AR-23

COURSE STRUCTURE

AND

DETAILED SYLLABUS OF

ELECTRICAL AND ELECTRONICS ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2023-2024)

ADITYA INSTITUTE OF TECHNOLOGY ANDMANAGEMENT
(AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC,Recognised under 2(f)12(b) of UGC

Permanently Affiliated to JNTUGV, Vizianagaram K.Kotturu, Tekkali, Srikakulam-532 201, Andhra Pradesh.

VISION OF THE INSTITUTE

To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operations.

MISSION OF THE INSTITUTE

Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that efficiency for employability increases on a continued basis.

VISION OF THE DEPARTMENT

The department of Electrical and Electronics Engineering is committed to innovation and excellence in teaching, research, service and provide programs of the high quality, collaborative efforts with industry to produce world class engineering professionals.

MISSION OF THE DEPARTMENT

M1. To inculcate value based, socially committed professionalism to the cause of overall development of students and society.

M2. Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.

M3. Improve continuously the engineering pedagogical methods employed in delivering its academic programs.

M4. Evolve thoughtfully in response to the needs of industry, society and the changing world.

PROGRAM EDUCATIONAL OBJECTIVES

On successful completion of under graduation in Electrical and Electronics Engineering, the graduates are expected to attain the following program educational objectives.

PEO1: The graduates would be employed as a practicing engineer in fields such as design, research, development, testing and manufacturing.

PEO2: The graduates would be engaged in lifelong self-directed learning to maintain and enhance professional skills and to undertake higher studies.

PEO3: The graduates will be able to create new methods to meet the society needs or to become an entrepreneur with their gained knowledge and confidence.

PEO4: The graduates will be able to exhibit their communication skills, team spirit, leadership skills and ethics with social responsibility.

PROGRAM OUTCOMES

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering, fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

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

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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

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

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

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

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

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

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

PSO-PROGRAM SPECIFIC OUTCOMES

PSO1: Ability to exhibit the basics of Engineering to identify, formulate, design and solve complex problems of Electrical and Electronics Engineering.

PSO2: Practice the application of appropriate techniques of hardware and software tools in power systems, power Electronics and Industrial Automation.

PSO3: To Exhibit success in higher studies and competitive examinations in the field of Multi-Disciplinary Environments.

Aditya Institute of Technology and Management, Tekkali
AR-23 – COURSE STRUCTURE (1st B.Tech.)
(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (1st Sem)	MC	23MCS101	Induction Program	3 weeks			0
	BH	23BHT102	Linear Algebra and Calculus	2	1	0	3
	BH	23BHT104	Engineering Physics	3	0	0	3
	ES	23EST101	Basic Electrical Engineering	3	0	0	3
	ES	23EST105	Introduction to Programming	3	0	0	3
	ES	23ESL103	Engineering Drawing	1	0	4	3
	BH	23BHL102	Engineering Physics Lab	0	0	3	1.5
	ES	23ESL101	Basic Electrical Engineering Lab	0	0	3	1.5
	ES	23ESL105	Computer Programming Lab	0	0	3	1.5
	MC	23MCS102	NSS/NCC/Scouts &Guides/Community Service	0	0	1	0.5
Total				**12**	**1**	**14**	**20**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (2nd Sem)	BH	23BHT101	Communicative English	3	0	0	3
	BH	23BHT103	Differential Equations and Vector Calculus	2	1	0	3
	BH	23BHT105	Chemistry	3	0	0	3
	PC	23EET101	Switching Theory and Logic Design	3	0	0	3
	PC	23EST104	Engineering Mechanics	3	0	0	3
	ES	23ESL104	Engineering Workshop	0	0	3	1.5
	BH	23BHL101	Communicative English Lab	0	0	3	1.5
	BH	23BHL104	Chemistry Lab	0	0	3	1.5
	MC	23MCS103	Health and Wellness, Yoga and Sports	0	0	1	0.5
Total				**14**	**1**	**10**	**20**

INDUCTION PROGRAMME

S.No.	Course Name	Category	L	T	P	C
1.	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	**0**	**0**	**6**	**0**
2.	Career Counseling	MC	**2**	**0**	**2**	**0**
3.	Orientation to all branches -- career options, tools, etc.	MC	**3**	**0**	**0**	**0**
4.	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	**2**	**0**	**3**	**0**
5.	Proficiency Modules & Productivity Tools	ES	**2**	**1**	**2**	**0**
6.	Assessment on basic aptitude and mathematical skills	MC	**2**	**0**	**3**	**0**
7.	Remedial Training in Foundation Courses	MC	**2**	**1**	**2**	**0**
8.	Human Values & Professional Ethics	MC	**3**	**0**	**0**	**0**
9.	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	**2**	**1**	**2**	**0**
10.	Concepts of Programming	ES	**2**	**0**	**2**	**0**

Aditya Institute of Technology and Management, Tekkali AR23

COURSE STRUCTURE (2nd B.Tech.)

(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B.Tech. (1st Sem)	BH	23BHT211	Transform Theory	3	0	0	3
	ES	23EST206	Python Programming	3	0	0	3
	PC	23EET202	Electronic Devices and Circuits	2	0	0	2
	PC	23EET203	Electric Circuit Theory	3	0	0	3
	PC	23EET204	Electromagnetic Field Theory	3	0	0	3
	ES	23ESL207	Python Programming Lab	0	0	3	1.5
	PC	23EEL201	Electronic Devices and Circuits Lab	0	0	3	1.5
	PC	23EEL202	Electrical Circuits Lab	0	0	3	1.5
	SC	23EES204	Skill Enhancement course–I	1	0	1	1.5
	MC	23MCT204	Environmental Studies	2	0	0	0
Total				**17**	**0**	**10**	**20**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B.Tech. (2nd Sem)	BH	23BHT207	Universal Human Values	2	0	0	2
	PC	23EET205	D.C Machines & Transformers	3	0	0	3
	PC	23EET206	Control Systems	3	0	0	3
	PC	23EET207	Electrical Power Generation & Distribution	3	0	0	3
	PC	23EET208	Electrical Measurements	3	0	0	3
	ES	23ESL208	Competitive Programming Lab–I	0	0	3	1.5
	PC	23EEL203	D.C Machines & Transformers Lab	0	0	3	1.5
	PC	23EEL204	Control Systems Lab	0	0	3	1.5
	SC	23EES205	Skill Enhancement course–II	1	0	1	1.5
	BH	23BHT208	Design Thinking	1	0	2	2
Total				**16**	**0**	**12**	**22**
Mandatory Community Service Project Internship of 02 weeks duration during summer vacation.							

LINEAR ALGEBRA AND CALCULUS
(Common to All Branches)

Subject Code: 23BHT102	L	T	P	C
	2	1	0	3

Course Objectives:

To equip the students with standard concepts and tools of mathematics to handle various real-worldproblems and their applications as follows.

- Develop proficiency in fundamental algebraic techniques. Apply algebraic concepts to solve engineering problems and practical applications.
- Understand the principles of linear transformations. Explore the concept of orthogonal transformations. Apply these transformations in engineering contexts and problem-solving.
- Gain a deep understanding of calculus concepts. Apply calculus to analyze and solve real-world problems. Explore the applications of calculus in engineering and related fields.
- Understand the concept of functions with multiple variables. Explore optimization techniques using functions of several variables. Apply these concepts in engineering optimization problems
- Learn the concepts of double integrals in two dimensions. Understand triple integrals in three dimensions. Apply integration techniques for calculating areas and volumes in engineering applications.

Course Outcomes:

The student will be able to:

CO 1. Develop matrix algebra techniques that is needed by engineers for practical applications.
CO 2. To find the eigen values and eigen vectors and solve the problems by using linear transformation
CO 3. Learn important tools of calculus in higher dimensions.
CO 4. Familiarize with functions of several variables which is useful in optimization.
CO 5. Familiarize with double and triple integrals of functions of several variables in two and three dimensions.

UNIT – I

Matrices: Rank of a matrix by echelon form, normal form. Inverseof Non- singular matrices by Gauss- Jordan method.

System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT- II

Linear Transformation and Orthogonal Transformation: Eigen values, Eigen vectors and their properties (without Proof), Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley- Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT- III

Calculus : Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT- IV

Partial differentiation and Applications (Multi variable calculus): Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – V

Multiple Integrals (Multi variable Calculus): Double integrals - change of variables (Cartesian and Polar coordinates), Change of order of integration, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Text Books:

1. B.S.Grewal,HigherEngineeringMathematics,44/e,Khanna Publishers,2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e,John Wiley & Sons, 2018.

Reference Books:

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 5/e, Alpha ScienceInternational Ltd.,2021 (9th reprint).
2. George B. Thomas, Maurice D.Weir and Joel Hass, Thomas Calculus,14/e, PearsonPublishers, 2018.
3. Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4. Michael Greenberg, Advanced Engineering Mathematics, 9thedition, Pearson edn
5. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand,2021.

