | Python Programming | ES# | 3 | 3 | 0 | 0 | 3 |
| 5. | 24EE201 | Electric Circuit Theory | PC | 3 | 2 | 1 | 0 | 3 |
| 6. | 24HST02 | தமிழரும்தொழில்நுட்பமும் / Tamils and Technology | HS# | 1 | 1 | 0 | 0 | 1 |
| **THEORY CUM PRACTICAL** | | | | | | | | |
| 7. | 24HS201 | Professional English –II | HS# | 4 | 2 | 0 | 2 | 3 |
| **PRACTICAL** | | | | | | | | |
| 8. | 24EE2L1 | Electric Circuits Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| 9. | 24GE2L1 | Python Programming Laboratory | ES# | 3 | 0 | 0 | 3 | 1.5 |
| 10. | 24GE2L2 | Industrial practices Workshop | ES# | 3 | 0 | 0 | 3 | 1.5 |
| 11. | 24HS2L1 | Aptitude and Soft Skills–I | EEC# | 2 | 0 | 0 | 2 | 1* |
| 12. | 24HS2L2 | Physical Education - I | HS# | 2 | 0 | 0 | 2 | 1* |
| **TOTAL** | | | | **34** | **16** | **2** | **16** | **24** |

# Common to all B.E. / B.Tech programmes

*The grades earned by the students will be recorded in the mark sheet, however the same shall not be Considered for the computation of CGPA

**SEMESTER III**

| S. NO | COURSE CODE | COURSETITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 24BS301 | Transforms and Partial Differential Equations (Common to Mechanical & EEE programmes) | BS | 4 | 3 | 1 | 0 | 4 |
| 2. | 24EE301 | Digital Logic Circuits | PC | 3 | 3 | 0 | 0 | 3 |
| 3. | 24EE302 | Electronic Devices and Circuits | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 24EE303 | Electromagnetic Theory | PC | 4 | 3 | 1 | 0 | 4 |
| 5. | 24EE304 | DC Machines and Transformer | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | 24HS301 | Human Values and Ethics (Common to all B.E./B.Tech. programmes) | HS | 2 | 1 | 1 | 0 | 2 |
| 7. | | Foreign Language (Common to all B.E./B.Tech. programmes) | HS | 2 | 2 | 0 | 0 | - |
| **PRACTICAL** | | | | | | | | |
| 8. | 24EE3L1 | Electronics Laboratory | PC | 3 | 0 | 0 | 3 | 1.5 |
| 9. | 24EE3L2 | Electrical Machines Laboratory – I | PC | 3 | 0 | 0 | 3 | 1.5 |
| 10. | 24HS3L1 | Aptitude and Soft Skills –II (Common to all B.E./B.Tech. programmes) | EEC | 2 | 0 | 0 | 2 | 1* |
| 11. | 24HS3L2 | Physical Education – II (Common to all B.E./B.Tech. programmes) | HS | 2 | 0 | 0 | 2 | 1* |
| **TOTAL** | | | | **31** | **18** | **3** | **10** | **22** |

**SEMESTER IV**

| S. NO | COURSE CODE | COURSETITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 24BS401 | Probability, Statistics and Numerical Methods (Common to B.E Mech & EEE programmes) | BS | 4 | 3 | 1 | 0 | 4 |
| 2. | 24EE401 | Synchronous and Asynchronous Machines | PC | 4 | 3 | 1 | 0 | 4 |
| 3. | 24EE402 | Transmission and Distribution | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 24EE403 | Linear Integrated Circuits | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | 24EE404 | Measurements and Instrumentation | PC | 3 | 3 | 0 | 0 | 3 |
| 6. | 24EE405 | Artificial Intelligence and Applications | PC | 3 | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | | | |
| 7. | 24EE4L1 | Electrical Machines Laboratory– II | PC | 3 | 0 | 0 | 3 | 1.5 |
| 8. | 24EE4L2 | Linear and Digital Integrated Circuits Laboratory | PC | 3 | 0 | 0 | 3 | 1.5 |
| 9. | 24EE4L3 | Micro Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 10. | 24HS4L1 | Aptitude and Soft Skills –III (Common to all B.E./B.Tech. programmes) | EEC | 2 | 0 | 0 | 2 | 1* |
| **TOTAL** | | | | **30** | **18** | **2** | **10** | **24** |

*** The grades earned by the students will be recorded in the grade sheet, however the same shall not be considered for the computation of CGPA**

| 24HS101 | PROFESSIONAL ENGLISH – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**OBJECTIVES:**

- To improve the communicative competence of learners.
- To learn to apply basic grammatical structures in appropriate contexts.
- To acquire lexical competence, use them appropriately in sentences, and comprehend their meaning in a text.
- To help learners use language effectively in professional contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

**PRE-REQUISITE: NIL**

**UNIT-I Introduction to Effective Communication 6**

Exploring the Elements of Effective Communication through various Activities - Unveiling the Significance of Effective Communication in Academic, Research, and Professional Achievements -Dissecting the Seven Components Integral to Effective Communication - Analyzing the Characteristics of Effective Writing - Enhancing English Language and Communication Skills for Optimal Course Outcome

**Introduction to Fundamentals of Communication**

**Reading –** Reading Brochures (Technical Context) – Telephone Messages / Social Messages. **Writing –** Email to MNC's (Requesting for IV, Internship, and Requesting HR for College Function, Internal & External Business Communication) - Letter to the Principal (Requesting Bona-fide Certificate, Getting Original Certificate, etc.,) **Grammar –** Present Tense – Questions Types. **Vocabulary** – Technical Vocabulary.

**UNIT-II Narration and Summation 6**

**Reading** – Biographies. **Writing –** Guided Writing – Paragraph Writing – Travel & Technical Blogs – Report on Events. **Grammar** – Simple Past Tense – Concord. **Vocabulary** – Word Formation – Prefix, Suffix and Roots

**UNIT-III Description of a Process / Product 6**

**Reading** – Project Reviews – User Manuals. **Writing –** Definitions – Instructions – Process Description. **Grammar –** Modals. **Vocabulary** – Compound Nouns – Voices

**UNIT- IV Classification and Recommendations 6**

**Reading** – Newspaper Articles, Note Taking. **Writing –** Inference – Charts, Diagrams, Tables – Note Making – Recommendations. **Grammar –** Articles – Possessive & Relative Pronouns – Degrees of Comparison.

**UNIT-V Expression 6**

**Reading** – Opinion Blogs. **Writing –** Essay Writing – Descriptive Writing - Social Issues (Public Transportation, Drinking Water) - Narrative Writing (Cyber Crime, Experience of First Semester). **Grammar –** Future Tense – Punctuation – Cause & Effect – Discourse Markers.

**CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. VeenaSelvam, Dr. SujathaPriyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

**REFERENCES:**

1. Technical Communication – Principles And Practices By Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English for Technical Communication (With CD) By AyshaViswamohan, Mcgraw Hill Education, ISBN: 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.
6. A Course in Technical English by Mr. D. Praveen Sam, KN Shoba, Cambridge University Press, 2020, India.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :PROFESSIONAL ENGLISH – I** | | **COURSE CODE : 24HS101** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C101.1** | Remember and use appropriate words in a professional context in precise and efficient way on technological contexts | I-V | AD |
| **C101.2** | Form situational conversations and technical writing styles for interpersonal and effective communication | I-V | AD |
| **C101.3** | Gain understanding of basic grammatical structures and use them in right context | I-V | AD |
| **C101.4** | Read and infer the denotative and connotative meanings of technical texts | I-V | AD |
| **C101.5** | Write definitions, descriptions, narrations and essays on various topics | I-V | AD |

| **24BS101** | **ENGINEERING MATHEMATICS** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **3** | **1** | **0** | **4** |

**OBJECTIVES:**

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- To achieve conceptual understanding and to retain the best traditions of Calculus.
- To provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

**UNIT - I MATRICES 9+3**

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem(without proof) – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

**UNIT - II DIFFERENTIAL CALCULUS 9+3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable.

**UNIT - III FUNCTIONS OF SEVERAL VARIABLES 9+3**

Partial differentiation – Homogeneous functions and Euler's theorem(without proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

**UNIT - IV INTEGRAL CALCULUS 9+3**

Definite and Indefinite integrals - Substitution rule - Techniques of integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions, Improper integrals.

**UNIT - V ORDINARY DIFFERENTIAL EQUATIONS 9+3**

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Veerarajan. T., "Engineering Mathematics I", The Tata McGraw Hill Publication-New Delhi, First Edition, 2018.

**REFERENCES:**


1. James Stewart, “Calculus, Early Transcendental”, Cengage Learning, 7th Edition, New Delhi, 2015. [For units II & III].
2. Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons, 9th Edition, New Delhi, 2006.
3. Wiley, “Calculus- International Student version”, 10th Edition, Wiley India Pvt. Ltd, New Delhi 2017.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.
5. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics II”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 9th Edition, 2014.


**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME : ENGINEERING MATHEMATICS** | | **COURSE CODE : 24BS101** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C102.1** | Determine the Eigen values, Eigen vectors to diagonalize a matrix and reduce quadratic form to canonical form. | I | K3 |
| **C102.2** | Apply the concepts of Concavity, Convexity to determine the critical points, point of Inflection, Maxima and Minima of Single variable functions. | II | K3 |
| **C102.3** | Compute the derivatives of functions of two variables and apply them to calculate the maxima and minima. | III | K3 |
| **C102.4** | Determine integrals using techniques of integration, such as substitution, partial fractions and integration by parts | IV | K3 |
| **C102.5** | Apply the various techniques to solve higher order differential equations with constant and variable coefficients. | V | K3 |

| 24BS102 | ENGINEERING PHYSICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To inculcate properties of matter and characteristics of electromagnetic waves.
- To introduce the basics of LASER, fiber optics and crystallography.
- To enhance the knowledge on importance and applications of quantum physics.

**UNIT - I PROPERTIES OF MATTER 9**

Elasticity – Hooke's Law – Stress-Strain diagram and its uses – three modulus of elasticity (qualitative) – Poisson's ratio – Factors affecting elastic modulus and tensile strength – Twisting couple – Torsional pendulum: theory and experiment – Bending of beams – Bending moment –Cantilever: theory and experiment – Uniform and Non-uniform bending – theory and experiment – I-shaped girders

**UNIT - II ELECTROMAGNETIC WAVES 9**

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 - Reflection and Transmission of electromagnetic waves from a non-conducting medium - Vacuum interface for normal incidence.

**UNIT - III LASER AND FIBER OPTICS 9**

LASER: theory of laser - Characteristics - Spontaneous and Stimulated emission - Einstein's coefficients - Population inversion - Nd-YAG laser, $CO_2$ laser – Basic applications of lasers in industry. Fiber optics: principle, Numerical aperture and Acceptance angle - Types of optical fibers (material, refractive index, mode) – Losses associated with optical fibers - Fiber optic sensors: Pressure and Displacement

**UNIT - IV QUANTUM PHYSICS 9**

Black body radiation – Planck's theory – Compton effect: theory and experimental verification – wave particle duality – Concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – Particle in a one-dimensional box – Tunneling (qualitative) - Scanning tunneling microscope (STM).

**UNIT - V CRYSTALLOGRAPHY 9**

Crystalline and amorphous materials – Unit cell, Crystal systems, Bravais lattices, Lattice planes - Miller indices – Inter planar spacing in cubic lattice – Atomic radius, Coordination number and Packing factor for SC, BCC, FCC, HCP structures - Growth of single crystals: Solution and melt growth techniques.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. R. K. Gaur and S. L. Gupta, “Engineering Physics”, DhanpatRai Publishers,2012.
2. B. K. Pandey and S. Chaturvedi, “Engineering Physics”, Cengage Learning India, 2018.

**REFERENCES:**

1. D. K. Bhattacharya and T. Poonam, “Engineering Physics”, Oxford University Press 2017.
2. R. Wolfson, “Essential University Physics”, Volume 1 & 2, Pearson Education (Indian Edition), 2009.
3. K.Thyagarajan and A.Ghatak, “Lasers: Fundamentals and Applications”, Laxmi Publications (Indian Edition), 2019.
4. D. Halliday, R. Resnick and J. Walker, “Principles of Physics”, Wiley (Indian Edition), 2015.
5. P. A. Tipler and G. Mosca W. H. Freeman, “Physics for Scientists and Engineers with Modern Physics”, 2007.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME : ENGINEERING PHYSICS** | | **COURSE CODE : 24BS102** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C103.1** | Demonstrate the properties of elasticity and measure the different moduli of elasticity | I | K3 |
| **C103.2** | Discuss the characteristics of electromagnetic waves. | II | K2 |
| **C103.3** | Examine the characteristics of laser and optical fiber. | III | K2 |
| **C103.4** | Explain black body radiation, properties of matter waves and Schrodinger equation. | IV | K2 |
| **C103.5** | Classify Bravais lattices, different types of crystal structures and crystal growth techniques | V | K3 |

| 24BS103 | ENGINEERING CHEMISTRY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- To introduce the basic concepts and applications of corrosion and alloys.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.

**UNIT - I WATER AND ITS TREATMENT 9**

Water: Sources and impurities, Water quality parameters: Estimation of hardness by EDTA method (Problems). Desalination of brackish water: Reverse Osmosis, Electro dialysis. Waste water treatment. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment: phosphate, colloidal, sodium aluminate and calgon conditioning and External treatment: Ion-exchange demineralization and zeolite process.

**UNIT - II ENERGY SOURCES AND STORAGE DEVICES 9**

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials, Wind energy.

Batteries- Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles - working principles; Fuel cells: $H_2$-$O_2$ fuel cell, microbial fuel cell.

**UNIT - III CORROSION AND ALLOYS 9**

Corrosion-causes-factors-types-chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control-material selection and design aspects-electrochemical protection-sacrificial anode method and impressed current cathodic method.

Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze.

**UNIT - IV FUELS AND COMBUSTION 9**

Fuels: Introduction: Classification of fuels; Coal proximate analysis of coal and manufacture of metallurgical coke (Otto Hoffmann method). Petrol characteristics, knocking - octane number, diesel oil characteristics, cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method.