ENGINEERING PHYSICS
(Common for all branches)

Subject Code: 23BHT104	L	T	P	C
	3	0	0	3

Course Objectives:

- Bridging the gap between the Physics in school at 10+2 level and UG level engineering courses.
- To identify the importance of the optical phenomenon. interference, diffraction and polarization related to its Engineering applications
- Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of de Broglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals.
- To Understand the Physics of Semiconductors and their working mechanism, Concept utilization of transport phenomenon of charge carriers in semiconductors.

Course Outcomes:

Students will be able to

CO 1. Explain the need of coherent sources and the conditions for sustained interference (L2). Identify the applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2).

CO 2. Classify various crystal systems (L2). Identify different planes in the crystal structure (L3). Analyze the crystalline structure by Bragg's X-ray diffractometer (L4).

CO 3. Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius- Mosotti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2).

CO 4. Describe the dual nature of matter (L1). Explain the significance of wave function (L2). Identify the role of Schrodinger's time independent wave equation in studying particle in one- dimensional infinite potential well (L3). Identify the role of classical and quantum free electron theory in the study of electrical conductivity (L3).

CO 5. Classify the crystalline solids (L2). Outline the properties of charge carriers in semiconductors(L2). Identify the type of semiconductor using Hall effect (L2). Apply the concept of effective mass of electron (L3).

Unit – I (12 hrs)

Wave Optics: Interference: Introduction **-** Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit,double slit & Diffraction Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

Unit Outcomes

The students will be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference (L3)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary polarized light and extraordinary polarized light (L2)

Unit – II (8 hrs)

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (h k l) planes. Bragg's law - X-ray Diffractometer – crystal structure determination by Laue method and Powder method.

Unit Outcomes

The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)

Unit – III (8 hrs)

Dielectric and Magnetic Materials : Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius-Mossotti equation.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Classification of magnetic materials: Dia, Para, Ferro, Antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit Outcomes

The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence(L2)

Unit – IV (10 hrs)

Quantum Mechanics and Free electron theory: Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) - Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution and its temperature dependence.

Unit Outcomes
The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)

Unit – V (10 hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Extrinsic semiconductors: density of charge carriers - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

Unit Outcomes
The students will be able to

- **Outline** the properties of charge carriers in semiconductors (L2)
- **Understand** the carrier transportation in semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)

Text Books:

1. "A Text book of Engineering Physics" - M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S.Chand Publications, 11th Edition 2019.
2. "Engineering Physics" - D. K. Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" - P. K. Palanisamy SciTech publications.

Reference books:

1. "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
2. "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).
3. "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
5. "Semiconductor physics and devices:Basic principle" - A. Donald, Neamen, Mc GrawHill.
6. "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
7. "Solid state physics" – A.J.Dekker ,Pan Macmillan publishers
8. "Introduction to Solid State Physics" - Charles Kittel ,Wiley

BASIC ELECTRICAL ENGINEERING
(Common for ECE, EEE)

Subject Code: 23EST101	L	T	P	C
	3	0	0	3

Course Objectives:

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To become familiar with DC Generators.
- To become familiar with DC Motors.

Course Outcomes:

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

CO 1. Able to summarize different electrical circuits.
CO 2. Able to construct network reduction techniques
CO 3. Able to outline the basics of AC circuits.
CO 4. Able to examine DC Generators.
CO 5. Able to describe DC Motors.

Unit - I

Introduction to Electric Circuits: Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sources Independent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Faraday's laws of electromagnetic induction, Lenz's law, simple problems.

Unit - II

Network Reduction Techniques: Kirchhoff's Laws, Star-Delta transformation, Nodal Analysis, Mesh analysis, -Problems.

Unit - III

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

Unit - IV

DC Generator: Generator-Principle of Operation, Construction, EMF equation, Classification of D.C generators, O.C.C, internal and external characteristics of shunt generator, Applications.

Unit - V

DC Motor: Motor-principle of operation, Torque equation, Classification of D.C Motors Speed Control Methods, Operation of 3pointstarter, Applications.

.

Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.

Reference Books:

1. Basic Electrical Engineering Dr.K.B.MadhuSahuscitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
4. Schaum's Outline of Basic Electrical Engineering (SCHAUMS' ENGINEERING) by J. J. Cathey (Author), Syed A. Nasar (Author).
5. Electrical Engineering Fundamentals, 2e by Vincent Deltoro (Author)

INTRODUCTION TO PROGRAMMING
(Common to all branches)

Subject Code: 23ESTI05	L	T	P	C
	3	0	0	3

Course objectives:

- To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.

Course outcomes:

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

CO 1. Understand the fundamentals of Computers and C programming
CO 2. Develop programs using control structures and Arrays to store and manipulate data
CO 3. Design modular programs using functions and storage classes
CO 4. Use structures and pointers to manipulate record based data
CO 5. Implement and manipulate files on secondary storage media

Unit –I

Introduction to Programming: Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Data Types, Operator precedence and associativitiy, Structure of C program, simple programs using Basic I/O statements.

Unit-II

Control Structures: Decision statements: if, if-else, nested if, if-else-if ladder, and switch

Iterative statements: while loop, do-while loop, for loop, nested loops

Branching: Break, continue

Arrays: Definition, Types: Single Dimensional arrays, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations and String Handling.

Unit-III

Functions: Definition, Declaration, Types of Functions, Parameter passing, Call by value and call by reference, Passing Arrays to functions, Recursion, Scope and lifetime of variables, Command line arguments, Storage classes.

Pointers: Definition, Declaration, Initialization, Pointer arithmetic, functions and pointers, Pointer to pointer, Uses of Pointers, arrays and pointers.

Unit-IV

Structures: Definition, Declaration, Accessing the structure elements, Array of structures, Arrays with in structures, pointer to structure, Self referential structure, passing structure to function, nested structures and unions, Dynamic memory allocation.

Unit-V

File Handling: Introduction, Types of files, Defining and Opening a File, Closing a File, Input/Output operations on Files, Error Handling during I/O operations, Random Access to Files.

Text Books:

1. B. W Kernighan, Dennis M. Ritchie. The C – Programming Language. 2nd Edition, PHI.
2. Behrouz A. Forouzan, "A Structured Approach Using C" Richard F. Gilberg 3rd Edition

Reference Books:

1. Yashwant Kantikar. 2012. Let Us C, 8th Ed. PBP Publications.
2. E. Balagurusamy. 2011. C Programming. Tata Mc Graw Hills, New Delhi, India.

Website References:

1. https://www.tutorialspoint.com › C programming › C – Home
2. https://www.programiz.com/c-programming

ENGINEERING DRAWING
(Common for ECE/EEE/CSE/IT/CSM/CSD)

Subject Code: 23ESL103	L	T	P	C
	1	0	4	3

Course Objectives:

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To make the students understand the viewing perception of a solid object in Isometric and
- Perspective projections.

Course Outcomes:

On completion of this course, students should be able to:

CO 1. To draw general constructions and conic sections
CO 2. To draw the projection of points and lines with respect to HP & VP
CO 3. To project and draw straight lines, and project plane surfaces with respective to one reference plane
CO 4. Develop the projections for a simple solids and their inclinations with respect to one reference plane.
CO 5. Convert orthographic views into isometric projections and vice-versa.

List of Exercises:

Geometrical Constructions

Drawing Instruments and their uses, Types of Lines and Dimensioning, Line bisecting, Angle bisecting, Line divided into equal number of parts, Construction of Regular Polygons (Pentagon and Hexagon).

Construction of Conics: General method, Oblong method and Concentric circles method.

Simple Projections

Introduction to Orthographic Projections (First Angle Projection only).

Projections of Points: A point situated in I,II,III & IV quadrants.

Projections of Straight Lines: Line parallel to one or both the of the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined one plane and parallel to other.

Projections of Planes: Types of planes, Traces of planes, planes parallel to one of the planes and plane inclined to one reference plane.

Projections of Solids

Polyhedra: Types of Solids, Projections of Solids in simple positions, Projections of Solids axis inclined to the V.P. and parallel to the H.P. Projections of Solids axis inclined to the H.P. and parallel to the V.P. Solids of Revolution: Projections of Solids axis inclined to the V.P. and parallel to the H.P. Projections of Solids axis inclined to the H.P. and parallel to the V.P.

Orthographic-Isometric Projections

Conversion of pictorial view (Isometric views) into orthographic views.

Isometric Projections: Isometric axes, lines & planes. Isometric scale, Isometric drawing, Isometric drawing of plane figures, prisms and pyramids. Conversion of orthographic views into Isometric views.

Text Books:

1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub.
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon, Prentice Hall India Pub.

ENGINEERING PHYSICS LAB
(Common for all branches)

Subject Code: 23BHL102	L	T	P	C
	0	0	3	1.5

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

CourseOutcomes: The students will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.
CO2: Estimatethewavelengthsofdifferentcoloursusingdiffractiongrating.
CO3: Discuss the magnetic, electrical and electronic properties of materials.
CO4: Analyze the mechanical and thermal properties of materials.
CO5: Calculate the band gap of a given semiconductor.