**UNIT - V NANOCHEMISTRY 9**

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties: optical, electrical, mechanical and magnetic; Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. P. C. Jain and Monica Jain, *"Engineering Chemistry",* 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., *"Engineering Chemistry"*, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, *"A Text book of Engineering Chemistry",* S. Chand Publishing, 12th Edition, 2018

**REFERENCES:**

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME : ENGINEERING CHEMISTRY** | | **COURSE CODE : 24BS103** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C104.1** | Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water. | I | K2 |
| **C104.2** | Describe the different forms of energy resources, apply them in suitable energy sectors and illustrate the working of various batteries. | II | K2 |
| **C104.3** | Explain the principles, various type of corrosion, corrosion control methods and alloys. | III | K2 |
| **C104.4** | Categorize various fuels for Engineering processes and describe about applications. | IV | K2 |
| **C104.5** | Identify basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. | V | K2 |

| **24GE101** | **PROBLEM SOLVING AND C PROGRAMMING** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **3** | **0** | **0** | **3** |

**OBJECTIVES:**

- To understand the basic C programming constructs
- To learn about usage of arrays and strings
- To understand the concepts of functions and pointes
- To understand structures and unions
- To expose to file handling operations in C

**UNIT - I PROBLEM SOLVING USING C PROGRAMMING 9**

Introduction to computer system – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs and System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code, Overview of C : Features of C, structure of C program, data types, variables, Constants, Keywords, Operators–Precedence and Associativity, Expressions, statements, Control structures- Branching and Looping , Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number

**UNIT - II ARRAYS AND STRINGS 9**

Arrays– Declaration and Initialization of one dimensional array , Example Programs– Insertion sort, Selection sort, Linear search, Binary search, Declaration and Initialization of two dimensional array, Example programs- Matrix Addition and Multiplication, Determinant and Transpose of a matrix

Strings- Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, String-handling Functions, Example Programs- with and without using built-in string functions

**UNIT - III FUNCTIONS AND POINTERS 9**

Introduction to functions – need of Function, Function prototype, function definition, function call, Return Values and their Types, Category of Functions, Built- in functions (string functions, math functions), Passing Arrays to Functions, Recursion, Scope, Visibility and Lifetime of variables, Example Program – Computation of Sine series, Scientific calculator using built-in functions. Pointers- Declaration and Initialization of pointer, Pointer operators, Pointer arithmetic, Pointer Increments and Scale Factor, 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

**UNIT - IV STRUCTURES AND UNIONS 9**

Structure – Defining a structure, declaring structure variables, accessing structure members, structure initialization, Nested structures, Pointer and Structures, Array of structures, Example Program – using structures and pointers, typedef, Self referential structures, Union, Dynamic memory allocation, Illustrative programs – allocating block of memory, sum of n numbers using malloc, calloc.

**UNIT - V FILE PROCESSING 9**

Files – File operations, Types of file processing– Sequential access and Random access, Error Handling on Files - 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.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. Balagurusamy E, “Programming in ANSI C”, Eighth Edition, Tata Mcgraw-Hill,2019.
2. YashavantKanetkar, “Let Us C”, BPB Publications, 17th Edition,2020.
3. Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education,2015.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh edition, Pearson Education India, 2015.
2. Juneja, B. L and Anita Seth, “Programming in C”, CENGAGE Learning India pvt. Ltd.,2011
3. PradipDey, ManasGhosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press,2013.
4. Byron Gottfried, "Schaum’s outlines- Programming with C", McGraw-Hill Education, Fourth edition, 2018.
5. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition,2016.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :PROBLEM SOLVING AND C PROGRAMMING** | | **COURSE CODE : 24GE101** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C105.1** | Explain the basic concepts of computer system and develop simple C programs. | I | K3 |
| **C105.2** | Apply one dimensional and two dimensional arrays for implementing matrix operations and string operations. | II | K3 |
| **C105.3** | Make use of function concept and develop programs to implement pointer arithmetic and arrays with pointers for solving simple mathematical problems. | III | K3 |
| **C105.4** | Illustrate simple programs for structures and unions. | IV | K3 |
| **C105.5** | Apply various file operations and develop programs to implement file access procedures. | V | K3 |

| 24GE102 | ENGINEERING GRAPHICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**OBJECTIVES:**

- To understand the importance of the drawing in engineering applications
- To develop graphic skills for communication of concepts, ideas and design of engineering products
- To expose them to existing national standards related to technical drawings.
- To improve their visualization skills so that they can apply this skill in developing new products.
- To improve their technical communication skill in the form of communicative drawings

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning

**UNIT-I PROJECTION OF POINTS AND LINES** **9**

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method.

**UNIT-II PROJECTION OF PLANE SURFACES** **9**

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

**UNIT-III PROJECTION OF SOLIDS** **9**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

**UNIT- IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES** **9**

Sectioning of simple solids in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section - Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone.

**UNIT-V ISOMETRIC PROJECTION** **9**

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids – Frustum and truncated Prisms and Pyramids.

Introduction to Perspective projections. (Not for Examination)

**DEMONSTRATION ON DRAFTING PACKAGES**(For Internal Evaluation Weightage only)

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. Natarajan K.V., “A text book of Engineering Graphics”, Dhaallnalakshmi Publishers, Chennai, 33rd Edition, 2020.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 17th Multicolor Edition, 2021.
3. N.D. Bhatt, “Engineering Drawing” Charotar Publishing House, 54th Edition, 2023.

**REFERENCES:**


1. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education, 5th Edition, 2022
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2019
3. Luzadder and Duff, Fundamentals of Engineering Drawing, 11th edition, Pearson Education, 2015
4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2019
5. M.S.Kumar, "Engineering Graphics", DD Publications, 2018
6. http://nptel.ac.in/courses/112103019/
7. https://archive.nptel.ac.in/courses/112/102/112102304/


**BUREAU OF INDIAN STANDARDS:**

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001: Technical drawings - General principles of presentation.
4. IS 11669 – 1986: General principles of dimensioning on technical drawings.
5. SP 46 (2003): Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

**SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:**

1. There will be five questions, each of either or type covering units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :ENGINEERING GRAPHICS** | | **COURSE CODE : 24GE102** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C106.1** | Build the orthographic projections of points and lines. | I | K3 |
| **C106.2** | Sketch the projection of polygonal and circular planes. | II | K3 |
| **C106.3** | Project simple solids like prisms, pyramids, cylinder and cone. | III | K3 |
| **C106.4** | Construct the section and develop lateral surfaces of solids. | IV | K3 |
| **C106.5** | Apply the concept of isometric projection to sketch 3D views. | V | K3 |

| 24HST01 | HERITAGE OF TAMILS | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**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, VilluPattu, KaniyanKoothu, 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 Conquestof 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.

**CLASS HOURS: 15 PERIODS TERM HOURS: 15 PERIODS TOTAL: 30 PERIODS**

| 24HST01 | **தமிழர்மரபு** | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**அலகு** -I **மொழிமற்றும்இலக்கியம்** 3

இந்தியமொழிக்குடும்பங்கள் – திராவிடமொழிகள் – தமிழ்ஒருசெம்மொழி – தமிழ்செவ்விலக்கியங்கள்சங்கஇலக்கியத்தின்சமயச்சார்பற்றதன்மை – சங்கஇலக்கியத்தில்பகிர்தல்அறம் – திருக்குறளில்மேலாண்மைக்கருத்துக்கள் – தமிழ்க்காப்பியங்கள், தமிழகத்தில்சமணபௌத்துவசமயங்களின்தாக்கம் – பக்திஇலக்கியம், ஆழ்வார்கள்மற்றும்நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில்நவீனஇலக்கியத்தின்வளர்ச்சி – தமிழ்இலக்கியவளர்ச்சியில்பாரதியார்மற்றும்பாரதிதாசன்ஆகியோரின்பங்களிப்பு

**அலகு** -II **மரபு – பறைஓவியங்கள்முதல்நவீனஓவியங்கள்வரை – சிற்பக்கலை** 3

நடுகல்முதல்நவீனசிற்பங்கள்வரை – ஐம்பொன்சிலைகள் – பழங்குடியினர்மற்றும்அவர்கள்தயாரிக்கும்கைவினைப்பொருட்கள், பொம்மைகள் – தேர்செய்யும்கலை – சுடுமண்சிற்பங்கள் – நாட்டுப்புறத்தெய்வங்கள் – குமரிமுனையில்திருவள்ளுவர்சிலை – இசைக்கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின்சமூகபொருளாதாரவாழ்வில்கோவில்களின்பங்கு.

**அலகு** -III **நாட்டுப்புறகலைகள்மற்றும்வீரவிளையாட்டுகள்** 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கனியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்விளையாட்டுகள்

**அலகு** -IV **தமிழர்களின்திணைக்கோட்பாடுகள்** 3

தமிழகத்தின்தாவரங்களும், விலங்குகளும் – தொல்காப்பியம்மற்றும்சங்கஇலக்கியத்தில்அகம்மற்றும்புறக்கோட்பாடுகள் – தமிழர்கள்போற்றியஅறக்கோட்பாடு – சங்ககாலத்தில்தமிழகத்தில்எழுத்தறிவும், கல்வியும் – சங்ககாலநகரங்களும்துறைமுகங்களும் – சங்ககாலத்தில்ஏற்றுமதிமற்றும்இறக்குமதி – கடல்கடந்தநாடுகளில்சோழர்களின்வெற்றி.

**அலகு** -V **இந்தியதேசியஇயக்கம்மற்றும்இந்தியபண்பாட்டிற்க்குத் தமிழர்களின்பங்களிப்பு** 3

இந்தியவிடுதலைப்போரில்தமிழர்களின்பங்கு – இந்தியாவின்பிற்ப்பகுதிகளில்தமிழ்பண்பாட்டின்தாக்கம் – சுயமரியாதைஇயக்கம் – இந்தியமருத்துவத்தில், சித்தமருத்துவத்தின்பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்புத்தகங்களின்அச்சுவரலாறு.

**TEXT & REFERENCE BOOKS:**


1 தமிழகவரலாறு – மக்களும்பண்பாடும் – கே. கே. பிள்ளை
(வெளியீடு:தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)

2. கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்

3. கீழடி–வைகைநதிக்கரையில்சங்ககாலநகரநாகரீகம்
(தொல்லியல்துறைவெளியீடு)

4. பொருனை – ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL

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 C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,TamilNadu

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text BookAnd Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

| 24BS1L1 | BASIC SCIENCE LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

## PHYSICS LABORATORY

**OBJECTIVES:**

- To inculcate the proper usage of various physics laboratory equipments and interpretation of experimental data.
- To stimulate problem solving skills related to physics principles.
- To make the student as an active participant in each part of all lab exercises.

**LIST OF EXPERIMENTS: (ANY SIX)**

1. Torsion Pendulum – determination of moment of inertia of a disc and rigidity modulus of wire.
2. Uniform Bending – determination of Young's modulus of a given material.
3. Determination of band gap of a semiconductor.
4. Air wedge – determination of thickness of a thin wire / sheet.
5. Newton's ring – determination of radius of curvature of plano convex lens.
6. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
7. a. Optical fiber – determination of Numerical aperture and acceptance angle.
   b. Diode laser – determination of width of groove in compact disc.
8. Spectrometer grating – determination of wavelength of mercury spectrum.
9. Spectrometer hollow prism – determination of refractive index of a given liquid.

**TOTAL: 30 PERIODS**

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

| S.No. | NAME OF THE EQUIPMENT | Quantity |
|---|---|---|
| 1 | Torsion pendulum set | 6 |
| 2 | Travelling microscope & accessories | 6 |
| 3 | Air wedge set up | 6 |
| 4 | Ultrasonic interferometer | 6 |
| 5 | Laser kit | 6 |
| 6 | Spectrometer &hollow prism | 6 |
| 7 | Spectrometer & grating | 6 |
| 8 | Semiconductor band gap kit | 6 |
| 9 | Newton's ring set up | 6 |

## CHEMISTRY LABORATORY

**OBJECTIVES:**

- To inculcate experimental skills to test basic understanding of water quality parameters through volumetric analysis.
- To have hands on experience in using instruments like pH meter, conductivity meter, potentiometer.
- To determine the amount of metal ions in alloys& molecular weight of polymer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer

**LIST OF EXPERIMENTS:(ANY SIX)**

1. Determination of types and amount of alkalinity in a water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Estimation of copper content of the brass solution by EDTA.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Determination of strength of acids in a mixture of acids using conductivity meter.
7. Conductometric titration of barium chloride against sodium sulphate. (precipitation titration)
8. Estimation of iron content of the given solution using potentiometer.
9. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
10. Estimation of Nickel in steel.

**TOTAL: 30 PERIODS**

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

| S.No. | NAME OF THE EQUIPMENT | Quantity |
|---|---|---|
| 1 | Burette (50ml) | 30 |
| 2 | Pipette(20ml) | 30 |
| 3 | Beaker (100ml) | 30 |
| 4 | Conical Flask (250ml) | 30 |
| 5 | Conductivity meter | 10 |
| 6 | Potentiometer | 10 |
| 7 | pH meter | 10 |
| 8 | Viscometer | 14 |
| 9 | Electronic Balance | 1 |

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :BASIC SCIENCE LABORATORY** | | **COURSE CODE: 24BS1L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K –CO** |
| **PHYSICS LABORATORY** | | | |
| **C107.1** | Calculate rigidity modulus, Young's modulus of a given material and band gap of a semiconductor diode | 1,2, 3 | K3 |
| **C107.2** | Predict the thickness of a given thin object, radius of curvature of Plano convex lens and velocity of ultrasound, compressibility of liquid | 4,5,6 | K3 |
| **C107.3** | Determine the basic parameters of optical fiber, width of groove in CD, wavelength of the prominent spectral lines and refractive index of a given liquid | 7,8,9 | K3 |
| **CHEMISTRY LABORATORY** | | | |
| **C107.4** | Estimate the chemical quality of a water sample by volumetric analysis. | 1,2, 3, 4 | K3 |
| **C107.5** | Determine the molecular weight of polymer and amount of metal ions and impurities in solution through volumetric and electro analytical techniques. | 5,6,7,8,9,10 | K3 |

| 24GE1L1 | C PROGRAMMING LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

**LIST OF EXPERIMENTS:**

1. Programs using I/O statements, expressions and decision-making constructs.
2. Program for finding given year is leap year or not and finding given number is Armstrong number or not.
3. Design a calculator to perform the operations namely, addition, subtraction, multiplication, division and square of a number.
4. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
   a. if it is a perfect cube.
   b. if it is a multiple of 4 and divisible by 6.
   c. if it is a prime number.
5. Sort the numbers based on the weight in the increasing order as shown below <10,its weight><36,its weight><89,its weight>
6. Matrix addition and subtraction
7. Matrix multiplication and transpose of a matrix
8. Program using string with and without using string functions: string copy and Reverse the String.
9. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
10. From a given paragraph perform the following using built-in functions:
    a. Find the total number of words.
    b. Capitalize the first word of each sentence.
    c. Replace a given word with another word.
11. Program using recursion – factorial and Fibonacci series
12. Sort the list of numbers using pass by reference.
13. Generate salary slip of employees using structures and pointers.
14. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
15. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
16. **Mini project (Any one project : Maximum 4 per Team)**
    - Railway reservation system
    - Library Management System
    - University Result Publication System
    - Hospital Management System
    - Student Automation System
    - Payroll System
    - Banking System
    - Inventory System

**PLATFORM NEEDED:** Turbo C++ Compiler **TOTAL: 60 PERIODS**

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

**Laboratory requirements for a batch of 30 students -** Systems with Linux Operating System with gnu compiler.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME : C PROGRAMMING LABORATORYCOURSE CODE** | | **COURSE CODE: 24GE1L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K –CO** |
| **C108.1** | Develop simple programs using decision making and looping statements. | 1-5 | K3 |
| **C108.2** | Utilize array concepts to perform matrix addition, subtraction and multiplication. | 6-7 | K3 |
| **C108.3** | Develop programs using user defined functions, built-in functions and recursion and utilize string operations to show string copy and reverse | 8-12 | K3 |
| **C108.4** | Develop applications using sequential and random access files. | 14-15 | K3 |
| **C108.5** | Develop simple real time projects using the concepts of structures and union. | 13,16 | K3 |

| 24HS1L1 | ENGLISH LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities which are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

**UNIT-I Introduction to Fundamentals of Communication 6**

Listening for General Information - Specific Details - Conversation: Introduction to Classmates - Audio / Video (Formal & Informal); Telephone Conversation; Listening to Voicemail & Messages; Listening and Filling a Form. Speaking - Making Telephone Calls - Self Introduction; Introducing a Friend; Politeness Strategies - Making Polite Requests, Making Polite Offers, Replying to Polite Requests and Offers - Understanding Basic Instructions (Filling Out a Bank Application for Example).