List of Experiments

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determinationofwavelengthsofdifferentspectrallinesinmercuryspectrumusingdiffr actiongratingin normal incidence configuration.
3. Determination of width of a slit using diffraction phenomenon.
4. Determination of wave length of Laser light using diffraction grating.
5. Estimation of Planck's constant using photo cell.
6. To study V-I characteristics of a PN junction diode in forward and reverse biasing conditions.
7. MagneticfieldalongtheaxisofacurrentcarryingcircularcoilbyStewartGee'sMethod.
8. DeterminationofHallvoltageandHallcoefficientofagivensemiconductorusingHalleffect.
9. Determination of temperature coefficients of a thermistor.
10. Determinationofaccelerationduetogravityandradiusof Gyrationbyusingacompound pendulum.
11. Determinationofrigiditymodulusofthematerialofthegivenwireusing Torsionalpendulum.
12. Sonometer: Verification of laws of stretched string.
13. DeterminationofFrequencyofelectricallymaintainedtuningforkbyMelde'sexperiment.
14. Determination of energy band gap of a given semiconductor
15. Determination of thickness of a thin object using wedge shaped film.
16. Determination of crystal structure and lattice parameter of a given crystal using powder diffraction data.
17. Determination of Young's modulus of the given beam by non-uniform bending.
18. Determination of dielectric constant using resonance method.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

References:

- ATextbookofPracticalPhysics-S.Balasubramanian,M.N.Srinivasan,S.ChandPublishers, 2017.

Web Resources

- www.vlab.co.in
- https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

BASIC ELECTRICAL ENGINEERING LAB
(Common for ECE, EEE)

Subject Code: 23ESL101	L	T	P	C
	0	0	3	1.5

Course Objective:

- To introduce the student to study different electrical components and to verify the basic lawsrelated to electrical engineering and Speed control of D.C. motor.

Course Outcomes:

Students will be able to

CO 1. Label various types of electrical components.
CO 2. Demonstrate various basic electrical laws.
CO 3. Demonstrate speed control DC motor & Characteristics of generator.
CO 4. Experiment to determine power factor.
CO 5. Examine tariff calculation.

List of Experiments*:*

1. Study of electrical components.
2. To verify Ohm's law.
3. To verify Kirchhoff's current law
4. To verify Kirchhoff's voltage law.
5. To verify the total resistance of the series and parallel connected circuits.
6. Find armature resistance, field resistance and filament Lamp Resistance using V-I method.
7. Magnetization characteristics of DC shunt generator.
8. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
9. To find voltage current relationship for series RL circuit and determine power & power factor.
10. Energy meter reading and tariff calculation with lamp load.

Additional Experiments*:*

11. Soldering & bread board practice
12. Fan internal wring.

COMPUTER PROGRAMMING LAB
(Common to all Branches)

Subject Code: 23ESL105	L	T	P	C
	0	0	3	1.5

Course Objectives

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

Course Outcomes

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

CO 1. Solve the given problem using the syntactical structures of C language.
CO 2. Design programs involving decision structures and loops.
CO 3. Apply programming to solve different operations on arrays and strings.
CO 4. Develop modularity concept using functions and write programs for allocating memory dynamically.
CO 5. Construct C program that uses structures and unions and implement file operations ongiven application.

LIST OF EXPERIMENTS:

1. Write the C programs to calculate the following
   a) Area of triangle when sides are given.
   b) Program for Type Casting.
   c) Interchanging values of two variables.

2. Write the C programs to perform the following
   a) Conversion of Fahrenheit to Celsius and vice versa
   b) Simple interest calculation
   c) Square root of a given number

3. Write the C programs to perform the following
   a) Read lower case character and convert into upper case.
   b) Find maximum of 3 values using conditional operator.
   c) Calculate area and perimeter of circle.

4. Write C programs for the following using decision making statements
   a) Find roots of quadratic equation.
   b) Find the max and min of three numbers using if-else.
   c) Calculate the grades of a student.
   d) Find the given year is a leap year or not.

5. Write the C programs to perform the following
   a) Arithmetical operations using switch-case.
   b) Read a number and display in reverse.
   c) Check for Armstrong number property

6. Write the C programs to perform the following
   a) Find factorial of given number
   b) Check a number is palindrome property
   c) Generate Fibonacci series.
   d) Generate Prime numbers between two numbers.

7. Implement the following using arrays
   a) Largest and smallest from a list of elements.
   b) Program for Linear Search.
   c) Program for Bubble Sort.

8. Implement the following using arrays
   a) Matrix addition.
   b) Matrix Multiplication.
   c) Transpose of a matrix.
   d) Program using string handling functions.

9. Write the C programs to perform the following
   a) Factorial using recursion and non recursion.
   b) GCD using recursion and non recursion.

10. Write the C programs to perform the following
    a) Find the sum and average of list of elements using DMA Functions
    b) Implementation of call by value and call by reference.

11. Write the C programs to perform the following
    a) Implementation of array of structure.
    b) Demonstration of Union.

12. Write the C programs to perform the following
    a) Write a C program to write and read text into a binary file using fread() and fwrite()
    b) Copy the contents of one file into another.
    c) Count the number of characters, words and lines in a file.

Text Books:

1. B. W Kernighan, Dennis M. Ritchie. The C – Programming Language. 2nd Edition, PHI.
2. Behrouz A. Forouzan, “A Structured Approach Using C” Richard F. Gilberg 3rd Edition

Reference Books:

1. Yashwant Kantikar. 2012. Let Us C, 8th Ed. PBP Publications.
2. E. Balagurusamy. 2011. C Programming. Tata Mc Graw Hills, New Delhi, India.

Website References:

1. https://www.tutorialspoint.com › C programming › C – Home
2. https://www.programiz.com/c-programming

NSS/NCC/SCOUTS &GUIDES/COMMUNITY SERVICE

(Common to all Branches)

Subject Code: 23MCS102	L	T	P	C
	0	0	1	0.5

Course Objective

- The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

Course Outcome

After completion of the course the students will be able to

1. Understand the importance of discipline, character and service motto.
2. Solve some societal issues by applying acquired knowledge, facts, and techniques.
3. Explore human relationships by analyzing social problems.
4. Determine to extend their help for the fellow beings and downtrodden people.
5. Develop leadership skills and civic responsibilities.

Unit – 1 Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talentsand skills
ii) Conducting orientations programs for the students –future plans-activities-releasing roadmap etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issuesetc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

Unit – 2 Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

Unit – 3 Community ServiceActivities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in thevillage, identification of problems- helping them to solve via media- authorities- experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mentalhealth, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme
2. Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
3. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General ofNCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., ―Introduction to Environmental Engineering‖, McGrawHill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. ―Introduction to Environmental Engineeringand Science‖, Pearson Education, New Delhi. 2/e 2007
6. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

COMMUNICATIVE ENGLISH
(Common to all Branches)

Subject Code: 23BHT101	L	T	P	C
	3	0	0	3

Course Objectives:

- To enable students to build vocabulary appropriate to their levels and to make students understand printed texts of different genres
- To enhance basic writing skills of the students in different forms of written communication
- To assist students implicitly synthesize the rules of grammar for the production of accurate sentences
- To aid students to acquire appropriate and adequate letter writing skills
- To get students enhance their essay writing skills and develop reading skills

Course Outcomes:

By Studying this Course Student will be able to

CO 1. Comprehend printed texts of different genres easily and they will be able to make appropriate word choice for writing.
CO 2. Write short texts efficiently.
CO 3. Construct grammatically correct sentences.
CO 4. Communicate through letters effectively.
CO 5. Write essays and comprehend unfamiliar passages.

Unit – I

A Power of a Plate of Rice by Ifeoma Okoye

Skimming and Scanning — Capital letters and Punctuation — Spellings — Parts of speech — Root words — Prefixes and Suffixes — Synonyms and Antonyms

Unit – II

Night of the Scorpion by Nissim Ezekiel

Sequencing — Paragraph writing — Cohesive devices — Articles — Prepositions — Homonyms, Homographs, homophones

Unit-III

Biography of Steve Jobs

Drawing inferences — Paraphrasing, Summarizing, Note-making — Verbs and Tenses, Subject-verb agreement — Compound words — Collocations

Unit – IV

The Toys of Peace by Saki

Data interpretation — Official letters and Résumé — Direct and Indirect speech — Academic reporting verbs — Active and passive voice — Words often confused — Jargon

Unit – V

The Power of Intrapersonal Communication (An Essay)

Reading comprehension — Essay writing — Correcting errors — Technical Jargon

Text Books:

1. Pathfinder: Communicative English for UndergraduateStudents, 1st Edition, Orient BlackSwan, 2023 (Units 1, 2 & 3)
2. Empowering English by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Website References:

Grammar

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

Vocabulary

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches of Engineering)

Subject Code: 23BHT103	L	T	P	C
	2	1	0	3

Course Objectives

To equip the students with standard concepts and tools of mathematics to handle various real- world problems and their applications as follows

- To furnish the learners in the concept of first order and first degree differential equations and multivariable calculus.
- To enlighten the learners in the concept of higher order differential equations with constant coefficients.
- To furnish the learners with solution methods for partial differential equations that model physical processes
- To equip knowledge with basic concepts and techniques to interpret the physical meaning of different operators such as gradient, curl and divergence by handling various real-world applications
- To furnish the learners with basic concepts and techniques the work done against a field, circulation and flux using vector calculus by handling various real-world applications.