**UNIT-II Narration and Summation 6**

Listening - Listening to Podcasts, Anecdotes / Stories / Event Narration; Documentaries and Interviews with Celebrities. Speaking - Narrating Personal Experiences / Events - Talking about Current and Temporary Situations & Permanent and Regular Situations - Describing Experiences and Feelings Engaging in Small Talk - Describing Requirements and Abilities.

**UNIT-III Description of a Process / Product 6**

Listening - Listen to Product and Process Descriptions; a Classroom Lecture; and Advertisements about Products. Speaking – Picture Description & Video Description - Describing Locations in Workplaces - Giving Instruction to Use the Product - Explaining Uses and Purposes - Presenting a Product - Describing Shapes and Sizes and Weights - Talking about Quantities (Large & Small) - Talking about Precautions; Tips to Create YouTube Channel.

**UNIT- IV Classification and Recommendations 6**

Listening – Listening to TED Talks; Listening to Various Online Video Repository. Speaking – SMALL Talk; Discussing and Making Plans - Talking about Tasks - Talking about Progress - Talking about Positions and Directions of Movement - Talking about Travel Preparations - Talking about Transportation.

**UNIT-V Expression** **6**

Listening – Listening to Debates / Discussions; Different View Points on an Issue; and Panel Discussions. Speaking – Making Predictions - Talking about a Given Topic - Giving Opinions Understanding a Website - Describing Processes.

**TOTAL: 30 PERIODS**

**REFERENCES:**


1. Learn English with Cambridge - https://www.youtube.com/channel/UC9-5oT15dxc81MI-pUui3Ww
2. https://www.oxfordonlineenglish.com/
3. Oxford Online English - https://www.youtube.com/channel/UCNbeSPp8RYKmHUliYBUDizg
4. British Council | Learn English - https://www.youtube.com/channel/UCOtnu-KKoAbN47IuYMeDPOg
5. https://tcesrenglish.blogspot.com/


**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME : ENGLISH LABORATORY** | | **COURSE CODE : 24HS1L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K – CO** |
| **C109.1** | Listen to and comprehend general as well as complex academic information | I – V | AD |
| **C109.2** | Listen to and understand different points of view in a discussion | I – V | AD |
| **C109.3** | Speak fluently and accurately in formal and informal communicative contexts | I – V | AD |
| **C109.4** | Describe products and processes and explain their uses and purposes clearly and accurately | I – V | AD |
| **C109.5** | Express their opinions effectively in both formal and informal discussions | I – V | AD |

| 24HS201 | PROFESSIONAL ENGLISH - II | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**OBJECTIVES:**

- To engage learners in meaningful language activities to improve their reading and writing skills.
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To demonstrate an understanding of job applications and interviews for internship and placements.

**UNIT-I Making Comparisons** **12**

Reading - Reading New Product Features, Invitations – Technical Seminar, Conferences, Workshops, Inter-College Functions; Writing – Safety Instructions - Compare and Contrast Essay; Grammar – Preposition – Position, Movement, Direction - Prepositional Phrases – Connectives, Common Errors in Technical Writing.

**LAB COMPONENT**

**Speaking –** Self Introduction – Role Play Exercises Based on Workplace Contexts – Discussion on Goal Setting. **Listening –** about Important Events – Experts Talks

**UNIT-II Expressing Causal Relations in Speaking and Writing** **12**

Reading - Reading Longer Technical Texts – Technological Inventions – Flaws – Rectifications Writing - Cause and Effect Essays, and Letters to Companies - Product Enquiry – Service Information - Emails of Complaint - Writing Responses to Complaints. Grammar - Voice Transformations – Impersonal Passive Voice, Infinitive and Gerunds, Smileys & Abbreviations for Email Writing - Resume Preparation

**LAB COMPONENT**

**Speaking –** Technical Presentations (TED Talk) **-** Recent Media Updates – Travel Experiences – Devising Plans and Making Decisions. **Listening –** FAQ on Technological Contexts – Making Itineraries

**UNIT-III Problem Solving** **12**

Reading - Journal Abstracts, Case Studies, Excerpts from Literary Texts, News Reports etc. Writing – Letter to the Editor, Checklists, Problem Solution Essay / Argumentative Essay. Grammar – Present Perfect Tense, If conditional Sentences, Digital Vocabulary, Spell Check, Tips to Create Technical Blogs - Introduction to Word Processing Online Tools (Quillbot, Grammarly, etc.,)

**LAB COMPONENT**

**Speaking –** Group Discussions**-**Likes & Dislikes **–** Climate Conditions **–** Narrating Imaginary Situations. **Listening –** Talks on Purchase and TRADES – Merits and Demerits – Advantages & Disadvantages.

**UNIT- IV Reporting of Events and Research 12**

**Reading** – Newspaper Archives; **Writing** – Suggestions, Transcoding - Flow Charts, Pie / Bar Diagrams, Accident Report, Survey Report. Grammar – Reported Speech; **Vocabulary** (Social Media Platforms) – Coherence Markers - Use of Prepositions.

**LAB COMPONENT**

**Speaking –** Discussion on Environments –Socio Political Systems, Mandatory Systems. **Listening –** Technical Instructions – Positions and Challenges of Higher Officials

**UNIT-V The Ability to Put Ideas or Information Cogently 12**

Reading – Technical Articles / Papers, Company Profiles, Statement of Purpose (SOP), an Excerpt of Interview with Professionals; Writing – Job / Internship Application – Cover Letter & Resume - Letter of Recommendation (To the Principal from NRI); Grammar – Numerical Adjectives - Relative Clauses – .PPT Preparation Tips

**LAB COMPONENT**

**Speaking –** Job Interview Practice **-** Describing Personal Outlook, Grooming, Safety Issues. **Listening –** Instructions about Electrical Devices, Timely Remedial Measures, Precautionary Measures

**CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
3. Authored by Dr. VeenaSelvam, Dr. SujathaPriyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

**REFERENCES:**

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, MeeraBannerji- Macmillan India Ltd. 1990, Delhi.
6. A Course in Technical English by Mr. D. Praveen Sam, KN Shoba, Cambridge University Press, 2020, India.

**Lab Component References:**

**Free, Authentic Online Repositories for English Proficiency and General Aptitude Practice for Higher Studies and Placement.**

- https://www.examenglish.com
- https://www.aptitude-test.com/verbal-aptitude.html
- https://www.edudose.com
- https://www.fresherslive.com/online-test/aptitude-test/questions-and-answers
- https://www.indiabix.com/

- https://www.oxfordonlineenglish.com/english-level-test
- https://learnenglish.britishcouncil.org/english-levels/online-english-level-test
- https://www.ted.com
- https://tcesrenglish.blogspot.com/

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name : PROFESSIONAL ENGLISH - II** | | **Course Code: 24HS201** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C111.1** | Compare and contrast ideas in technical texts, identify and report cause and effects in events, industrial processes | I – V | AD |
| **C111.2** | Analyze problems, feasible solutions and communicate them in the written format. | I – V | AD |
| **C111.3** | Present their ideas, opinions, discuss, analyze concepts and problems by effective speaking in group discussions. | I – V | AD |
| **C111.4** | Draft effective emails, official letters and job applications, effective resumes in a planned and logical manner. | I – V | AD |
| **C111.5** | Write critical reports from inferred data and information with clarity and precision | I – V | AD |

| **24BS201** | **ADVANCED CALCULUS** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **3** | **1** | **0** | **4** |

**OBJECTIVES:**

- To make the student familiar with topics such as Multiple Integrals, Vector Calculus, Analytic Functions, Complex Integration and Laplace Transform.
- To learn the concept of basic Vector Calculus which can be widely used for Modeling the various laws of Physics.
- To understand the various methods of Complex Analysis and Laplace Transform can be used for efficiently solving the problems that occur in various branches of Engineering disciplines.

**UNIT - I LAPLACE TRANSFORM 9+3**

Existence Conditions – Transforms of Elementary Functions – Transform of Unit Step Function and Unit Impulse Function – Basic Properties – Shifting Theorems -Transforms of Derivatives and Integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of Periodic Functions – Application to Solution of Linear Second Order Ordinary Differential Equations with Constant Coefficients.

**UNIT - II MULTIPLE INTEGRALS 9+3**

Double integrals – Change of order of integration – Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of Variables in Double and Triple integrals.

**UNIT - III VECTOR CALCULUS 9+3**

Gradient and Directional Derivative – Divergence and Curl - Vector Identities – Irrotational and Solenoidal Vector fields – Line Integral over a Plane curve – Surface Integral - Area of a Curved Surface - Volume Integral – Green's, Gauss divergence and Stoke's theorems (without proof) – Verification and Application in evaluating Line, Surface and Volume Integrals.

**UNIT - IV ANALYTIC FUNCTIONS 9+3**

Analytic functions – Necessary and Sufficient Conditions for Analyticity in Cartesian and Polar Coordinates – Properties – Harmonic Conjugates – Construction of Analytic Function – Conformal Mapping – Mapping by Functions $w = z+c$, $cz$, $1/z$ , $z^2$ - Bilinear transformation.

**UNIT - V COMPLEX INTEGRATION 9+3**

Line integral – Cauchy's Integral Theorem (without proof) – Cauchy's Integral Formula – Taylor's and Laurent's Series – Singularities – Residues – Residue Theorem (without proof) – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Veerarajan.T" Engineering Mathematics I", The Tata McGraw Hill Publication-New Delhi, First Edition 2018.

**REFERENCES:**


1. Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons, 9th Edition, NewDelhi, 2006.
2. James Stewart, “Calculus, Early Transcendental”, Cengage Learning, 7th Edition, New Delhi, 2015.
3. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics II”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 9th Edition, 2014.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics II”, Narosa Publications, New Delhi, 5th Edition, 2016.
5. Robert C.Wrede, Murray R.Spiegel, “Advanced Calculus” Schaum’s outline series, McGraw Hill, New Delhi, Second Edition, 2002.


**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name : ADVANCED CALCULUS** | | **Course Code: 24BS201** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C112.1** | Apply Laplace transform and inverse transform to solve the initial value problems. | I | K3 |
| **C112.2** | Solve the multiple integrals and apply the concept to find areas, volumes. | II | K3 |
| **C112.3** | Determine the line, surface and volume integrals using Green’s, Gauss and Stokes theorems | III | K3 |
| **C112.4** | Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves. | IV | K3 |
| **C112.5** | Determine the Contour Integrals using Cauchy’s Integral and Residue theorems. | V | K3 |

| 24BS203 | PHYSICS FOR ELECTRONICS AND DEVICES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To introduce the essential physics of semiconductors, dielectric materials and electron transport properties
- To inculcate proficiency in Diodes and transistors
- To develop the knowledge on special semiconducting and optoelectronic devices.

**UNIT - I ELECTRICAL PROPERTIES OF MATERIALS 9**

Classical free electron theory: Derivation of Electrical conductivity and Thermal conductivity – Wiedemann-Franz law – Success and failures – Quantum free electron theory: Fermi–Dirac statistics – Density of energy states. Band theory: electron in periodic potential – Energy bands in solids – Semiconductor, metals and insulators - Electron effective mass – Concept of hole.

**UNIT - II SEMICONDUCTOR PHYSICS 9**

Properties of semiconductors – Energy band diagram – Direct and indirect semiconductors – Intrinsic semiconductors – Carrier concentration (derivation) – Variation of Fermi level with temperature – Extrinsic semiconductors – Carrier concentration in n-type & p-type semiconductors (qualitative) – Variation of carrier concentration with temperature - Variation of Fermi level with temperature and carrier concentration - Hall effect and devices.

**UNIT - III DIELECTRIC MATERIALS 9**

Basic definitions – Polarization processes – Frequency and temperature dependence of polarization – Internal field – Clausius - Mosotti relation – Dielectric constant: experiment – Relation between dielectric constant and refractive index – Dielectric loss – Dielectric breakdown – High-K dielectric – applications: capacitor, transformer.

**UNIT - IV DIODE & TRANSISTORS 9**

P-N junction diodes: biasing, V-I characteristics – UJT: operation, characteristics and equivalent circuit – BJT open circuit - Biasing, operation of PNP and NPN transistor, V-I characteristics - Introduction to FET, J-FET (n & p channels) - MOSFET structures, I-V Characteristics, trans conductance and substrate effects - Frequency limitations, non-ideal effects - MOSFET scaling, threshold voltage modification due to short and narrow channel effects, Drain induced barrier effects.

**UNIT - V SPECIAL SEMICONDUCTOR DEVICES 9**

SCR, IGBT, Schottky barrier diode, Zener diode - Varactor diode – Tunnel diode - Gallium arsenide devices, LDR, LASER diode, LED, LCD, phototransistor, Opto Coupler, Solar cell.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. S.M.Sze, “Physics of Semiconductor Devices”, John Wiley & Sons, third Edition, 2007.
2. D.Neaman and D.Biswas, “Semiconductor Physics and Devices”, McGraw Hill Education, 2017.
3. D.K.Bhattacharya, PoonamTandon, “Engineering Physics”, Oxford University Press, 2016.
4. BEN G.Streetman, Sanjay Kumar Banerjee, “Solid State Electronic Devices”, PHI learning Private Limited, sixth edition, 2012.

**REFERENCES:**

1. S.O.Kasap, “Principles of Electronic Materials and Devices”, McGraw Hill Education (India) Private Limited, 2017.
2. B.K Pandey, S.Chaturvedi, “Engineering Physics”, Cengage Learning India Pvt. Ltd, 2012.
3. S.Salivahanam, N Suresh Kumar, “Electronic Devices and Circuits”, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017.
4. Dr. K. S. Srinivasan, “Electronic Device and Circuits”, Anuradha Publications, 2023.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :PHYSICS FOR ELECTRONICS AND DEVICES** | | **Course Code: 24BS203** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C113.1** | Differentiate classical, quantum electron theories and energy band theory. | I | K2 |
| **C113.2** | Discuss the various types of semiconductors and Hall effect. | II | K2 |
| **C113.3** | Explain dielectric properties of materials. | III | K2 |
| **C113.4** | Compare the characteristics of the diode and transistors. | IV | K2 |
| **C113.5** | Generalize the physics of special semiconductor devices. | V | K2 |

| 24HS202 | ENVIRONMENTAL SCIENCES AND SUSTAINABILITY | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

**OBJECTIVES:**

- To study the scope and significance of environment, understand the interrelationship between living organism and environment.
- To get a concept knowledge on various types of pollution and its effects.
- To gain knowledge on various renewable energy sources and its applications.
- To provide knowledge on solid waste disposal methods and natural disasters and its management.
- To development goals and protocol- sustainability and gain knowledge on carbon credit and carbon footprint.

**UNIT – I ENVIRONMENT AND BIODIVERSITY 6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

**UNIT - II ENVIRONMENTAL POLLUTION 6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Climate change, Global warming, Acid rain, Ozone layer depletion. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection.

**UNIT - III RENEWABLE SOURCES OF ENERGY 6**

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Solar, Wind, Tidal, Geothermal, $H_2$ energy & Ocean energy. Applications of Hydrogen energy, Ocean energy resources.

**UNIT - IV SOLID WASTE AND DISASTER MANAGEMENT 6**

Solid waste management - Introduction, types, e-waste, effects on human beings and disposal management. Disaster management - Introduction, causes, effects and management of flood, cyclone, earthquake, landslide disasters, case studies – roles and responsibilities of Government and community.

**UNIT - V SUSTAINABILITY AND MANAGEMENT 6**

Development, GDP, sustainability – concept, needs and challenges- economic, social and aspects of sustainability –from unsustainability to sustainability – millennium development goals, and protocols – Sustainable Development Goals-targets, indicators and intervention areas. Climate change – Global Regional and local environmental issues and possible solutions – case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry – A case study.

**CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS**

**TEXT BOOKS:**


1. AnubhaKaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition,New Age International Publishers, 2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.


**REFERENCES:**


1. Dr.A.Ravikrishnan, 'Environmental Science & Engineering', Sri Krishna Hitech Publishing Company Pvt.Ltd. Revised Edition 2023-2024.
2. Dr.V.Veeraiyanand Dr.L.Devaraj Steohen, 'Environmental Science & Engineering', VRB Publishers Pvt.Ltd. Reised& Updated Edition 2018-19.


**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name :ENVIRONMENTAL SCIENCES AND SUSTAINABILITY** | | **Course Code: 24HS202** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C114.1** | Describe the environment, ecosystem and their significances and explain the threats to biodiversity. | I | K2 |
| **C114.2** | Describe the sources, effects, and control methods of environmental pollution. | II | K2 |
| **C114.3** | Explain the knowledge on various renewable sources and its applications. | III | K2 |
| **C114.4** | Describe the disposal techniques of solid waste and record the consequences of natural disasters. | IV | K2 |
| **C114.5** | Outline the different goals of sustainable development and apply them for suitable technology and societal development. | V | K2 |

| 24GE201 | PYTHON PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand Python basics and programs with conditional and looping constructs.
- To understand Python functions and strings.
- To understand various operations using Python data structures– lists, tuples, sets and dictionaries.
- To understand exception handling and modules, packages in Python
- To understand usage of data base in python

**UNIT - I PYTHON BASICS AND PROGRAM FLOW 9**

**Introduction to python** - Features of python, python syntax compared to other programming languages, python installation, python interpreter and interactive mode, values and types – int, float, boolean, string and list, variables, expressions, statements, comments, operators and precedence of operators, control flow statements – conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), iteration – state, while, for, break, continue, pass ,illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points.

**UNIT - II FUNCTIONS, STRINGS 9**

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion , Illustrative programs- Decimal binary conversion, Tower of Hanoi , Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search.

**UNIT - III LISTS, TUPLES, SETS AND DICTIONARIES 9**

**Lists** – list operations, list slices, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, list methods, List comprehension, **Tuples** –Tuple operations (create, access, modify, delate, append, membership test, concatenation and repeat), tuple assignment, tuple as return value, Iterating a tuple, Built-in functions with tuple, **Sets** – Creating, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Built-in functions and methods with set, **Dictionaries** – creation, accessing elements, operations and methods, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers.

**UNIT - IV FILES HANDLING, MODULES, PACKAGES 9**

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and Rand, Illustrative programs – word count, copy file, merge two files

**UNIT - V DATA BASES INPYTHON 9**

**Python SQL database:** Installation, DB connection, create table, Data Manipulation operations (Insert, read, update, delete, commit and rollback), **Additional topics:** Lambda function, filter, map, reduce, decorators, Frozenset – creation, accessing elements, operations, collections (Counters, Ordered Dict, Default Dict ,Chain Map ,NamedTuple, DeQue, UserDict, UserList, UserString)

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

**REFERENCES:**

1. YashavantKanetkar, AdityaKanetkar, “Let Us Python”, 2nd Edition, BPB Publications, 2020.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Application to Understanding Data”, 2nd Edition, PHI Publisher,2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,2015.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3.6”, 3rd edition, Shroff/O’ Reilly Publishers,2018.
6. Dr.A.Kannan,Dr.L.SaiRamesh, “Problem Solving and Python Programming”, Updated Edition, United Global Publishers Pvt. Ltd., April 2018.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSE NAME :PYTHON PROGRAMMING** | | **Course Code: 24GE201** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C115.1** | Explain the basic concepts of python programming like python installation, data types, expression and control statements. | I | K2 |
| **C115.2** | Apply Python functions, recursive functions and string functions to solve simple problems and perform linear and binary search. | II | K3 |
| **C115.3** | Illustrate the various operations of lists, tuples, sets, dictionaries and arrays and develop programs to solve various sorting and matrix operations. | III | K3 |
| **C115.4** | Explain file handling operations, exception handling, modules and packages and develop programs for word count, file copy, merge operations and exception handling. | IV | K3 |
| **C115.5** | Apply python SQL database and additional functions like Lambda function and Frozenset to solve real world applications. | V | K3 |

| 24EE201 | ELECTRIC CIRCUIT THEORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 1 | 0 | 3 |

**OBJECTIVES:**

- To impart knowledge on solving A.C and D.C Circuits using various laws and theorems.
- To familiarize the concepts of resonance circuits and coupled circuits.
- To educate on obtaining the transient response of circuits.
- To introduce Phasor diagrams and analysis of three phase circuits.

**UNIT - I BASIC CIRCUITS ANALYSIS 6+3**

Ohm's Law – Kirchhoff's law – D.C and A.C circuits, Resistors in series and parallel circuits- Voltage and current division rule – Mesh current and node voltage analysis in DC and AC circuits - average and R.M.S value, Phasor diagram, Power and Power Factor.

**UNIT - II NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS 6+3**

Network reduction: source transformation – star- delta and delta-star transformation, Thevenin's theorem – Norton's Theorem – Superposition Theorem – Reciprocity Theorem – Maximum power transfer theorem.

**UNIT - III RESONANCE AND COUPLED CIRCUITS 6+3**

Series and parallel resonance – frequency response – Quality factor and Bandwidth - Self and mutual inductance –Coefficient of coupling – Tuned circuits – Single tuned circuits.

**UNIT - IV TRANSIENT RESPONSE ANALYSIS 6+3**

Transient response of series RL, RC and RLC Circuits for DC input and A.C. sinusoidal input.

**UNIT - V THREE PHASE CIRCUITS 6+3**

Three phase balanced / unbalanced voltage sources - Analysis of three phase 3-wire and 4-wire circuits - three phase balanced star and delta connected load - three phase unbalanced star and delta connected load – phasor diagram of voltage, current and power measurement in three phase circuits.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.
2. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, edition, New Delhi, 2013.
3. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2013.

**REFERENCES:**

1. Chakrabarti A, “Circuits Theory (Analysis and synthesis), DhanpathRai& Sons, New Delhi, 2017.
2. Jegatheesan, R., “Analysis of Electric Circuits” McGraw Hill, 2015.
3. Joseph A. Edminister, MahmoodNahri, “Electric circuits”, Schaum’s series, McGraw-Hill, New Delhi, 2010.
4. Mahadevan, K., Chitra, C., “Electric Circuits Analysis,” Prentice-Hall of India Pvt Ltd., New Delhi, 2015.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name : ELECTRIC CIRCUIT THEORY** | | **Course Code: 24EE201** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C116.1** | Solve the DC and AC circuits by using nodal analysis and mesh analysis | I | K3 |
| **C116.2** | Solve the DC and AC circuits by using network theorems. | II | K3 |
| **C116.3** | Calculate frequency response, Quality factor and B and width of Series And Parallel resonance and tuned circuits. | III | K3 |
| **C116.4** | Solve the transient response of series RL, RC and RLC Circuits for DC and AC input. | IV | K3 |
| **C116.5** | Determine the voltage, current and power measurement in three phase circuits | V | K3 |

| 24HST02 | TAMILS AND TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

**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)-ThirumalaiNayakarMahal - 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 KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conchediving - 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.

**CLASS HOURS: 15 PERIODS TERM HOURS: 15 PERIODS TOTAL: 30 PERIODS**

| | | L | T | P | C |
|---|---|---|---|---|---|
| 24HST02 | தமிழரும்தொழில்நுட்பமும் | 1 | 0 | 0 | 1 |

**அலகு -I நெசவு மற்றும் பானைதொழில்நுட்பம்:** 3

சங்ககாலத்தில் நெசவுத்தொழில் - பனைத்தொழில்நுட்பம் -கருப்புசிவப்பு பாண்டங்கள் - பண்டங்களில்கீறல்குறியீடுகள்.

**அலகு-II வடிவமைப்பு மற்றும் கட்டிடத்தொழில்நுட்பம்** 3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள்&சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமானபொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்புபற்றியவிவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப்பெருங்கோயில்கள்மற்றும்பிறவழிப்பாட்டுதலங்கள் - நாயக்கர்காலகோயில்கள் - மாதிரிகட்டமைப்புகள்பற்றிஅறிதல், மதுரைமீனாட்சிஅம்மன்ஆலயம்மற்றும்திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ்காலத்தில்சென்னையில்இந்தோ - சாரோசெனிக்கட்டிடக்கலை

**அலகு-III உற்பத்திதொழில்நுட்பம்** 3

கப்பல்கட்டும்கலை - உலோகவியல் - இரும்புதொழிற்சாலை - இரும்பைஉருக்குதல், எஃகு - வரலாற்றுச்சான்றுகளாகசெம்புமற்றும்தங்கநாணயங்கள் - நாணயங்கள்அச்சடித்தல் - மணிஉருவாக்கும்தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புத்துண்டுகள் - தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில்மணிகளின்வகைகள்

**அலகு- IV வேளாண்மை மற்றும் நீர்பாசன தொழில்நுட்பம்** 3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்குமிழித்தூம்பின்முக்கியத்துவம்- கால்நடைபராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மைமற்றும்வேளாண்மைசார்ந்தசெயல்பாடுகள் - கடல்சார்அறிவு - மீன்வளம் - முத்துமற்றும்முத்துக்குளித்தல் - பெருங்கடல்குறித்தபண்டையஅறிவுஅறிவுசார்சமூகம்.

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

அறிவியல்தமிழின்வளர்ச்சி - கணித்தமிழ்வளர்ச்சி - தமிழ்நூல்களைமின்பதிப்புசெய்தல் - தமிழ்மென்பொருட்கள்உருவாக்கம் - தமிழ்இணையக்கல்விக்கழகம் - தமிழ்மின்நூலகம் - இணையத்தில்தமிழ்அகராதிகள் - சொற்குவைத்திட்டம்

**TEXT & REFERENCE BOOKS:**

1. தமிழகவரலாறு – மக்களும்பண்பாடும் – கே. கே. பிள்ளை ( வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்)

2. கணினித்தமிழ் – முனைவர்இல. சுந்தரம். ( விகடன்பிரசுரம்)

3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரீகம் ( தொல்லியல்துறைவெளியீடு)

4. பொருனை – ஆற்றங்கரைநாகரீகம். ( தொல்லியல்துறைவெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL

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 C ivilization 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) (Publishedby: 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

| **24HS203** | **JAPANESE - I** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **2** | **0** | **0** | **-** |

**OBJECTIVE:**

1. To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation.
2. Develop basic communicative competence in everyday Japanese
3. Enable learners to understand and use fundamental grammar pattern

**Module- I Japanese Writing System & Basic Sentence Structure 6**

Introduction to Japanese writing systems: Hiragana, Katakana, basic Kanji (introduction), Pronunciation and sound patterns, Greetings and self-introduction.

**Module- Ⅱ Basic Sentence Structure & Vocabulary 4**

Sentence pattern: **A** は **B** です, Question formation using か, Particles: は**,** の, Basic vocabulary: nationality, occupations, majors, Subject pronouns, Family.

**Module -Ⅲ Demonstratives, Numbers & Daily Objects 6**

Demonstratives: これ**,** それ**,** あれ**,** どれ, Demonstratives with noun**:** この**,** その**,** あの**,** どの**,** Location words: ここ**,** そこ**,** あそこ**,** Numbers, time, prices, counters, Particles: も、ね、よ, Classroom and daily-use vocabulary.

**Module- IV Verbs, Actions , Time Expressions & Present Tense 8**

Verb classification: Group I, II, III, Verb ます form (present & negative), Time expressions and frequency adverbs, Particles: を、で, Making invitations: ～ませんか**,** Word order, Days, Weeks, Months, and Years.

**Module-V Past Tense & Movement Expressions 6**

Past tense forms: ました／ませんでした form (past & negative)**,** Location and direction particles: に、へ、で**,** Means of transport, Talking about past events, Basic movement-related expressions**.**

**TOTAL:30 PERIODS**

**Text Books**

1. GENKI I – An Integrated Course in Elementary Japanese (3rd Edition)
2. Minna no Nihongo Shokyuu I – Main Text
3. Minna no Nihongo I – Translation & Grammatical Notes (English)

**Reference Books**

1. GENKI I Workbook (3rd Edition)
2. Minna no Nihongo I Workbook
3. JLPT N5 Official Practice Workbook

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: JAPANESE - I** | |
|---|---|
| **CO** | **Course Outcomes** |
| **CO1** | Understand simple spoken Japanese in everyday contexts. |
| **CO2** | Communicate with widely used Japanese words effectively. |
| **CO3** | Develop the skills necessary for self-directed learning and continuous improvement in Japanese language. |

| **24HS204** | **DEUTSCH-I** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **2** | **0** | **0** | **-** |

**OBJECTIVE:**

- To impart fundamentals of the German language, including reading, writing systems, pronunciation, and speaking.

**Module- I** **Basic Communication - Sprechen** **10**

Basics & Introduction: German alphabet and pronunciation, Vowels (long & short), consonants, Umlauts (ä, ö, ü) and ß. Greetings and farewells (formal & informal), Polite expressions (Bitte, Danke, Entschuldigung). Numbers 1–100 and days of the week, Months, Seasons, Personal pronouns (ich, du, er, sie…), Telling time (Wie spät ist es?) – Official timings and Unofficial timings.Grammar Essentials & Everyday Vocabulary: Present tense of regular verbs (spielen, arbeiten, machen…)

Activities: Self- Introduction and Talking about hobbies

**Module -II** **Basic German grammar** **10**

Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Artikel and gender (der, die, das; ein, eine), Modal verbs, and its conjugations. Nouns- Rules for Artikel (Masculine gender, Feminine gender and Neutram gender) Artikel - Nominativ Case. (Was oder Wer, kein oder nicht)

Activities: Conversation in the office, Hotel Reception, composition of simple texts giving information about person, daily routine, family members etc.,

**Module- III** **German grammar-II** **10**

Artikel-Akkusativ case (e.g., einen, keinen, doch), Akkusativ case- Pronomen, Possessivartikel, Präpositionen, Es gibt. Describing people and things: adjectives and colors, Family, food, furniture, and common vocabulary with gender.