Course Outcomes

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

CO 1. Solve the differential equations related to various engineering fields.
CO 2. Model engineering problems as higher order differential equations and solve analytically.
CO 3. Identify solution methods for partial differential equations that model physical processes.
CO 4. Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO 5. Estimate the work done against a field, circulation and flux using vector calculus.

Unit – I

Differential equations of first order and first degree: Exact equations and equations reducible to exact form. Linear differential equations – Bernoulli's equations. Newton's Law of cooling – Law of natural growth and decay- Electrical circuits

Unit – II

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general particular integral, method of variation of parameters. L-C-R Circuit problems.

Unit – III

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Unit – IV

Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient,del applied to vector point functions - Divergence and Curl, Vector identities.

Unit–V

Vector integration: Line integral- circulation- work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and problems on these theorems.

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e,John Wiley & Sons, 2018.
2. B.S.Grewal,HigherEngineeringMathematics,44/e,Khanna publishers,2017.

Reference Books:

1. Dennis G.Zill and Warren S.Wright, Advanced Engineering Mathematics, Jones andBartlett, 2018.
2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, PearsonPublishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
5. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017

CHEMISTRY
(Common to CSE, CSM, CSD, IT, ECE and EEE)

Subject Code: 23BHT105	L	T	P	C
	3	0	0	3

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods and spectroscopic techniques.

Course Outcomes:

At the end of the course, the students will be able to:

CO 1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
CO 2. Summarize the concepts of Instrumental methods and distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
CO 3. Compare the materials of construction for battery and electrochemical sensors.
CO 4. Demonstrate the preparation, properties, and applications of thermoplastics, thermosetting, elastomers, conducting polymers and bio-degradable polymers.
CO 5. Apply the principle of Band diagrams in the application of conductors and semiconductors.

Unit - I

Structure and Bonding Models: Types of Hybridisations - valency shell electron pair repulsion theory (VSEPR), molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of N2, O2, CO and NO. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit – II

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, Instrumentation, electronic transition, Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts, IR spectroscopies, Instrumentation fundamental modes and Fingerprint Region. NMR – Principle - Equivalent and Non- Equivalent Protons - Chemical Shift- Splitting – Coupling Constant.

Unit - III

Electrochemistry and Applications: Electrochemical cell, Nernst equation, cell potential (EMF) calculations and numerical problems (EMF), potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid- base titrations). Electrochemical sensors (definition and working principle), reference electrodes – calomel electrode – NHE (or) SHE.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Unit-IV

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of addition polymerization.

Plastics –Thermoplastics and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, Polyester resin(PET).

Elastomers–Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.
Bio-Degradable polymers - Polyhydroxy alkanoates (PHA), Polyl Lactic Acid (PLA).

Unit - V
Modern Engineering materials: Semiconductors – Introduction, Basic concepts (Salient features of band theory- Definition semiconductor- Elemental semiconductors -intrinsic semiconductor and extrinsic semiconductors), applications.
Super conductors – Introduction- Basic Concept (Preparation of $YBa_2Cu_3O_{7-y}$ by ceramic method), Properties-applications.
Supercapacitors: Introduction, Principle & Mechanism of Supercapacitors - Applications.
Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphinesnanoparticles.

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

SWITCHING THEORY AND LOGIC DESIGN

Subject Code: 23EET101	L	T	P	C
	3	0	0	3

Course Objectives:

- To classify different number systems and apply to generate various codes.
- To use the concept of Boolean algebra in minimization ofswitching functions
- To design different types of Adders and Subtractors
- To design different types of decoders, encoders, code converters, multiplexers and comparators
- To apply knowledge of flip-flops in designing of Registers and Counters

Course Outcomes:

At the end of the course the student will be able to:
CO1: Solve typical number base conversions and analyze new coding techniques
CO2: Optimize logic gates for digital circuits design
CO3: Understand concepts of Adders and Subtractors.
CO4: Analyze combinational circuits for various digital design applications.
CO5: Develop sequential circuits

UNIT – I

Number systems: Review of Number systems (binary, hexa and octal), base conversion, complements of numbers- r's, r – 1's compliment, BCD, 2421, excess-3, gray code.

UNIT – II

Logical operations: Logic gates, Boolean theorems, complements and dual of logic expressions, standard SOP and standard POS. Minimization of switching functions using theorems, K – map (up to 4-variables).

UNIT – III

Combinational logic circuits-I: Design of half adder, full adder, half subtractor, full subtractor, 4-bit binary adder, 4-bit binary subtractor, 4-bit binary adder/subtractor, BCD adder, carry look ahead adder.

UNIT – IV

Combinational logic circuits-II: Design of decoder, encoder, multiplexer, de-multiplexer, 3-bit comparator and BCD to seven segment display.

UNIT – V

Sequential logic circuits: Introduction, flip-flops (D-Flip-flop,T-Flip-flop, SR-Flip-flop, JK-Flip-flop) with truth tables and excitation tables. Conversion of Flip-Flops,

Design of ripple counters, synchronous counters, Johnson and ring counters, Design of shift registers, universal shift register.

TEXT BOOKS:

1. Digital design– Moris Mano, Michael D. Ciletti, Pearson, Fifth Edition.
2. Switching Theory and Logic Design-A. Anand Kumar, PHI.

REFERENCE BOOKS:

1. Modern Digital Electronics - R. P. Jain, Tata McGraw - Hill Education Publishers.
2. Fundamentals of Logic Design – Charles H.RothJr, Jaico Publishers.

Website References:

https://nptel.ac.in/courses/108/105/108105132/

ENGINEERING MECHANICS

(Common to ME/CE//EEE)

Subject Code: 23EST104	L	T	P	C
	3	0	0	3

COURSE OBJECTIVES:

- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- To apply the Work-Energy method to particle motion.
- To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.

CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.

CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.

CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

UNIT I

Introduction to Engineering Mechanics: Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant– Moment of Force and its Application –Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of concurrent forces, Numerical examples on spatial system of concurrent forces using vector approach, Analysis of plane trusses.

UNIT III

Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures. **Centre of Gravity:** Centre of gravity of simple body (from basic principles), Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia.

UNIT IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics – D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Textbooks:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

ENGINEERING WORKSHOP
(Common to ME/CE/ECE/EEE)

Subject Code: 23ESL104	L	T	P	C
	0	0	3	1.5

Course Objectives:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Course Outcomes:

Upon the completion of this course, the students will be able to

CO 1. Identify workshop tools and their operational capabilities.
CO 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO 3. Apply fitting operations in various applications.
CO 4. Apply basic electrical engineering knowledge for House Wiring Practice
CO 5. Apply the Plumbing tools in plumbing operations

Syllabus:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half - Lap joint b) Mortise and Tenon joint c) Corner Dovetail or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting
   d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on arc welding and gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

Text Books:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

COMMUNICATIVE ENGLISH LAB
(Common to all Branches)

Subject Code: 23BHL101	L	T	P	C
	0	0	3	1.5

Course Objectives:

- To enable students to cultivate proper speech habits
- To enhance the ability of students to make extempore speeches
- To help students master techniques of being successful in debates and group discussions
- To assist students to acquire effective and adequate presentation skills
- To prepare students to face interviews in an assertive manner

Course Outcomes:

CO 1. Students will be able to pronounce words accurately.
CO 2. Students will be able to speak spontaneously.
CO 3. Students will be able to participate in debates and group discussions and contribute proactively.
CO 4. Students will be able to present data on select topics using pre-existing slides.
CO 5. Students will be able to face interviews confidently.

Course Syllabus

Unit – I: Phonetics — Neutral English Accent

Unit – II: JAM session — Role play

Unit – III: Debate — Group Discussion

Unit – IV: Poster Presentation — PPT Presentations

Unit – V: Cover letter — Résumé — Interview Skills

Suggested Software:

- Walden InfoTech
- Young India Films

Text Books:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press. 2018.
2. Samson T : Innovate with English, Foundations
3. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016.
4. Jayashree, M Let's Hear them Speak: Developing Listening-Speaking skills in English Sage Publications.
5. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
6. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, (3rd Ed.) Trinity Press

Website References:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw
12. https://www.linguahouse.com/en-GB
13. https://www.ted.com/watch/ted-ed

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

CHEMISTRY LAB
(Common to CSE, CSM, CSD, IT, ECE and EEE)

Subject Code: 23BHL104	L	T	P	C
	0	0	3	1.5

Course Objectives:

- Verify the fundamental concepts with experiments.