Activities: Food culture in Germany, Ordering food and drinks at a café or Listening to short conversations and responding appropriately. History, geography and aspects of German culture as group task / project work.

**TOTAL:30 PERIODS**

**REFERENCES:**

1. Funk, H., Kuhn, C., & Demme, S. (2015), Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag
2. Studio d A1: Deutschals Fremdsprache, Hermann Funk and Christina Kuhn Cornelsen Verlag publication **(**2005).
3. Evans, S., &Pude, A. (2012),Menschen A1. HueberVerlag.
4. Niebisch, D., Penning-Hiemstra, S., et al. (2016). Schritte International Neu A1.1. HueberVerlag.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: DEUTSCH-I** | |
|---|---|
| **CO** | **Course Outcomes** |
| **CO1** | Communicate with widely used German words effectively |
| **CO2** | Understand German grammar and German culture |
| **CO3** | Understand German civilization and Translation |

| 24HS2L1 | APTITUDE AND SOFT SKILLS – I | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**Module I Aptitude Skills I** **15**

Quantitative Aptitude Modules : Number System, square root and cube root, average, problems on numbers, Ages, Percentages, Profit and Loss, Ratio and Proportion, Partnership, Chain rule, time and work, time and distance.

**Module II Soft Skills I** **15**

Self-Introduction - Self-analysis, Attitude, perceptions, Positive approach to challenges, Change management –ideas and approach, Goal setting vision, Time management, Planning, Entrepreneurial skills - Leadership skills, presentation and performance giving and receiving feedback, setting expectations and exhibiting professional behavior – Group Discussion.

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010

| 24EE2L1 | ELECTRIC CIRCUITS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

**OBJECTIVES:**

- To simulate various electric circuits using circuit simulation software.
- To gain practical experience on electric circuits and verification of theorems.
- To familiarize the concepts of resonance and coupled circuit experimentally.

**PRE-REQUISITE: NIL**

**LIST OF EXPERIMENTS:**

1. Simulation and experimental verification of electrical circuit problems using Ohm'slaw,Kirchhoff's voltage and current laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenin's theorem.
3. Simulation and experimental verification of electrical circuit problems using Norton's theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer Theorem.
6. Simulation and experimental verification of Reciprocity theorem.
7. Simulation and experimental determination of time constant of RL and RC series circuits.
8. Study of measurement of self and mutual inductance.
9. Design and Simulation of series & parallel resonance circuit.
10. Simulation of three phase balanced and unbalanced star, delta network.

**TOTAL: 60 PERIODS**

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

1. Regulated Power Supply: 0 – 15 V D.C - 10 Nos.
2. Function Generator (1 MHz) - 10Nos.
3. Self and Mutual inductance measurement kit – 2 Nos.
4. 10 Nos. of PC with Circuit Simulation Software (min 10 Users) ( e-Sim /Scilab/ Pspice / MATLAB /other Equivalent software Package) and Printer (1No.)
5. AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10Nos.)
6. Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box - 6 Nos each.
7. Circuit Connection Boards - 10 Nos.
8. Oscilloscope (20 MHz) – 5 Nos.
9. Digital storage Oscilloscope (20MHz)-1No.
10. Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: ELECTRIC CIRCUITS LABORATORY** | | **CourseCode:24EE2L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K–CO** |
| **C119.1** | Conduct experiments to verify electrical circuits using Ohm's Law and Kirchhoff's Voltage and Current Laws, and simulate the same using circuit simulation software. | 1 | K3 |
| **C119.2** | Conduct experiments to verify network theorems and simulate the same using circuit simulation software. | 2,3,4,5,6 | K3 |
| **C119.3** | Determine the time constant of RC and RL series circuits and simulate the same using circuit simulation software. Demonstrate the measurement of self and mutual inductance. | 7, 8 | K3 |
| **C119.4** | Experiments and simulate series and parallel resonance circuits using circuit simulation software | 9 | K3 |
| **C119.5** | Experiments and simulate three-phase balanced and unbalanced star and delta networks using circuit simulation software.. | 10 | K3 |

| **24GE2L1** | **PYTHON PROGRAMMING LABORATORY** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **0** | **0** | **3** | **1.5** |

**OBJECTIVES:**

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations and data manipulation on data base.

**LIST OF EXPERIMENTS:**

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files
13. Data Manipulation operations using python SQL database access

**PLATFORM NEEDED:** Python 3 interpreter for Windows/Linux

**TOTAL: 45 PERIODS**

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

Systems with Linux or Windows 7 or later Operating System with Python versions: 2.7.X, 3.6.X., 3.8.X, MySQL software.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: PYTHON PROGRAMMING LABORATORY** | | **Course Code: 24GE2L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K–CO** |
| **C120.1** | Develop simple Python programs using conditional and iterative constructs | 1,2,7 | K3 |
| **C120.2** | Construct simple Python programs using built-in functions, user-defined functions and recursion functions. | 3,4 | K3 |
| **C120.3** | Make use of array concepts to develop programs for solving various sorting and matrix operations. | 5,6,8,9 | K3 |
| **C120.4** | Apply command line arguments and file handling methods to implement programs to read word from text file and merging files. | 10,11,12 | K3 |
| **C120.5** | Make use of python SQL database to implement and solve data Manipulation operations. | 13 | K3 |

| **24GE2L2** | **INDUSTRIAL PRACTICES WORKSHOP** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **0** | **0** | **3** | **1.5** |

**OBJECTIVES:**

- To understand various pipe fittings used in common household plumbing work and wood work.
- To know about arc welding and machining processes.
- To gain knowledge on sheet metal work.
- Wiring various electrical joints in common house hold electrical wire work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

**GROUP A (CIVIL AND MECHANICAL)**

**PART I CIVIL ENGINEERING PRACTICE**

**CARPENTRY PRACTICE:**

1. Sawing, Planning and making T-Joint / Cross lap joint / Dovetail joint

**PLUMBING PRACTICE:**

2. Providing basic water line connection for a residential house using plumbing components and household utilities like water heater, wash basin etc.,

**PART II MECHANICAL ENGINEERING PRACTICE**

**SHEET METAL PRACTICE:**

3. Preparation of a Model of Rectangular Tray/ Conical Funnel.

**WELDING PRACTICE:**

4. Joining two metal plates by single butt joint / T fillet joint / lap joint using arc welding.
5. Demonstration on Gas welding

**BASIC MACHINING PRACTICE:**

6. Exercise on Simple turning, Facing / Taper turning / Drilling and Tapping.

Simple model development using above practices

**GROUP–B(ELECTRICAL AND ELECTRONICS)**

**PART III ELECTRICAL ENGINEERING PRACTICES**

7. Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter
8. Stair case wiring
9. Fluorescent Lamp wiring.
10. Energy meter wiring and related calculations
11. Study of Iron Box wiring and assembly
12. Study of Fan Regulator/ emergency lamp wiring

**PART IV ELECTRONIC ENGINEERING PRACTICES**

13. Resistor Colour coding and verification of series parallel connections.
14. Measurement of AC signals parameters. (Amplitude and Frequency)
15. Verification of logic gates.
16. Soldering simple electronic circuits and checking continuity.
17. PN Diode as a switch.
18. Study of Lap Top

**TOTAL: 45 PERIODS**

| **EQUIPMENT FOR A BATCH OF 30 STUDENTS:** | | |
|---|---|---|
| **CIVIL** | | |
| 1. | Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings | 15 sets |
| 2. | Carpentry Vice (fitted to work bench) | 15 nos |
| 3. | Standard wood working tools | 15 sets |
| 4. | Models of industrial trusses, door joints, furniture joints | 5 each |
| 5. | Power Tools<br>a. Rotary Hammer<br>b. Demolition Hammer<br>c. Circular Saw<br>d. Planer<br>e. Hand Drilling Machine<br>f. Jigsaw | 2 nos<br>2 nos<br>2 nos<br>2 nos<br>2 nos<br>2 nos |
| **MECHANICAL** | | |
| 6. | Arc welding transformer with cables and holders | 5 nos |
| 7. | Welding booth with exhaust facility | 5 nos |
| 8. | Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 sets |
| 9. | Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. | 2 nos |
| 10. | Centre Lathe | 2 nos |
| 11. | Power Tool: Angle Grinder | 2 nos |
| 12. | Standard Sheet metal working tools | 15 sets |
| **ELECTRICAL** | | |
| 1 | Assorted electrical components for house wiring | 5 sets |
| 2 | Electrical measuring instruments (Energy meter, ammeter, voltmeter) | 2 nos each |
| 3 | Study purpose items: Iron box, fan and regulator, emergency lamp | 1 each |
| **ELECTRONICS** | | |
| 1 | Assorted electronic components for making circuits. (Resistor, Capacitor, Diode) | 20 nos each |
| 2 | Small PCBs | 10 nos |
| 3 | Multi meter | 5 nos |
| 4 | CRO, AFO, Transformer | 3 nos each |
| 5 | Soldering guns | 5 nos |
| 6 | IC Trainer kit | 5 nos |
| 7 | AND, OR, NAND, NOR, NOT, XOR Gate ICs | 5 nos each |
| 8 | Used Laptop (for demo purpose) | 1 no |

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **COURSENAME: INDUSTRIAL PRACTICES WORKSHOP** | | **COURSE CODE:24GE2L2** | |
|---|---|---|---|
| **GROUPA(CIVIL&MECHANICAL)<br>GROUP B (ELECTRICAL & ELECTRONICS)** | | | |
| **CO** | **Course Outcomes** | **EXP** | **K–CO** |
| **C121.1** | Apply the knowledge of engineering fundamentals to the professional engineering practice. | 1-18 | K3 |
| **C121.2** | Identify, formulate and analyze engineering problems reaching conclusions using engineering sciences | 1-18 | K3 |
| **C121.3** | Design solutions for societal and environmental considerations. | 1-18 | K3 |
| **C121.4** | Apply reasoning informed by the contextual knowledge relevant to the professional engineering practice. | 1-18 | K3 |
| **C121.5** | Function effectively as an individual, as a leader and write effective reports and documentation. | 1-18 | K3 |

**24HS2L2** **PHYSICAL EDUCATION - I**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
- To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

**Introduction to physical education**: Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid practices. **Participation of athletic events**: Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles. **Skill development in any one of the following outdoor games:** Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis. **Skill development in any one of the following indoor games:** Shuttle Badminton, Chess and Table Tennis.

**REFERENCES:**

1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication.

**E-resources:** 1. https://www.who.int/health-topics/physical-activity

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name : PHYSICAL EDUCATION - I** | |
|---|---|
| **CO** | **Course Outcomes** |
| CO1 | Understand and explain the importance of physical activity for mental and physical health. |
| CO2 | Apply basic principles of exercise science in the routine life |
| CO3 | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively |
| CO4 | Demonstrate independent learning in health, nutrition, and fitness-related topics. |

| 24BS301 | TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- To learn the formation of partial differential equations and the solution of first order and higher order partial differential equations.
- To apply Fourier series to solve one dimensional wave, one and two dimensional heat equations which occur frequently in various branches of Engineering disciplines.
- To make the students familiar with the topics such as Fourier Transforms, Z-Transforms and Fourier series.

**UNIT- I PARTIAL DIFFERENTIAL EQUATIONS 9+3**

Formation of partial differential equations–Singular integrals –Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

**UNIT- II FOURIER SERIES 9+3**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

**UNIT- III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3**

Classification of PDE – Method of separation of variables - Fourier Series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

**UNIT- IV FOURIER TRANSFORMS 9+3**

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

**UNIT- V Z-TRANSFORMS AND DIFFERENCE EQUATIONS 9+3**

Z-transforms -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 - transforms.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXTBOOKS:**

1. Grewal .B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. Bali.N.P. and Manish Goyal,"A Text book of Engineering Mathematics", Laxmi Publications Pvt. Ltd, 9thEdition, 2014.

**REFERENCES:**

1. Erwin Kreyszig,"Advanced Engineering Mathematics",John Wiley, India,8thEdition, 2016.
2. James.G., "Advanced Modern Engineering Mathematics", Pearson Education,3rd Edition, 2007.

3. Andrews.L.C., L.C and Shivamoggi .B, "Integral Transforms for Engineers", SPIE Press, 1999.
4. Narayanan.S., Manicavachagom Pillay. T.K. and Ramanaiah.G, "Advanced Mathematics for Engineering Students",S.Viswanathan Publishers Pvt. Ltd, Chennai, Vol.II2003 &Vol.III2002.
5. Ramana.B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt .Ltd, New Delhi, 2016.

**OUTCOMES:**
**AT THE END OF THE COURSE LEARNERS WILL BE ABLE TO:**

| **Course Name: Transforms and Partial Differential Equations** | | **Course Code:24BS301** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K-CO** |
| **C201.1** | Solve linear partial differential equations, second and higher order with constant coefficients. | I | K3 |
| **C201.2** | Solve partial differential equations using Fourier series analysis. | II | K3 |
| **C201.3** | Solve one, two dimensional heat flow problems and one dimensional wave equation problems. | III | K3 |
| **C201.4** | Compute the Fourier transforms of various functions. | IV | K3 |
| **C201.5** | Apply Z-transforms techniques to solve difference equation. | V | K3 |

| 24EE301 | DIGITAL LOGIC CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To study various number systems and basic theorems of Boolean algebra and gate level minimization and implementation.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
- To analyze and design of sequential circuits: synchronous and asynchronous circuits.
- To introduce the concept of synchronous sequential circuits, PLCs and Digital Logic Families.
- To introduce digital simulation techniques for development of application oriented logic circuit.

**UNIT- I BOOLEAN ALGEBRA AND GATE LEVEL MINIMIZATION 9**

Review of number systems, types and conversion, binary codes, error detection and correction codes(Parity and Hamming code). Boolean theorems and properties —Boolean functions - Logic gates — Gate Level Minimization using Karnaugh Map, SOP & POS simplification, Don't Care conditions. Implementations of Logic Functions using gates-NAND–NOR implementations.

**UNIT-II COMBINATIONAL LOGIC 9**

Design of adders, subtractors, Multiplexers - Combinational logic design using Multiplexers - Demultiplexers and their use in combinational logic design - Magnitude comparators, Code Converters - BCD to Binary and Binary to BCD, Priority Encoders - Decimal to BCD, Octal to Binary, Decoders- BCD to Decimal and BCD to Seven Segment Display driver.

**UNIT- III SYNCHRONOUS SEQUENTIAL LOGIC 9**

Sequential logic - SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits —Moore and Mealy models- Counters, state diagram; state reduction; state assignment.

**UNIT-IV ASYNCHRONOUS SEQUENTIAL CIRCUITS,MEMORY AND LOGIC FAMILIES 9**

Asynchronous sequential logic circuits - Transition stability, flow stability - race conditions, hazards & errors in digital circuits; analysis of asynchronous sequential logic circuits. Memories: PROM, PLA —PAL - Digital Logic Families: TTL, ECL, CMOS.

**UNIT- V VHDL 9**

RTL Design —combinational logic —Sequential circuit —Operators —Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & De multiplexers).

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOKS:**

1.M.MorrisMano, MichaelD.Ciletti,"Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog" Pearson India, 6th Edition, 2018.
2.ThomasLFloyd"DigitalFundamentals"11thedition,PearsonEducation, 2020.