Course Outcomes:

At the end of the course, the students will be able to

CO 1. Determine the cell constant, conductance and potential of solutions.
CO 2. CO2: Prepare advanced polymer Bakelite materials.
CO 3. CO3: Measure the strength of an acid present in secondary batteries by pH metry.
CO 4. CO4: Analyse the sample using spectroscopic techniques.
CO 5. CO5: Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, of surface tension and viscosity etc

LIST OF EXPERIMENTS:

1. Measurement of 10Dq by spectrophotometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery. (pH metry)
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law. (Colurimetric estimation of iron)
9. Wavelength measurement of sample through UV-Visible Spectroscopy.
10. Identification of simple organic compounds by IR.
11. Preparation of nanomaterials by precipitation method.
12. Estimation of Ferrous Iron by Dichrometry.
13. Determination of surface tension and viscosity.
14. Determination of Hardness of water sample by EDTA Method
15. Determination of Dissolved Oxygen present in the given water sample by Modern Winkler's Method.
16. Determination of Chloride content present in given water sample

Reference Books:

1. "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to all Branches)

Subject Code: 23MCS103	L	T	P	C
	0	0	1	0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

Course Outcomes: After completion of the course the student will be able to

1. Understand the importance of yoga and sports for Physical fitness and sound health.
2. Demonstrate an understanding of health-related fitness components.
3. Compare and contrast various activities that help enhance their health.
4. Assess current personal fitness levels.
5. Develop Positive Personality

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups.

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar.

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

Practicing general and specific warm up, aerobics

ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping andrunning.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning,2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to SurvivingAnywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.

2. Institutes must provide field/facility and offer the minimum of five choices of as manyasGames/Sports.

3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

TRANSFORM THEORY
(EEE Branch Only)

Subject Code: 23BHT211	L	T	P	C
	3	0	0	3

Course Objectives:

- Examine the Laplace transform of various fundamental functions and explore its properties.
- Explore Inverse Laplace Transforms and use Laplace transforms to solve differential equations effectively.
- Investigate the properties of Fourier series and apply them to various applications.
- Understand the mathematical concepts of Fourier transforms and Inverse Fourier transforms, including their properties and practical uses.
- Study the mathematical tool of Z-transforms and Inverse Z-transforms, focusing on their properties and applications to solve difference equations.

Course Outcomes:

The student will be able to:

- Apply properties of the Laplace transform to evaluate the transform of various functions.
- Determine the Inverse Laplace Transform of different functions and use it to solve differential equations.
- Compute Fourier series and apply them to various scenarios.
- Analyze functions using the Fourier transform/Fourier sine (cosine) transform and their inverses.
- Utilize properties of the Z-transform to evaluate the transform of different functions and solve difference equations through inverse Z-transforms.

UNIT-I

Laplace Transforms (8 hrs):

Laplace Transform for elementary functions – Properties- 1st shift and 2nd shifting theorems - Laplace transform of derivative, integrals, multiplication and division by t^n.

UNIT-II

Inverse Laplace Transforms (8 hrs):

Inverse Laplace Transform by partial fractions, convolution theorem (without proof), application of Laplace transforms to solve ordinary differential equations.

UNIT-III

Fourier Series (10hrs) :

Determination of Fourier coefficients (without proof) – Fourier series for $(0, 2\pi)$, $(-\pi, \pi)$, $(0, 2C)$, $(-C,C)$,Fourier series – even and odd functions.

UNIT-IV

Fourier Transforms(10 hrs) :
Fourier Integral Theorem (without proof)- Fourier sine and cosine integrals –complex form of Fourier Integral - Fourier transform – Fourier sine and cosine transforms – properties.

Inverse Fourier Transforms:
Inverse Fourier Transforms, Inverse sine and cosine transforms – properties.

UNIT-V
Z- Transforms 10(hrs) :
Z-transform – Linear property – Damping rule – Shifting rule – Initial and final value theorems - Z transforms of functions multiplied and divided by n.

Inverse Z-Transforms : Basic functions, Partial fractions, Application of Z transforms to solve Difference Equations.

Suggested Text Books

1. B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Advanced Engineering Mathematics , Erwin Kreyszig, 9th Edition, John Wiley & Sons.
2. Engineering Mathematics for first year, Veerarajan T., Tata McGraw-Hill, New Delhi.
3. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.

PYTHON PROGRAMMING

Subject Code: 23EST206	L	T	P	C
	3	0	0	3

Course Objectives:

- Python programming course aims to empower students with the knowledge, skills, and practical experience essential for becoming proficient Python programmers. By mastering Python fundamentals, exploring its rich ecosystem, and learning software development best practices, students develop problem-solving abilities and gain the confidence to tackle real-world challenges.

Course Outcomes:

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

CO 1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

CO 2. Demonstrate proficiency in handling Strings and File Systems.

CO 3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

CO 4. Implement file handling functions and user defined functions in python.

CO 5. Interpret the concepts of Object-Oriented Programming as used in Python and Regular Expressions.

Unit – I

Introduction to Python: History, Features, Installing Python, Running Python, Operators, Statements and Expressions.

Control Structures: Conditional Statements, Loops

Unit – II

Data Types: Mutable vs immutable data type, Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules. Sequences - Strings, Lists, and Tuples, Dictionaries and Set Types

Unit – III

Functions: Definitions, Declaration, Parameter passing, calling functions

File Handling: creating a file, opening a file, I/O with file (read, write, append), closing a file

Unit – IV

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

Unit – V

Classes in Python: Principles of Object Orientation, Creating Classes, Instance Methods, Special Methods, class Variables and Inheritance, Data base connectivity.

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

Textbooks:

1. Wesley J .C hun "Core Python Applications Programming", 3rd Edition, 2012, Prentice Hall.
2. Brian jones, David Beazley “Python Cookbook ”, 3rd Edition.

Reference Books:

1. Mark Lutz "Programming Python, 4th Edition" O'Reilly Media.
2. Think Python, Allen Downey, Green Tea Press

Reference Links:

1. https://docs.python.org/3/tutorial/index.html
2. https://pythonprogramminglanguage.com

ELECTRONIC DEVICES AND CIRCUITS

Subject Code: 23EET202	L	T	P	C
	2	0	0	2

Course objectives:

- To understand the working, characteristics of PN Junction diode, Zener diode and LED.
- To describe the working, parameters of rectifiers and filters.
- To explain the working, characteristics of transistor (BJT) in different configurations, JFET and MOSFET.
- To understand the need for biasing and to explore the transistor biasing methods.
- To explain how transistor acts as a switch and amplifier and also understands types of feedback amplifiersand characteristics of negative feedback amplifier.
- To understand the condition for oscillations and analyze RC Phase shift oscillator, Wien bridge oscillator,Hartley and Colpitt's oscillator using BJT.

Course Outcomes:

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

- **CO1:** Describe the working principle of PN Junction diode, Zener diode and LED.
- **CO2:** Explain the operation and analyze the parameters of rectifiers and filters.
- **CO3:** Describe the working and behavior of transistor (BJT) in different configurations, JFET andMOSFET.
- **CO4**: Describe the need for biasing and transistor biasing methods & explain how transistor acts as a switch and amplifier.
- **CO5:** Understand the condition for oscillations and analyze RC Phase shift oscillator, Wien bridge oscillator, Hartley and Colpitt's oscillator using BJT. And also understand types of feedback amplifiers and characteristics of negative feedback amplifier.

UNIT I:

Diode Characteristics: Formation of PN junction diode, V-I Characteristics of Diode, Diode as a switch, ZenerDiode Characteristics, Zener Diode as Voltage Regulator, LED.

UNIT II:

Rectifiers and Filters: Half wave rectifier, Full wave rectifier, Ripple factor, Efficiency, TUF, Comparison betweenfull wave rectifier and Half Wave rectifier, Rectifiers with C- Filter, L- filter.

UNIT III:

Transistor Characteristics:

Bipolar Junction Transistors (BJT) - input & output Characteristics of transistor in CB, CE, CC configurations, Relationship between α, β and γ.

Field effect transistors (FET) -Characteristics of JFET, MOSFET (Enhancement and depletion)

UNIT IV:

Transistor Biasing and Stabilization: Need for biasing, DC & AC load line, Criteria for fixing the operatingpoint, Types of biasing and its stability, thermal run away, Thermal stability.

Applications of Transistor: Transistor as a switch, Transistor as an Amplifier (CE),

UNIT V:

Feedback amplifiers: Concept of feedback, classification of feedback amplifiers, general characteristics of negativefeedback amplifiers.

Oscillators: Condition for oscillations, RC Phase shift oscillator, Wien bridge oscillator, Hartley and Colpitt'soscillator using BJT.

Text Books:

1. Integrated Electronics – Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill,2009.
2. Electronic Devices - FLOYD 5th Edition, Pearson Education.

Reference Books:

1 Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-GrawHill.
2 Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition,2006.

http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html

ELECTRIC CIRCUIT THEORY

Subject Code: 23EET203	L	T	P	C
	3	0	0	3

Course Objective:

- To impart knowledge on different network theorems.
- To impart knowledge on resonance.
- To impart knowledge on three phase networks.
- To impart knowledge on two port networks.
- To analyze D.C transient analysis &A.C transient analysis.