**REFERENCES:**

1.D.P.Kothari,J.S.Dhillon“Digital Circuits and Design” Pearson Education,2018

2.Mandal,“Digital Electronics Principles & Application, McGraw Hill Edu,2019.

3.William Keitz, Digital Electronics-A Practical Approach with VHDL, Pearson, 2021

4.RajKamal, “Digital Systems–Principles and Design” Pearson Education India, 2020.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: Digital Logic Circuits** | | **Course Code:24EE301** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K–CO** |
| **C202.1** | Apply the knowledge of Engineering fundamentals to convert different types of codes and the various types of number system, simplify the Boolean functions and gate level minimization and implementation. | I | K3 |
| **C202.2** | Design the Combinational logic circuits, | II | K4 |
| **C202.3** | Design the synchronous Sequential logic circuits, draw the block diagram of Shift Registers and Counters | III | K4 |
| **C202.4** | Design the asynchronous sequential circuits and explain the hazards & errors in digital circuits and analysis the Programmable Logic Devices and describe the operation of digital logic families. | IV | K4 |
| **C202.5** | Develop the VHDL coding for combinational logic and Sequential circuits. | V | K3 |

| 24EE302 | ELECTRONIC DEVICES AND CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the structure of basic electronic devices.
- Be exposed to active and passive circuit elements.
- To familiarize the operation and applications of electronic devices.
- To explore the gain Vs frequency response characteristics of amplifier.
- To learn the required functionality of positive and negative feedback systems.

**UNIT- I PNJUNCTION DEVICES 9**

PN junction diode—structure, operation and V-I characteristics, Transition and Diffusion capacitances —Rectifiers —Half Wave and Full Wave Rectifier. Zener diode —reverse characteristics – Zener as voltage regulator, Display devices – LED, Laser diode.

**UNIT-II BJT AND SMALLSIGNAL AMPLIFIERS 9**

BJT - structure, operation of NPN and PNP transistor, Input and output characteristics of CE, CB and CC configurations. DC Load Line and operating point, Need for biasing - Fixed and Voltage divider biasing. Single stage BJT amplifiers — AC analysis of CE amplifier with Voltage divider bias using h-parameters - Gain and frequency response.

**UNIT- III FIELD EFFECT TRANSISTORS AND THYRISTORS 9**

JFET, MOSFET - structure, operation and characteristics, Biasing - self and voltage divider biasing. FET small signal model - Analysis of CS and Source follower. Thyristor - SCR operation and characteristics, UJT - operation and characteristics.

**UNIT- IV DIFFERENTIALAMPLIFIERS AND LARGESIGN ALAMPLIFIERS 9**

Cascade amplifier, BJT Differential amplifier—DC and AC analysis of common mode gain, differential mode gain and CMRR - Single tuned amplifier - construction, operation and frequency response. Power amplifiers—class A, class B and class C (Qualitative analysis).

**UNIT- V FEEDBACK AMPLIFIERS AND OSCILLATORS 9**

Feedback concepts, feedback connections - voltage / current, series / shunt feedback - Transfer gain with feedback - effect of negative feedback on $R_i$ and $R_o$ - Advantages of negative feedback. Positive feedback — Condition for oscillations, RC phase shift, Wien bridge, Hartley, Colpitts and Crystal oscillators.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOKS:**

1. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press Higher Education, 5th Edition,2008.
2. Sedra and smith, “Microelectronic circuits”,8thEd.,Oxford University Press 2020.

**REFERENCES:**

1. Thomas L. Floyd, “Electronic devices” Conventional current version, Pearson prentice Hall,10th Edition, 2017.
2. Robert Boylestad and Louis Nashelsky.,“Electron Device and Circuit Theory” Prentice Hall Private Limited,11thedition,2017.
3. SedhaR.S,“A Text Book of Applied Electronics”, S.Chand & company Ltd., Revised Edition, 2015.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: Electronic Devices and Circuits** | | **Course Code: 24EE302** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K–CO** |
| **C203.1** | Apply the knowledge of Engineering fundamentals to explain the operation and characteristics of PN junction diode, Zener diode, LED and Laser diode. | **I** | **K2** |
| **C203.2** | Apply the knowledge of Engineering fundamentals to derive the expression for voltage gain, current gain, Input resistance and output resistance of a BJT CE amplifier with voltage divider biasing using h-parameter model. | **II** | **K3** |
| **C203.3** | Apply the knowledge of Engineering fundamentals to derive the expression for voltage gain, input resistance and output resistance of FET amplifier under CS and Source follower connection. | **III** | **K3** |
| **C203.4** | Apply the knowledge of Engineering fundamentals to derive the expression for voltage gain of cascade amplifier, differential amplifier, single tuned amplifier and power amplifier. | **IV** | **K3** |
| **C203.5** | Apply the knowledge of Engineering fundamentals to derive the expression for gain of different types of negative feedback connections and expression for the oscillating frequency of RC and LC tuned Oscillators. | **V** | **K3** |

| 24EE303 | ELECTROMAGNETIC THEORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of Electrostatic fields, electrical potential, energy density and their applications.
- Magneto static fields, magnetic flux density, vector potential and its applications.
- Different methods of emf generation and Maxwell's equations
- Electromagnetic waves and characterizing parameters

**UNIT- I VECTOR CALCULUS 9+3**

Review of Vector algebra - Introduction to Cartesian, Cylindrical and Spherical coordinate systems - Vector calculus - Differential length, area and volume, line, surface and volume integrals - Del operator - Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes theorem - Laplacian of a scalar.

**UNIT-II STATIC ELECTRIC FIELDS 9+3**

Coulomb's law - Electric field intensity – Electrical field due to point, Line, Surface and Volume charge distributions - Gauss law and its applications - Absolute Electric potential - Potential difference - Calculation of potential differences for different configurations - Electric dipole - Electrostatic Energy and Energy density - Current and current density - Continuity of current - Boundary conditions of perfect dielectric materials - Permittivity of dielectric materials - Capacitance, Capacitance of different configurations - Poisson's and Laplace's equation - Applications.

**UNIT- III STATICMAGNETIC FIELDS 9+3**

Biot- Savart's Law —Ampere's Circuital Law - Steady magnetic fields produced by current carrying conductors—Magnetic flux and magnetic flux density–Scalar and Vector Magnetic potentials - Lorentz Force - Magnetic Force and Torque - Nature of magnetic materials - Magnetization and permeability - Magnetic boundary conditions - Magnetic circuits –Inductances and Mutual inductances-Energy density-Applications.

**UNIT- IV TIMEVARYING FIELDS 9+3**

Faraday's law for Electromagnetic induction- Motional and Transformer EMF-Displacement current, Point form and Integral form of Maxwell's equation- Maxwell's equation in Phasor form - Applications.

**UNIT- V ELECTROMAGNETIC WAVES 9+3**

Derivation of Wave Equation - Uniform Plane Waves - Wave equation in Phasor form - Plane waves in lossy dielectrics - Plane waves in free space and in a homogenous material - Wave equation for a conducting medium-Propagation in good conductors - Skin effect - Poynting theorem - Reflection and Refraction of Uniform plane waves - Standing wave ratio - Applications.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXTBOOKS:**

1.Mathew N.O.Sadiku, 'Principles of Electromagnetics',6th Edition,Oxford University Press Inc. Asian edition, 2015.
2.William H.Hayt and John A.Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition,2014.
3.KAGangadhar,'Electromagnetic Field Theory', Khanna Publishers; Eighth Reprint: 2015

**REFERENCES:**

1.Joseph.A.Edminister,'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), McGraw Hill, 2010.
2.Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.
3.J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers,2013

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO**

| Course Name : **ELECTROMAGNETIC THEORY** | | Course Code : **24EE303** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K–CO** |
| **C204.1** | Apply vector calculus in Cartesian, Cylindrical, and Spherical coordinate systems to solve electromagnetic field problems. | I | K3 |
| **C204.2** | Apply electrostatic field theory to determine electric field intensity, potential, energy density, and capacitance. | II | K3 |
| **C204.3** | Apply magnetostatic laws to compute magnetic fields, inductance, and torque in current-carrying systems and magnetic materials. | III | K3 |
| **C204.4** | Apply Maxwell's equations in differential and integral forms to time-varying electromagnetic fields. | IV | K3 |
| **C204.5** | Apply the principles of electromagnetic wave theory to determine wave behavior, power transmission, reflection, and refraction in various media. | V | K3 |

| 24EE304 | DC MACHINES AND TRANSFORMERS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the Constructional details, the principle of operation, types, performance characteristics and applications of DC generators.
- To understand the Constructional details, the principle of operation, types, performance characteristics and applications of DC motor.
- To explain the need of starters, types and its operation for DC motors and to explain the various methods of testing of DC machines.
- To understand the Constructional details, the principle of operation, types, performance characteristics and applications of Single Phase Transformer.
- Toexplainthevariousmethodsoftestingofsinglephasetransformerandtypesofthree phase transformer connections.

**UNIT- I DC GENERATOR 9**

Constructional Details – Working Principle – Types of Armature Winding and Connections – EMF Equation– Methods of Excitation–Characteristics of Series, Shunt and Compound Generators – Armature Reaction and Commutation – Parallel Operation – Losses, Efficiency and Power Stages in DC Generator – Condition for Maximum Efficiency – Applications.

**UNIT-II DC MOTOR 9**

Principle of Operation –Back EMF–Maximum output power- Torque Equation –Types of DC Motor–Characteristics of Series, Shunt and Compound Motor–Losses, Efficiency and Power Stages in DC Motor – Condition for Maximum Efficiency - Applications.

**UNIT- III STARTERS,SPEED CONTROL AND TESTING OF DC MACHINES 9**

Need of starters–two point, three point, four point starters–Speed Control Methods– Separation of No Load Losses – Testing of DC Machines – Brake Test, Swinburne‘s Test, Hopkinson‘s Test - Electric braking – Plugging, dynamic and regenerative braking.

**UNIT- IV TRANSFORMER 9**

Constructional Details–Principle of Operation-Types–EMF Equation–Transformation Ratio– Phasor Diagram–Transformer on No Load and Load–Equivalent Circuit–OC and SC Test– Regulation– Parallel Operation–Auto Transformer–Saving of Copper.

**UNIT- V THREE PHASE TRANSFORMER AND TESTING OF TRANSFORMER 9**

Losses and Efficiency in Transformers– Condition for Maximum Efficiency–Testing of Transformers – Polarity Test, Load Test – Phasing out Test – Sumpner’s Test – Separation of Losses – All day Efficiency – Three Phase Transformers– Types of Connections.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOKS:**

1. Nagrath.I.J and Kothari.D.P., ‘Electric Machines’, 5th Edition,TataMcGraw Hill Publishing Company, New Delhi, 2017.
2. P.C Sen, ‘Principles of Electric Machines and Power Electronics’ JohnWiley&Sons;3rd edition 2013.

**REFERENCES:**

1.Bimbra P.S. - Electrical Machinery, 1stEdition, Khanna Book Publishing co(P) Ltd, New Delhi, 2021

2.S.K. Bhattacharya, 'Electric Machines' McGraw - Hill education, New Delhi, 3rd edition,2009.

3.Sahdev.S.K.,'Electrical Machines', Cambridge University Press, 2018.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name :** DC MACHINES AND TRANSFORMER | | **Course Code : 24EE304** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K-CO** |
| **C205.1** | The knowledge of Engineering fundamentals to calculate the required filed turns and brush adjustment to compensate the armature reaction effect and explain the construction and working of D.C generator. | I | K3 |
| **C205.2** | The knowledge of Engineering fundamentals to analyze the characteristics of D.C motor to identify its applications based on requirement | II | K3 |
| **C205.3** | The knowledge of Engineering fundamentals to calculate the required resistance to minimize the starting current of D.C motor and to predetermine the efficiency of D.C. machine in different methods. | III | K3 |
| **C205.4** | The knowledge of Engineering fundamentals to calculate the voltage regulation and efficiency of two winding and auto transformer at different loading conditions in different methods | IV | K3 |
| **C205.5** | The knowledge of Engineering fundamentals to predetermine the voltage regulation and efficiency of single phase transformer. Different types of three phase transformer connection and calculating phase and line voltages. | V | K3 |

| 24HS301 | HUMAN VALUES AND ETHICS | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 1 | 0 | 2 |

**OBJECTIVES:**

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

**UNIT - I INTRODUCTION TO VALUE EDUCATION 3+3**

Value Education – Definition - Concept and Need for Value Education - Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education- fulfilling human aspirations.

**Practice Session:** Sharing about Oneself, Exploring Human Consciousness – self exploration, Exploring Natural Acceptance.

**UNIT - II HARMONY IN THE HUMAN BEING 3+3**

Understanding Myself as Co-existence of the Self and the Body - I' and Body synchronization - Realization of Self, Body needs - Self-regulation and Health.

**Practice Session:** Exploring the difference of Needs of Self and Body, Exploring Sources of Imagination in the Self, Harmony of Self with the Body - program for ensuring health vs dealing with disease.

**UNIT - III HARMONY IN THE FAMILY, SOCIETY AND NATURE 3+3**

Family as a basic unit of Human Interaction-Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love –Harmony in society: Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal- Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

**Practice Session:** Exploring the Feelings of Trust, Respect and Gratitude, Exploring Systems to fulfil Human Goals considering society and nature - Co-existence in Existence.

**UNIT - IV SOCIAL ETHICS 3+3**

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

**Practice Session:** Exploring Ethical Human Conduct, Humanistic Models in Education, Exploring Steps of Transition towards Universal Human Order.

**UNIT - V PROFESSIONAL ETHICS 3+3**

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies.

**Practice Session:** Holistic Technologies - Production Systems and Management Models, Holistic vision of life - Socially responsible behaviour and environmentally responsible work.

**CLASS HOURS: 30 PERIODS TERM HOURS: 30 PERIODS TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. R.R. Gaur, R. Asthana, G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd revised edition, Excel Books, New Delhi, Reprint 2019.
2. A N Tripathy, Human Values, New Age International Publishers, New Delhi, 2003.

**REFERENCES:**

1. E G Seebauer& Robert L.Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd, Reprint 2011.
3. Mike Martin and Roland Schinzinger "Ethics in Engineering" McGraw Hill, New York, 4th edition, Reprint 2017.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, "Engineering Ethics-concepts and Cases", Thomson Learning, 2000.
5. S.K. Chakraborty and Dabangshu Chakraborty, "Human Values and Ethics: Achieving Holistic Excellence", ICFAI University Press, 2006.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name : HUMAN VALUES AND ETHICS** | | **Course Code :24HS301** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K-CO** |
| **C206.1** | Explain the significance of value inputs and start applying them in their life and profession to ensure happiness and prosperity. | I | AD |
| **C206.2** | Differentiate between Thyself & the Body to ensure competency of an individual. | II | AD |
| **C206.3** | Explain the role of a human being in ensuring harmony in family, society, and nature. | III | AD |
| **C206.4** | Develop an awareness of human values to appreciate the rights of others and to enable social balance. | IV | AD |
| **C206.5** | Differentiate between ethical and unethical professional practices, and apply suitable strategy to actualize a harmonious working environment. | V | AD |

| **24EE3L1** | **ELECTRONICS LABORATORY** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| | | **0** | **0** | **3** | **1.5** |

**OBJECTIVES:**

- To understand the behavior of semiconductor devices experimentally.
- To design the amplifiers and oscillators.
- To analyze the rectifier and filters

**LISTOF EXPERIMENTS:**

1. Characteristics of PN Junction diode and Zener diode
2. Realization of Clipper and Clamper Circuit
3. Simulation and Experimental Verification of Single Phase Half-wave Rectifier
4. Simulation and Experimental Verification of Single Phase Full-wave Rectifier
5. Characteristics of BJT under common emitter and common base configurations.
6. Design and testing of Common Emitter amplifier.
7. Characteristics of UJT and generation of saw tooth waveforms.
8. Characteristics of JFET.
9. Differential amplifier using FET.
10. Design and testing of RC phase shift and LC oscillators.
11. Design and testing of Negative Feedback amplifiers.
12. Simple Electronic Projects

**TOTAL:45 PERIODS**

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: ELECTRONICS LABORATORY** | | **CourseCode :24EE3L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K–CO** |
| **C207.1** | Apply the knowledge of Engineering fundamentals to determine the Breakdown voltage, forward and reverse resistance of PN junction diode and Zener diode and calculate the ripple factor of rectifier circuits with filter and analyze the input and output performance of the given diode-based circuit using simulation tools. | 1,2, 3,4 | K3 |
| **C207.2** | Apply the knowledge of Engineering fundamentals to calculate the hybrid parameters of a BJT in both Common-Emitter (CE) and Common-Base (CB) configurations from their characteristics. | 5 | K3 |
| **C207.3** | Apply the knowledge of Engineering fundamentals to obtain the frequency response of BJT CE amplifier, feedback amplifier and calculate its bandwidth. | 6,11 | K3 |
| **C207.4** | Apply the knowledge of Engineering fundamentals to obtain the UJT and JFET parameters from the characteristics and also to calculate the gain of differential amplifier using JFET. | 7,8, 9 | K3 |
| **C207.5** | Apply the knowledge of Engineering fundamentals to design the RC and LC tuned oscillators for a specific oscillating frequency. | 10 | K3 |

| **LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:** | | |
|---|---|---|
| **S.No.** | **NAME OF THE EQUIPMENT** | **Qty.** |
| 1 | Semiconductor devices like Diode, Zener Diode, NPN Transistors | 20 Each |
| 2 | JFET,UJT | 10 Each |
| 3 | Resistors and Capacitors (Various Values) | 30 Each |
| 4 | Function Generators | 10Nos. |
| 5 | Regulated Power Supply ±15V | 10Nos. |
| 6 | CRO | 10Nos. |
| 7 | Storage Oscilloscope | 1No. |
| 8 | Breadboards | 20 Nos. |
| Atleast one demo kit for the listed experiment. | | |

**24EE3L2 ELECTRICAL MACHINES LABORATORY–I**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**OBJECTIVES:**

- To analyze the characteristics of D.C motor and D.C generator under actual load test.
- To analyze the characteristics of D.C motor and D.C generator by indirect method
- To analyze the characteristics of transformer by direct and indirect method

**LISTOF EXPERIMENTS:**

1. Load test on DC Shunt motor & DC Series motor
2. Load characteristics of DC Compound generator.
3. Load test on DC Compound motor
4. Speed Control of DC Motor: Field control and Armature control.
5. Swinburne's test.
6. Open circuit and Load characteristics of DC generator(Self and Separately Excited).
7. Load test on DC series generator.
8. Hopkinson's test.
10. Load test on Single phase transformer and Study of Three phase transformer connections.
11. Open circuit & Short circuit test on single phase transformer
12. Sumpner's test.
13. Study o fEV Trainer Module.

**TOTAL:45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name ELECTRICAL MACHINES LABORATORY -I** | | **Course Code : 24EE3L2** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K–CO** |
| **C208.1** | The knowledge of Engineering fundamentals to calculate torque, output power, input power, efficiency and speed control of DC motors | 1,3,4 | K3 |
| **C208.2** | The knowledge of Engineering fundamentals to calculate voltage drop due to winding resistance and armature reaction for DC generators | 2,6,7 | K3 |
| **C208.3** | The knowledge of Engineering fundamentals to calculate constant and variable losses and to predetermine the efficiency of DC shunt machine for both motor and generator operation. Study of EV trainer kit and BLDC motor | 5,8,12 | K3 |
| **C208.4** | The knowledge of Engineering fundamentals to obtain equivalent circuit, and to calculate voltage regulation and efficiency of single phase transformer in direct method | 9 | K3 |
| **C208.5** | The knowledge of Engineering fundamentals to obtain equivalent circuit, and to calculate voltage regulation and efficiency of single phase transformer in indirect method. | 10,11 | K3 |

| S. No. | NAME OF THE EQUIPMENT | Quantity |
|---|---|---|
| 1. | DC Shunt Motor with Loading Arrangement | 3Nos. |
| 2. | Single Phase Transformer | 4Nos. |
| 3. | DC Series Motor with Loading Arrangement | 1No. |
| 4. | DC compound Motor with Loading Arrangement | 1No. |
| 5. | DC Shunt Motor Coupled with DC Compound Generator | 2Nos. |
| 6. | DC Shunt Motor Coupled with DC Shunt Motor | 1No. |
| 7. | Tachometer-Digital/Analog | 8Nos. |
| 8. | Single Phase Auto Transformer | 2Nos. |
| 9. | Three Phase Auto Transformer | 1No. |
| 10. | Single Phase Resistive Loading Bank | 2Nos. |

**24HS3L1 APTITUDE AND SOFT SKILLS – II**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Module I Aptitude Skills II** **15**

Pipes and cisterns, boats and streams, Problems on trains, Alpha Numeric Puzzles, Simple Interest, Compound Interest, Mixtures and Allegations, calendar, clock, permutation and combination, probability, height and distance.

**Module II Soft Skills II** **15**

Introduction to Soft skills – Non-Verbal Communication - Role play - Learning styles – Writing Bio-data and Process description - Peak Life Moment / Challenging moment - People management – team work, leadership, Decision making – problem identification - Email and Essay writing - Just a minute (JAM).

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010

**24HS3L2** **PHYSICAL EDUCATION – II**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Objective:**
To impart knowledge on gymnastic exercises and pressing needs for up skilling in a particular game.

**Basic gymnastics exercises:** Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, horizontal bar exercise, flic-flac-walk

**Upskilling in any one of the athletics:** Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.

Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the previous semester.

**TOTAL: 30 PERIODS**

**References:**
1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.
3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication.
4. Kandappan, K. (2004). Foundations of physical education. Friends Publications.
**E-resources**: 1. https://www.who.int/health-topics/physical-activity

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name :PHYSICAL EDUCATION – II** | |
|---|---|
| **CO** | **Course Outcomes** |
| **CO1** | Understand and explain the importance of physical activity for mental and physical health. |
| **CO2** | Apply safety principles and methods during sports activities. |
| **CO3** | Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively. |
| **CO4** | Demonstrate the advanced technical skills and strategic understanding in the game of their interest. |

| 24BS401 | PROBABILITY, STATISTICS AND NUMERICAL METHODS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- To understand the basic concepts of Probability and Statistics.
- To introduce the numerical methods for solving algebraic and transcendental equations and interpolation in various intervals.
- To acquaint the knowledge of various Numerical methods of solving ordinary differential equations.

**UNIT - I PROBABILITY AND RANDOM VARIABLES 9+3**

Probability–Axioms of probability- conditional probability – Baye's theorem (Without Proof).Discrete and continuous random variables- Moments-Moment generating function – Binomial, Poisson and Normal distributions (Except derivations).

**UNIT - II INTRODUCTION TO STATISTICS, CORRELATION AND REGRESSION 9+3**

Measures of Central tendency- Mean-Median-Mode- Measures of Dispersion- Standard deviation -Coefficient of Variation- Correlation – Coefficient of correlation –Rank Correlation-Regression –Estimation of Regression line.

**UNIT - III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method -Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel-Eigenvalues of a matrix by Power method.

**UNIT - IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolations–Approximation of derivatives using interpolation polynomials –Numerical single and double integrations using Trapezoidal and Simpson's1/3rules.

**UNIT - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3**

Single step methods: Taylor's series method-Euler's method –Modified Euler's method-Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXT BOOKS:**

1. Gupta.S.C., Kapoor.V.K,, "Fundamental of Mathematical Statistics", Sultanch and Sons Educational Publishers, New Delhi, Reprint 2013
2. Grewal.B.S., "Numerical Methods in Engineering and Science", Khanna Publishers,NewDelhi,10$^{th}$Edition,2015.

**REFERENCES:**


1. Johnson.R.A.,Miller,IandFreundJ.,"Miller and Freund‘s Probability and Statistics for Engineers" ,Pearson Education,Asia,8th Edition,2015.
2. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw Hill,NewDelhi,2006.
3. Sastry. S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2018.
4. SankaraRao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall ofIndia Pvt.Ltd,5th Edition,NewDelhi,2007.
5. Veerarajan.T,Ramachandran.T," Numerical Methods With Programs in C", Tata McgrawHill Publishing Company Limited,8th Edition,Reprint2011.


**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: PROBABILITY, STATISTICS AND NUMERICAL METHODS** | | **Course Code: 24BS401** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K- CO** |
| **C209.1** | Build the parameters of statistical distributions using basic probability theory concepts. | I | K3 |
| **C209.2** | Compute the measures of central tendency, measures of dispersion to locate the central points and to know the amount of diversity in the distribution. | II | K3 |
| **C209.3** | Solve algebraic and transcendental equations. | III | K3 |
| **C209.4** | Solve numerical differentiation and integration using numerical techniques. | IV | K3 |
| **C209.5** | Apply numerical techniques to solve the ordinary differential equations with initial and boundary conditions with engineering applications. | V | K3 |

| 24EE401 | SYNCHRONOUS AND ASYNCHRONOUS MACHINES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**OBJECTIVES:**

- To learn the construction, calculation of voltage regulation in different methods and sharing of real and reactive power of synchronous generators.
- To analyze the operation and performance of synchronous motor.
- To learn the construction, principle of operation and performance of induction machines.
- To learn the starting methods and speed control of three-phase induction motors.
- To analyze the operation and performance of single-phase induction motors and special electrical machines.

**UNIT- I SYNCHRONOUSGENERATOR 9+3**

ConstructionalDetails—TypesofRotors—EMFEquation—SynchronousReactance—ArmatureReaction–Voltage Regulation–EMF, MMF and ZPF Methods–Synchronizing and Parallel Operation—Synchronizing Power-Output Equations-Change of Excitation and Mechanical Input.

**UNIT-II SYNCHRONOUSMOTOR 9+3**

PrincipleofOperation–TorqueEquation–StartingMethods-OperationonInfiniteBusbars – V and Inverted V Curves – Input and Output Power Equations – Power Angle Relations – Hunting - Synchronous Condenser - Applications.

**UNIT- III THREEPHAS EINDUCTIONMOTOR 9+3**

Constructional Details —Types of Rotors —Squirrel Cage and Slip Ring —Principle of Operation – Slip –Torque Equations -Slip-Torque Characteristics – Losses and Efficiency – Load Test - No Load and Blocked Rotor Tests - Equivalent Circuit- Separation of No-Load Losses – Crawling and Cogging – Double Cage Rotors – Induction Generator.

**UNIT–IV STARTING AND SPEED CONTROL OF THREEPHAS EINDUCTION MOTOR 9+3**

Need for Starters — Types of Starters — Stator Resistance, Rotor Resistance, Autotransformer, Star-Delta Starters and DOL Starters - Speed Control by Varying Voltage, Frequency, Poles and Rotor Resistance—Solid State starter -VFD controller.

**UNIT– V SINGLEPHAS EINDUCTION MOTOR ANDSPECIAL MACHINES 9+3**

Constructional Details–Types of single phase induction motors–Double Revolving Field Theory– No Load and Blocked Rotor Tests - Equivalent Circuit – Starting Methods – Applications. Special machines: Linear Induction Motor, Hysteresis motor, Brushless DC Motor.

**CLASS HOURS: 60 PERIODS TERM HOURS: 60 PERIODS TOTAL: 120 PERIODS**

**TEXTBOOK:**

1.Nagrath.I.JandKothari.D.P.,'Electric Machines',5th Edition,Tata McGrawHill Publishing Company, New Delhi, 2017.

**REFERENCES:**

1.BimbraP.S.-Electrical Machinery,1st Edition, Khanna Book Publishing co (P)Ltd, New Delhi, 2021
2. S.K.Bhattacharya,‘ Electric Machines’ McGraw-Hill education, New Delhi,3rd edition, 2009.
3. Sahdev.S.K., ‘Electrical Machines’, Cambridge University Press, 2018.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: SYNCHRONOUS AND ASYNCHRONOUS MACHINES** | | **CourseCode:24EE401** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C210.1** | Explain the construction details of alternator, determine the power sharing and voltage regulation of alternators. | I | K3 |
| **C210.2** | Explain the construction and working principle of synchronous motor and determine the torque angle | II | K3 |
| **C210.3** | Explain the construction and working principle of three phase induction motor and calculate the efficiency using equivalent circuit. | III | K3 |
| **C210.4** | Explain the working of starters, calculate the starting torque and full load torque and explain the speed control of three phase induction motor. | IV | K3 |
| **C210.5** | Explain the construction and working principle of single-phase induction motor and calculate the efficiency using equivalent circuit. | V | K3 |

| 24EE402 | TRANSMISSION AND DISTRIBUTION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To study the structure of electric power system and to develop expressions for the Computation of transmission line parameters
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of cables and methods to improve the efficiency.
- To study about distribution systems, types of substations, methods of grounding.

**UNIT- I TRANSMISSIONL INEPARAMETERS 9**

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition — application of self and mutual GMD; skin and proximity effects

**UNIT-II MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9**

Performance of Transmission lines - short line, medium line and long line —equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance – transmission efficiency and voltage regulation, real and reactive power flow in lines– FormationofCorona—CriticalVoltages—EffectonLinePerformance.

**UNIT- III MECHANICAL DESIGN OF LINES 9**

Mechanical design of OH lines — Line Supports –Types of towers — Stress and Sag Calculation —Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency ,testing of insulators.

**UNIT-IV UNDERGROUND CABLES 9**

Underground cable - Types of cables —Construction of single core and Three core Cables –Insulation Resistance—Potential Gradient-Capacitance of Single-core and Three core cables- Grading of cables-Power factor and heating of cables.

**UNIT- V DISTRIBUTION SYSTEMS 9**

Distribution Systems — AC distribution System — Connection schemes-radial and ring main-Interconnected system-Techniques of Voltage Control and Power factor improvement – Distribution Loss –Types of Substations – Methods of Grounding – Introduction to Smart Grid.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOKS:**

1.D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Third Edition, 2019.

**REFERENCES:**

1. C.L.Wadhwa,'Electrical Power Systems', New Academic ScienceLtd,2018.

2.SoniML,GuptaPV,Bhatnagar US and Chakrabarthi A,"A Text Book on Power System Engineering",Dhanpat Rai & Co.,New Delhi, 2016.