Course Outcomes:

CO1: Able to understand different network theorems.
CO2: Able to explain resonance.
CO3: Able to describe three phase circuits.
CO4: Able to illustrate two port networks.
CO5: Able to analyze D.C transient analysis & A.C transient analysis.

UNIT I:

Network theorems – I: Superposition, Thevenin's, Norton's and Reciprocity Theorems for D.C and sinusoidal excitations (for independent and dependent sources).

UNIT II:

Network theorems –II: Maximum Power Transfer, Millman's, Tellegen's, and compensation Theorems for D.C and sinusoidal excitations (for independent sources).

Resonance: Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT-III:

Three Phase Circuits: Three phase circuits: Phase sequence- Star and delta connection Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits Measurement of Active and Reactive power in balanced three phase systems. Analysis of Three Phase unbalanced circuits-Loop Method- Application of Millman's Theorem.

UNIT IV:

Two Port Networks: Two port network parameters – Z, Y, ABCD (transmission) and hybrid parameters and their relations, inverse of transmission & Hybrid parameters, Series and parallel two-Port Networks.

UNIT V:

D.C Transient Analysis: Transient response of R-L, R-C & R-L-C series circuits for D.C excitation-Initial conditions-solution method using differential equation and Laplace transforms, Response of R-L & R-C & R-L-C networks to pulse excitation.

A.C Transient Analysis: Transient response of R-L, R-C &R-L-C series circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and Laplace transforms.

TEXT BOOKS:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition .
2. Circuit theory Analysis & Synthesis by Chakrabarti, DhanpatRai Publishing Company (P) Ltd.

REFERENCE BOOKS:

1. Network Analysis by N.C.Jagan, C.LakshmiNarayana BS publications 2nd edition.
2. Network Analysis, Revised 3e by M. E. Van Valkenburg/T.S. Rathore
3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.

ELECTROMAGNETIC FIELD THEORY

Subject Code: 23EET204	L	T	P	C
	3	0	0	3

Course objectives: The objective of this course is to acquire knowledge on

- Electric field and potentials due to different configurations of static charges.
- Behavior of conductors and dielectrics in the presence of external magnetic field, calculate the capacitance of different configurations
- Magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations and to study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
- Concept of self and mutual inductances and the energy stored.
- Time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced EMF

Course outcomes:

The student should be able to
CO1: Determine EFI using Coulomb's and Gauss's law for various electric charge distributions.
CO2: Calculate the capacitance for different configurations.
CO3: Calculate the MFI due to different current configuration using Biot-Savart's law and Ampere's law.
CO4: Determine the self inductances of solenoid and Toroid.
CO5: Calculate induced emf, understand the concepts of displacement current and Poynting vector.

UNIT – I
Electrostatics Electrostatic Fields: Coulomb's Law – Electric Field Intensity (**EFI**) – EFI due to a line and a surface charge, work done in moving a point charge in an electrostatic field, electric potential – potential gradient, Guass's law – Maxwell's first law

UNIT – II
Conductor-Dielectrics: Conductors – Dielectrics and Capacitance Electric dipole – dipole moment – potential and **EFI** due to an electric dipole, Torque on an Electric dipole in an electric field conductors and Insulators – their behavior in electric field. Polarization, boundary conditions between dielectric to dielectrics, conductor to dielectric and conductor to free space.
Laplace's and Poison's equations and solution of Laplace's equation in one variable. Capacitance of parallel plates, spherical and coaxial cables, current density, conduction and convection current densities

UNIT – III
Magneto statics & Ampere's law: Biot-Savart's law , Magnetic Field Intensity (**MFI**) – MFI due to a straight current carrying filament, MFI due to circular and solenoid current carrying wire.Ampere's Law, point form of Ampere's circuital law, Ampere's circuital law and its applications., Maxwell's third equation.

Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors– Torque on a current loop placed in a magnetic field.

UNIT – IV

Self and mutual inductance:

Self and mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane.

UNIT – V

Time Varying Fields Time varying fields: Faraday's laws of electromagnetic induction – its integral and point forms, Maxwell's fourth equation, modification of Maxwell's equations for time varying fields, displacement current, Poynting theorem and Poynting vector.

Text Books:

1. " Principles of Electro Magnetics" by Sadiku, Oxford Publications,6th edition, 2015.
2."Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.

Reference Books:

1."Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd edition
2. "Electromagnetic" by Joseph A.Edminister, Schaum's outline, 4th edition, 2014.
3. "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford higher Education.

PYTHON PROGRAMMING LAB

Subject Code: 23ESL207	L	T	P	C
	0	0	3	1.5

Course Objectives:

- This course will enable students with a comprehensive understanding of Python programming language, including its history, features, and fundamental concepts, enabling them to write Python programs proficiently.

Course Outcomes:

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

CO 1. Able to implement conditional statements and loops to control the flow of their Python programs effectively.
CO 2. To manipulate strings, lists, tuples, dictionaries, and sets using appropriate Python syntax and built-in functions.
CO 3. To perform basic file operations such as creating, opening, reading, writing, appending, and closing files using Python.
CO 4. To import specific attributes from modules, utilize built-in functions provided by modules, and organize modules into packages effectively.
CO 5. Apply OOP concepts and regular expressions in Python to search, match, and manipulate textual data effectively.

Exercise Questions: 1

Ex 1: Write the python programs to implement all Number type operations.
Ex 2: Write the python programs to perform all String operations.

Exercise Questions: 2

Ex 3: Write the python programs to calculate the List data type operations.
Ex 4: Write the python programs to perform the Dictionary operations.

Exercise Questions: 3

Ex 5: Write the python programs to implement the recursive function.
Ex 6: Write the python programs to perform the file operations.

Exercise Questions: 4

Ex 7: Write the python programs to implement modules and packages.

Exercise Questions: 5

Ex 8: Write the python program to create class, object and its concepts of OOP.
Ex 9: Write a Python program that uses regular expressions to find all occurrences of a specific pattern in a given text and validations.

Text Books

1. Wesley J .C hun "Core Python Applications Programming", 3rd Edition, 2012, Prentice Hall.
2. Brian jones, David Beazley “Python Cookbook ”, 3rd Edition.

References Books

1. Mark Lutz "Programming Python, 4th Edition" O'Reilly Media.
2. Think Python, Allen Downey, Green Tea Press

Web Links

1. https://docs.python.org/3/tutorial/index.html
2. https://pythonprogramminglanguage.com

ELECTRONIC DEVICES AND CIRCUITS LAB

Subject Code: 23EEL201	L	T	P	C
	0	0	3	1.5

Course Objective:

- To measure the voltage, time period and phase using CRO.
- To observe the characteristics of PN junction diode &Zener diode experimentally.
- To find ripple factor of half and full wave rectifiers with and without filter.
- To observe the characteristics of BJT in CB and CE configurations and also analyze the frequencyresponse of CE Amplifier experimentally.
- To observe the characteristics of JFET experimentally.
- To measure the frequency of oscillations of RC Phase Shift Oscillator.

Course Outcomes:

Students will be able to
CO1: Measure the voltage and time period using cathode ray oscilloscope (CRO).
CO2: Analyze the V-I characteristics of P-N diode, Zener diode and examine its cut-in voltages.
CO3: Analyze the half wave and full wave rectifiers with and without Filters
CO4: Differentiate the characteristics of Bipolar Junction Transistor (BJT) in CB and CE configurations andalso analyze the frequency response of CE Amplifier.
CO5: Draw the characteristics of Field Effect Transistor (FET) & determine the frequency of oscillations of RC Phase Shift Oscillator.

List of Experiments:

1. Study of Electronic components
2. Measurement of voltage and time period using cathode ray oscilloscope(CRO)
3. PN Junction diode forward and reverse bias characteristics (cut-in voltage, static and dynamic resistance).
4. V-I characteristics of Zener diode.
5. Rectifier without filters (Full wave & half wave).
6. Rectifier with filters (Full wave & half wave).
7. Transistor CB characteristics (Input and Output)
8. Transistor CE characteristics (Input and Output)
9. Frequency response of CE Amplifier
10. FET characteristics
11. RC Phase Shift Oscillator

ELECTRICAL CIRCUITS LAB

Subject Code: 23EEL202	L	T	P	C
	0	0	3	1.5

Course Objective:

- Able to understood and analyze the network theorems
- Able to understand other network concepts through the conduction of experiments
- Able to design series and parallel resonant circuit for a given resonant frequency
- Able to measure power in 3-Phase star and delta connected loads

Course Outcomes:

CO1: Understands different theorems and thereby able to measure the load currents.
CO2: Designs the Series & Parallel resonance circuit and hence calculates band widths for different values of Quality of factors.
CO3: Calculates the two port network parameters for a given network.
CO4: Measures the active power for 3-Phase Star & Delta connected loads.
CO5: Work effectively in groups by sharing responsibilities and analyzing on findings & Understand measurement of three phase power.

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin's Theorem
2) Verification of Norton's Theorem
3) Verification of Superposition theorem
4) Verification of Compensation Theorem and Maximum Power Transfer Theorem
5) Verification of Reciprocity, Millmann's Theorems
6) Locus Diagrams of RL and RC Series Circuits
7) Frequency response of Series and Parallel RLC circuit.
8) Determination of Self, Mutual Inductances and Coefficient of coupling of a Transformer.
9) Determination of Z and Y Parameters of Two-Port network.
10) Determination of Transmission and hybrid parameters of Two-Port network.

Additional Experiments:

11) Measurement of Active Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by 2 Wattmeter Method for balanced loads
13) Measurement of 3-phase Power by 2 Wattmeter Method for unbalanced loads.

ENVIRONMENTAL STUDIES
(Common to all Branches)

Subject Code: 23MCT204	L	T	P	C
	2	0	0	0

Course Objectives:
- Memorize the knowledge of environment and status of different resources on earth.
- Identify the significance, arrangement, causes of annihilation and conservation of ecosystems and biodiversity..
- Discriminate causes, effects of a variety of pollutions and suitable control methods.
- Identify the hurdles of sustainable development; evaluate the different environmental management and legal issues.
- Describe the population growths, health problems and evaluate the environmental assets.

Course Outcomes:
By Studying this Course Student will

CO 1. Recognize and speaks well again on the general issues of environment and know how to conserve resources for better usage.
CO 2. Explain and demonstrate the ecosystems setup, assess. Recognize and conserving of diversity to upkeep.
CO 3. Examine a range of pollution problems along with control and their eco-friendly disposal methods.
CO 4. Translate the sustainable development practice through clean development mechanisms.
CO 5. Evaluate the changing trends of world population and compile the information in order to document the environmental assets.

Unit – I (6 Hours)
Importance of Environmental Studies and Natural Resources: Definition of Environment – Importance - Need for Public Awareness
Forest Resources - Use and over exploitation - deforestation – consequences – casestudy
Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment
Food Resources – Food security concept - changes caused by agriculture and overgrazing -effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – conceptof sustainable agricultural methods - case study
Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources

Unit – II (6 Hours)
Ecosystems and Biodiversity and its conservation: Definition – Structure of ecosystem: producers - consumers – decomposers.Functions of ecosystem: Food chains - food webs ecological pyramids - Energy flow – Nutrient cycles (Carbon cycle and Nitrogen cycle). Ecological succession.
Definition of Biodiversity - Values of biodiversity - Bio-geographical classification of India - Hot Spots of India - Endangered and endemic species of India –Threats to biodiversity - Conservation of biodiversity

Unit – III (6 Hours)
Environmental Pollution: Definition – causes - effects - control measures of Air pollution -Water pollution - Noise pollution – Marine Pollution - Nuclear hazards.

Solid waste Management: Causes - effects - disposal methods of urban waste – biomedical wastes - case studies
Disaster management: floods – earthquakes – cyclones

Unit – IV (6 Hours)
Social Issues and the Environment: Concept of Unsustainable and Sustainable development –Water conservation: Rain water harvesting- Watershed management – Global environmental challenges: climate change - global warming – acid rains - ozone layer depletion -World summits on environment: Stockholm conference – Rio-earth summit – Kyoto protocol – Environment (Protection) Act - Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Wildlife (Protection) Act -Forest (Conservation) Act

Unit – V (4 Hours)
Human Population and the Environment: Population growth patterns - variation amongnations - Population problems - control -Environment and human health - Role of informationTechnology in Environment and human health

Text Books:
1. Shashi Chawla. 2015, *A Text book of Environmental Studies*, Revised edition, TMH, New Delhi
2. Bharucha, E. 2005, *Text book of Environmental Studies*, First edition, Universities Press (India) Pvt. Ltd., Hyderabad
3. Suresh K. Dhameja. 2006-07, *Environmental Studies*, Third revised edition, S.K. Kataria & Sons (P) Ltd., New Delhi
4. Benny Joseph. 2015, *Environmental Studies*, Revised edition, TMH, New Delhi

Reference Books:
1. Odum, E.P, *Fundamentals of Ecology*, Third edition, W.B. Saunders & Co (P) Ltd., Philadelphia.
2. P. D. Sharma, *Ecology and Environment*, Revised edition, Rastogi Publications (P) Ltd.
3. Cunningham, W.P., Cunningham, M.A., *Principles of Environmental Science*, TMH, New Delhi.
4. Peavy, Rowe and Tchobanoglous, *Environmental Engineering*, Mc Graw – Hill Internationaledition.
5. Graedel, T.E., Allenby, B.R., *Industrial Ecology and Sustainable Engineering*, Pearson Publications.

UNIVERSAL HUMAN VALUES
(Common To All B.Tech Branches)

Subject Code: 23BHT207	L	T	P	C
	2	0	0	2

COURSE OBJECTIVES:

- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.
- To Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

COURSE OUTCOMES:

CO 1. Upon completion of this course students can aware of ethical behavior in the work place
CO 2. To shapes the students by the end of this curriculum being harmony himself
CO 3. To understand the human relationship and values
CO 4. To understand the Nature and its existence of connectivity
CO 5. Learn the importance of Human values and universal order

UNIT-I

Introduction: Understanding the need, basic guidelines, content and process for Value Education- Self Exploration - what is it?- Continuous Happiness and Prosperity Morals, Values and Ethics – Integrity – Work Ethics – Service Learning- Respect for others- Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment Self-confidence – Spirituality.

UNIT-II

Understanding Harmony in the Human Being: Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'- Understanding the needs of Self ('I') and 'Body'- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

UNIT-III

Understanding Harmony in the Family and Society: Harmony in Human-Human Relationship- Understanding harmony in the Family- the basic unit of human interaction Understanding values in human-human relationship- Trust (Vishwas) and Respect (Samman) as the foundational values of relationship- Understanding the meaning of Vishwas; Difference between intention and competence -Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

UNIT- IV

Understanding Harmony in the Nature and Existence: Whole existence as Co-existence-Understanding the harmony in the Nature- Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature- Holistic perception of harmony at all levels of existence

UNIT-V

Implications of the Holistic Understanding of Harmony: Natural acceptance of human values - Definitiveness of Ethical Human Conduct- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Reference Books:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics
2. "Professional Ethics and Human Values" by Prof. D.R. Kiran.
3. "Engineering Ethics & Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
4. A N Tripathy, 2003, Human Values, New Age International Publishers
5. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press
6. M Govindrajan, S Natrajan& V. S Senthilkumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

D.C MACHINES & TRANSFORMERS

Subject Code: 23EET205	L	T	P	C
	3	0	0	3

Course objective

- To analyze the performance of different types of DC machines & Transformers.
- To appreciate the applications of DC machines & Transformers

Course outcomes

CO1: Identify and Define different types of dc generators.
CO2: Interpret the performance of DC generators under different load conditions.
CO3: Describe the construction and performance of various types of DC motors.
CO4: Determine the performance of DC machines by conducting different tests.
CO5: Distinguish between different types of transformers and compute their equivalentcircuit parameters and performance of transformer by conducting different tests.

UNIT I

D.C generators: Constructional details, Principle of operation, Armature winding, Lap & Wave, Emf equation, Methods of excitation.
Armature Reaction, Commutation, O.C.C, internal-external characteristics, voltage regulation, losses-power flow, efficiency calculation.

UNIT II

DC Motors: Principle of operation of DC motors, Back EMF, Torque equation, Types of DC motors, Speed-Torque characteristics of DC motors, Applications.

UNIT III:

Speed Control & Testing of DC Machines: Starting of DC motors: 3 point starter, 4 point starter, Losses and efficiency, Condition for maximum efficiency, Speed control methods, Brake test, Swinburne's test, Retardation test, Hopkinson's test, fields test.

UNIT IV

Transformers –I: Constructional features, Principle of operation, EMF equation, Transformer on No load and Load Phasor diagram, equivalent circuit, Regulation, losses and efficiency, All day efficiency, Applications.

UNIT V

Transformers –II: Open circuit and short circuit test, Sumpner's test, parallel operation, separation of core losses test, auto transformers, 3-Ø transformer connections, Scott connection.

TEXT BOOKS:

1. I.J. Nagrath&D.P.Kothari, " Electrical Machines", Tata McGrawHill, 5th edition.
2. P.S.Bimbhra, "Electrical Machinery", Khanna Publisher, 7th edition.

REFERENCE BOOKS:

1. Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India.
2. Husain Ashfaq , " Electrical Machines", DhanpatRai& Sons.
3. Direct Current Machines by M. G. Say (Author), E.O. Taylor (Author).

CONTROL SYSTEMS

Subject Code: 23EET206	L	T	P	C
	3	0	0	3

Course objective:

- To describe the feedback controls with basic components of control systems.
- To formulate mathematical models of physical systems and block diagramrepresentation.
- To analyze stability of the system from transfer function approach.
- To describe and analyze various time domain and frequency domain tools for analysisand design of linear control systems.
- To Represent physical systems in state space form and analyze them.