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: TRANSMISSIONAND DISTRIBUTION** | | **CourseCode:24EE402** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C211.1** | Calculate the transmission network parameters for various configuration | I | K3 |
| **C211.2** | Determine the performance of transmission line. | II | K3 |
| **C211.3** | Calculate the sag of transmission line, the voltage distribution in insulator strings and determine the string efficiency of insulator. | III | K3 |
| **C211.4** | Compute the electrical parameter of underground cable. | IV | K3 |
| **C211.5** | Explain the distribution system, substation and grounding. | V | K2 |

| 24EE403 | LINEAR INTEGRATED CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To discuss the IC fabrication procedure.
- To learn the characteristics of Op-Amp.
- To design and construct the basic applications of Op–amp.
- To interpret the internal functional blocks and the applications of special ICs.
- To illustrate the operation of application ICs.

**UNIT- I IC FABRICATION** **9**

IC classification - fundamentals of monolithic IC technology – basic planar processes - fabrication of typical circuit - Fabrication of diodes, resistors, capacitors, FETs and PV Cell

**UNIT-II CHARACTERISTICS OF OP-AMP** **9**

Ideal Op-Amp - DC and AC characteristics - Basic applications of Op-Amp – Inverting and Non-inverting Amplifiers, summer, differential amplifier, differentiator and integrator – V to I and I to V converters

**UNIT- III APPLICATIONS OF OP-AMP** **9**

Instrumentation amplifier - First order Low pass and high pass active filters- Sample and Hold circuit – Op-Amp circuits using Diodes - peak detector, clippers, clampers - Comparators – Multi vibrators - Waveform generators – D/A converters - A/D converters.

**UNIT-IV SPECIALICs** **9**

555 Timer - Functional block, characteristics – IC NE/SE 566 Voltage Controlled Oscillator - IC NE/SE 565 Phase Locked Loop – AD633 Analog multiplier and Divider

**UNIT- V APPLICATIONICS** **9**

IC voltage regulators – LM78XX, LM79XX series voltage regulator - 723 Variable voltage regulators – switching regulator - LM 380 power amplifier - ICL 8038 function generator IC.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXT BOOKS:**

1. D. Roy Choudhury, Shail B. Jain, “Linear Integrated Circuits”, Sixth edition, New Age International Private Limited, 2021.

**REFERENCES:**

1. David A. Bell, “Operational Amplifiers and Linear ICs”, Third edition, Oxford University Press, 2011
2. Ramakant A. Gayakward, “Op–Amps and Linear Integrated Circuits”, 4th Edition, PHI, 2015.

**OUTCOMES:**
**AT THE END OF THE COURSE,LEARNERS WILL BE ABLE TO:**

| Course Name: LINEAR INTEGRATED CIRCUITS | | CourseCode:24EE403 | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C212.1** | Explain the IC fabrication process and discuss the fabrication of active and passive components. | I | K2 |
| **C212.2** | Compute the gain and output voltage of the given Op-Amp circuits. | II | K3 |
| **C212.3** | Determine the oscillating frequency of waveform generators, cutoff frequency of filters and also discuss the operation of Op-Amp circuits using diodes. | III | K3 |
| **C212.4** | Discuss the internal functional blocks and applications of special ICs 555,566,565, and AD633 ICs. | IV | K2 |
| **C212.5** | Explain the operation of voltage regulator ICs namely LM78XX, LM79XX, LM317, LM723, µA78S40 switching regulator, LM380 power amplifier and ICL 8038 function generator IC. | V | K2 |

| 24EE404 | MEASUREMENTS AND INSTRUMENTATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the concepts of measurement technology.
- To learn different types of measuring instruments and its operation
- To learn the different types of Potentiometer and bridge circuits.
- To learn the different types of display devices and transducers
- To learn the various sensors and data acquisition system.

**UNIT- I INTRODUCTION 9**

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration - Classification of measuring instruments-Essential requirements of an instrument.

**UNIT-II ELECTRICAL AND ELECTRONIC INSTRUMENTS 9**

Construction, working principle and Torque equation of Permanent Magnet Moving Coil instruments - Attraction type and Repulsion type Moving iron instruments-Extension of Voltmeter and Ammeter range - Construction, working principle of Instrument transformers-Wattmeter - Energy meter – Power Factor Meter.

**UNIT- III COMPARISON METHODS OF MEASUREMENTS 9**

D.C potentiometers - Crompton Potentiometer, D.C Bridges (Wheatstone, Kelvin, Kelvin double) & A.C Bridges (Maxwell, Anderson, Wein& Schering).

**UNIT-IV DISPLAY DEVICES AND TRANSDUCERS 9**

Digital CRO, LED, LCD & Dot matrix display –- Classification of transducers – Selection of transducers – Resistive Transducer – Strain gauge, Measurement of Temperature - RTD, thermistor & thermocouple, Capacitive transducer - Inductive Transducers – Linear Variable Differential Transducer, Piezoelectric, Hall effect, optical and digital transducers

**UNIT- V SENSORS AND DATA ACQUISITION SYSTEMS 9**

Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types. –– Smart sensors - GPS, Bluetooth, Laser Range Sensor (LIDAR), Motion Sensors, Load Cell -Thermal Imagers - Elements of data acquisition system - Data Loggers – Smart Energy Meter.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOK:**

1. Sawney A K and PuneetSawney, “A Course in Electrical and Electronics Measurements and Instrumentation”, Revised edition, DhanpatRai& Co, New Delhi, 2021.

**REFERENCES:**

1. Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
2. Er. R K Rajput “Electrical and Electronic Measurements and Instrumentation” S Chand, 2016

**OUTCOMES:**
**AT THE END OF THE COURSE,LEARNERS WILL BE ABLE TO:**

| Course Name: MEASUREMENTS AND INSTRUMENTATION | | CourseCode:24EE404 | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C213.1** | Explain the functional elements of instrumentation and calculate the errors in measurement. | I | K3 |
| **C213.2** | Explain the working of PMMC and MI meters and Derive the Torque equation. | II | K2 |
| **C213.3** | Calculate the resistance, inductance and capacitance values using bridges and potentiometers. | III | K3 |
| **C213.4** | Explain the working of various types of display devices and transducers. | IV | K2 |
| **C213.5** | Discuss the DAQ systems with different sensors for real time applications. | V | K2 |

| 24EE405 | ARTIFICIAL INTELLIGENCE AND APPLICATIONS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To learn the basic AI approaches
- To develop problem solving agents
- To perform logical reasoning
- To understand various search problems
- To learn various applications of AI

**UNIT- I INTELLIGENT AGENTS** **9**

Introduction to AI – Agents and Environments – concepts of rationality – nature of environments – structure of agents, problem solving agents – search algorithms – uninformed search strategies

**UNIT-II PROBLEM SOLVING METHODS** **9**

Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments

**UNIT- III CONSTRAINT SATISFACTION PROBLEMS** **9**

Alpha-Beta search – Monte - Carlo tree search –. Constraint satisfaction problems - Types of CSP – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.

**UNIT-IV LOGICAL REASONING** **9**

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining - resolution.

**UNIT- V APPLICATIONS OF AI** **9**

Language models - Information retrieval – Information Extraction - Natural Language Processing, Machine Translation, Speech recognition, Robot-Hardware perception-planning-Moving.

**CLASS HOURS: 45 PERIODS TERM HOURS: 45 PERIODS TOTAL: 90 PERIODS**

**TEXTBOOKS:**

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach Prentice Hall, 4th Edition, 2021.
2. M. TimJones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008

**REFERENCES:**

1. Anamitra Deshmukh - Nimbalkar, Artificial Intelligence, Technical Publications, 2nd Edition, July 2025.
2. Gerhard Weiss, Multi AgentSystems,2nd Edition, MIT Press,2013.
3. I. Bratko, Prolog: Programming for Artificial Intelligence,4th edition, Addison-Wesley Educational Publishers Inc., 2011.

**OUTCOMES:**
**AT THE END OF THE COURSE,LEARNERS WILL BE ABLE TO:**

| **Course Name: ARTIFICIAL INTELLIGENCE AND APPLICATIONS** | | **CourseCode:24EE405** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **Unit** | **K –CO** |
| **C214.1** | Develop fundamental search strategies to solve simple goal-based problems by explaining the characteristics of intelligent agents | I | K3 |
| **C214.2** | Make use of heuristic search, local search, and optimization techniques for solving deterministic and non-deterministic search problems in known and partially observable environments. | II | K3 |
| **C214.3** | Analyze and compare various CSP techniques including backtracking, constraint propagation, and local search to select appropriate methods for solving structured constraint problems. | III | K4 |
| **C214.4** | Apply propositional and first-order logic inference methods to design knowledge-based agents for logical reasoning tasks. | IV | K3 |
| **C214.5** | Demonstrate real-world intelligent system applications with AI techniques such as NLP, machine translation, information retrieval, and robotic perception-planning. | V | K3 |

**24EE4L1 ELECTRICAL MACHINES LABORATORY–II L T P C**

**0 0 3 1.5**

**OBJECTIVES:**

- To analyze the voltage regulation of synchronous generator in different methods
- To analyze the performance characteristics of three phase and single phase induction motor using equivalent circuit
- To analyze the characteristics of synchronous motor for various excitation

**LISTOF EXPERIMENTS:**

1. Regulation of three-phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF method.
3. Load test on three-phase alternator.
4. V and inverted V curves of three phase synchronous motor.
5. Load test on three phase induction motor
6. No load and blocked rotor test on three phase induction motor.
7. Load test on single phase induction motor
8. Determination of equivalent circuit of single phase induction motor
9. Synchronization of three phase alternator with bus bar.
10. Separation of no-load losses of three-phase induction motor.
11. Measurement of starting current of AC motors with different starter using Power Quality Analyzer (Study experiment)
12. Performance analysis of BLDC Motor(MODROB- study experiment)

**TOTAL:45 PERIODS**

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: ELECTRICAL MACHINES LABORATORY–II** | | **CourseCode:24EE4L1** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K –CO** |
| **C215.1** | Analyze the voltage regulations of synchronous machine by direct and indirect methods | 1,2,3 | K4 |
| **C215.2** | Analyze the power factor of synchronous motor for various excitations. | 4 | K4 |
| **C215.3** | Calculate the efficiency of induction motor by direct and indirect methods | 5,7,12 | K3 |
| **C215.4** | Calculate the performance characteristics using equivalent circuit of three phase induction motor | 6,8,10 | K3 |
| **C215.5** | Calculate the performance characteristics using equivalent circuit of single phase induction motor | 9 | K3 |

| 24EE4L2 | LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

- To design, test, and characterize circuit behavior using digital and analog ICs.
- To design and test various combinational and sequential circuits.
- To introduce the functions of counters and shift registers.
- To interpret and realize the basic applications of Op-amps and timers.
- To explain the behavior of special ICs.

**LISTOF EXPERIMENTS:**

1. Verification of Boolean functions, Full Adder, and Full Subtractor.
2. Binary to Gray code converter and vice versa.
3. Encoders, Decoders, Parity generator, and Parity checker.
4. Multiplexer and Demultiplexer.
5. Shift Registers: SISO, SIPO, PISO, and PIPO modes.
6. Counters: Synchronous and Asynchronous types.
7. Inverting amplifier, Non-inverting amplifier, and Adder using IC 741.
8. Integrator and Differentiator using IC 741.
9. As table and Mono stable multi vibrators using 555 timer IC.
10. Characteristics of Voltage-Controlled Oscillator (VCO) NE/SE566 IC.
11. Characteristics of Voltage Regulator IC LM317 / LM723.
12. Simulation of wave-shaping circuits.

**TOTAL:45PERIODS**

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY** | | **CourseCode:24EE4L2** | |
|---|---|---|---|
| **CO** | **Course Outcomes** | **EXP** | **K –CO** |
| **C216.1** | Design and implement the combinational logic circuits to realize Boolean function, to verify the truth table of code converters, parity generator, parity checker, encoders, decoders, multiplexer and demultiplexer | 1,2,3,4 | K3 |
| **C216.2** | Design and implement the sequential logic circuits for counters and shift registers | 5,6 | K3 |
| **C216.3** | Design and implement inverting amplifier, non-inverting amplifier, adder, comparator, integrator and differentiator circuits using IC 741. | 7,8 | K3 |
| **C216.4** | Design and construct a stable and mono stable multi vibrator circuits using 555 timers, VCO using IC 566. | 9,10,11 | K3 |
| **C216.5** | Simulate wave shaping circuits like clippers, clampers, peak detectors with Op-mp and diodes | 12 | K3 |

| 24EE4L3 | MICRO PROJECT | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**OBJECTIVES:**

- To allow the students to explore the breadth of research that is being performed within the college.
- To implement electrical/electronic hardware by learning PCB artwork design, soldering techniques, testing, and troubleshooting, etc.
- To set the students apply the programming knowledge into a real-world situation/problem.
- To work as an individual or in a team in development of technical projects.
- To communicate and report effectively project related activities and findings.

**MICRO PROJECT GUIDELINES:**

The micro-project is a team activity having 3-4 students in a team. This is electrical/electronic circuit building and testing for developing real life small electrical/electronic applications. The micro-project may be a complete hardware or hardware with small programming aspect. It should encompass electrical/electronic components, devices, analog or digital ICs, etc. Micro- Project should cater to a small system required in laboratory or real-life application. Based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of Micro-project.

**TOTAL: 30 PERIODS**

**OUTCOMES:**
**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

| **Course Name: MICRO PROJECT** | | **Course Code: 24EE4L3** |
|---|---|---|
| **CO** | **COURSE OUTCOMES** | **K- CO** |
| **C217.1** | Identify and define a problem statement from the requirements raised from literature survey /need analysis. | K2 |
| **C217.2** | Build and Test electronic circuits/prototype for developing real life small electronic applications. | K3 |
| **C217.3** | Work in teams, write comprehensive report and effective presentation of the project work. | K3 |
| **C217.4** | Construct prototyping which will lead them towards entrepreneurship | K6 |
| **C217.5** | Deliver a compelling presentation of the academic project. | K3 |

| 24HS4L1 | APTITUDE AND SOFT SKILLS -III | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**Module I LOGICAL REASONING SKILLS 10**

Logical Reasoning, Letter and Symbol series, Number series, Analyzing arguments, Making judgments, Logical Reasoning, Direction Sense test, Venn diagrams, Seating arrangements, Cause and effect, Blood relation test, Dice Logical, verbal puzzles, Analytical puzzles and sudoku.

**Module II BEHAVIOURAL SKILLS 5**

Interview Etiquettes - Body language, Dress code, Eye contacts, Handshakes for Interview - Interview handling – Mock Interview Videos - High Frequency words in resume and interviews - Visual Interpretation – HR Interview question – Sell yourself - Interpersonal and intrapersonal communication

**Module III VERBAL SKILLS 15**

Vocabulary basics, Grammar basics, Critical Reasoning, Reading comprehension, Synonyms, Antonyms, Idioms and phrases - sentence completion, Spotting errors, Error correction, Sentence correction, Writing Resume, Letter writing, Official mail correspondence -Ways to communicate in different scenarios-job interview, business meeting, project proposal submission, informal gathering, speech for a large audience and debate.

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010