Course outcomes:

CO1: Able to understand basic components of feedback control systems; formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs.
CO2: Able to understand the time- domain specifications; Analyze first and second order control systems in time domain;
CO3: Able to understand the concepts of stability; Analyze stability of the system from transfer functions approach and graphical methods.
CO4: Able to understand frequency response analysis and understand compensation techniques.
CO5: Able to Represent physical systems in state space form and analyze them.

UNIT I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems- examples- Classification of control systems- Feedback characteristics- Effects of feedback characteristic.
Mathematical models of physical systems: Differential equations- transfer functions and block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula - Translational and Rotational mechanical systems.

UNIT II:

Transfer function of elements of control systems: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,
Time response analysis: Standard test signals - Time response of first order systems – Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, and proportional integral derivative systems.

UNIT III:

Concept of stability: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV:

Frequency response analysis: Introduction, Frequency domain specifications-Bode plots-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots-Stability Analysis. Concept of Compensation techniques

UNIT V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from transfer function and vice versa - State Transition Matrix, properties of state transition matrix, controllability, observability.

TEXT BOOKS:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age InternationalLimited Publishers, 2nd edition.
2. Modern Control Engineering, Fifth edition, Kotsuhiko Ogata, Prentice Hall of India Pvt.Ltd.

REFERENCE BOOKS:

1. Control Systems by A.Anand Kumar, PHI Publications,4th edition.
2. Control Systems Engineering by S.Palani,TataMcGraw Hill Publications.
3. Automatic Control Systems by Farid Golnaraghi, Benjamin C. KUO,Wileyindia Pvt. Ltd,Ninth Edition

ELECTRICAL POWER GENERATION & DISTRIBUTION

Subject Code: 23EET207	L	T	P	C
	3	0	0	3

Course objective:

- To impart knowledge about the generation of electrical power to meet the everincreasing demand of electrical power and operation of conventional power plants.
- To impart knowledge about the various aspects and methods of improving Voltageand power factor in distribution system.

Course outcomes:

CO1: Students are able to draw the line diagrams and identify different components in thermal & hydel power generating stations.
CO2: Students can able to understand the operation of Solar, wind and Nuclear power generation.
CO3: Students can summarize different distribution systems.
CO4: Students can understand the operation of Substations.
CO5: Students can analyze the economic aspects of power generation and understand the different tariff methods.

UNIT I:

Thermal &Hydel Power Stations: Site selection, Line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Boilers, Super heaters, Economizers, Turbines, Condensers, Cooling towers, andChimney.
Hydro power plants: Site selection, Line diagram of Hydel Power Station and Brief description of dam, penstock, storage tank and forebay.

UNIT II:

Solar, Wind and Nuclear power generation: Solar Power generation: Line diagram of solar energy, solar thermal collectors, solar PV generation. Wind Power generation: Line diagram of wind energy, types of wind turbines.

Nuclear Power Stations: Working principle, Nuclear fuels. Nuclear reactor Components: Moderators, Control roads, Reflectors and Coolants. Radiation: Radiation hazards and Shielding.

UNIT III:

Distribution Systems: Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at ends (equal / unequal voltages), ring main distributor. AC distribution, Comparison of DC and AC distribution.

UNIT IV:

Substations: Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.
33/11 KV substation line diagram.

Gas insulated substations (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations.

UNIT V:

Economic Aspects of Power Generation: Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, utilization factor, Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar andA.Chakrabarti, DhanpatRai& Co. Pvt. Ltd., 1999.
2. Electrical Power sytem by S.L.Uppal, KHANNA PUBLISHERS; Fifteenth edition(1 January 1987).

REFERENCE BOOKS:

1. Generation,Distribution and Utilization of Electric Energy by C.L.Wadhawa New age 6th edition 2018.
2. Power systems-I by S.Sivanagaraju, Pearson Education; 1st edition (1 January 2011)
3. Principles of Power System by V.K Mehta S Chand; 3rd edition (1 March 2005)

ELECTRICAL MEASUREMENTS

Subject Code: 23EET208	L	T	P	C
	3	0	0	3

Course Objectives:

- Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current, power, power factor, energy and magnetic measurements.

Course Outcomes:
Students will be able to

CO1: Classify various analog instruments and understand their principle and operation
CO2: Understand the operation of C.Ts and P.Ts and also able to measure the active and reactivepowers
CO3: Illustrate knowledge on measurement of energy ,P.f. in the power system using energy meterand power factor meter respectively
CO4: Evaluate different methods of measuring R,L,C parameters in an electric network
CO5: Understand the principle and operation of Potentiometers& Transducers.

UNIT I:
Measuring Instruments: Classification, deflecting, control and damping torques, Ammeters and Voltmeters, PMMC, moving iron type instruments, expression for the deflecting torque and control torque, Errors and compensations, extension of range using shunt and series resistance.

UNIT II:
Instrument transformers & Measurement of Power: CT and PT Ratio and phase angle errors, Single phase dynamometer wattmeter, PF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems,Basics of hall effect sensor.

UNIT III:
Measurement of Energy, P.F. meters: Single phase induction type energy meter, driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter.

Three phase energy meter, trivector meter, maximum demand meters. Design considerations Type of P.F. Meters, dynamometer and moving irontype,1-phand3-ph meters .

UNIT IV:

D.C. Bridges: Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, unbalanced Kelvin's bridge loss of charge method.

A.C. Bridges: Measurement of inductance, Quality Factor, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle Desauty bridge. Wien's bridge –Schering Bridge**.**

UNIT V:

Potentiometers& Transducer: Principle and operation of D.C.Crompton's potentiometer standardization, Measurement of unknown resistance, current,voltage. **A.C.Potentiometers:** polar and coordinate types, Drysdale polar potentiometer, GallTinsley (coordinatetype) A.C.potentiometer,standardization,applications.

Thermistors, Thermocouples, Linear Variable Differential Transformer, Peizo-Electric transducers, Strain Gauges, Optical Transducer, Electronic energy meter, principle of calibration and how it can be calibrated in transducers.

TEXTBOOKS:

1 Electrical & Electronic Measurement & Instruments by A.K. Sawhney Dhanpat Rai & Co .Publications.
2 Electrical Measurements and measuring Instruments– by E.W. Goldingand F.C.Widdis ,fifth Edition, Wheeler Publishing.

REFERENCEBOOKS:

1 Electrical Measurements :Fundamentals, Concepts ,Applications– by Reissl and, M.U,New AgeInternational (P) Limited, Publishers.
2 M.B.Stout,"BasicElectricalMeasurements",PHI,1981.
3 F.K.Harris, Electrical Measurements", Wiley Eastern Pvt. Ltd., 1974

COMPETITIVE PROGRAMMING LAB – I

Subject Code: 23ESL208	L	T	P	C
	0	0	3	1.5

Course Objectives:

- This course aim to enhance student proficiency in a particular programming language C++.
- Acknowledge in the value of mathematics and problem solving techniques in programming
- Learning about the optimized solution in solving problems.

Course Outcomes:

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

CO 1. Use programming to find solution of the problems.
CO 2. Create solution based on OOPS concept
CO 3. Choose the right container to arrange data in order to solve problems.
CO 4. Provide problem Solving strategies employing Recursion.
CO 5. Apply mathematics to the problem Analysis.
CO 6. Write data retrieval queries and evaluate the result set

LAB MODULE I:

CPP Essentials: Basic Syntax, Variables, Data types, Operators, Input and output, Conditional Statements ,loops.

Data Type,Conditions: https://codeforces.com/group/MWSDmqGsZm/contest/219158
Loops: https://codeforces.com/group/MWSDmqGsZm/contest/219432

LAB MODULE II:

Arrays, Functions and Strings

Arrays : https://codeforces.com/group/MWSDmqGsZm/contest/219774
Functions : https://codeforces.com/group/MWSDmqGsZm/contest/223205
Strings: https://codeforces.com/group/MWSDmqGsZm/contest/219856

LAB MODULE III:

OOPS

Class: https://www.hackerrank.com/challenges/c-tutorial-class/problem
Classes and Objects: https://www.hackerrank.com/challenges/classes-objects/problem
https://www.hackerrank.com/challenges/box-it/problem

LAB MODULE IV:

Inheritance:
https://www.hackerrank.com/domains/cpp?filters%5Bsubdomains%5D%5B%5D=inheritance
Virtual Functions:
https://www.hackerrank.com/challenges/virtual-functions/problem
Abstract Classes – Polymorphism:
https://www.hackerrank.com/challenges/abstract-classes-polymorphism/problem

LAB MODULE V:

STL - 1: Containers, Container Classes, Vectors, Lists, Iterators,set

Vector: https://www.geeksforgeeks.org/problems/c-stl-set-1-vector/1

https://www.hackerrank.com/challenges/vector-erase/problem?isFullScreen=true

Intersection of Two Arrays:

https://leetcode.com/problems/intersection-of-two-arrays/description

Set: https://www.hackerrank.com/challenges/cpp-sets/problem?isFullScreen=true

Stack:

Next Greater Element I: https://leetcode.com/problems/next-greater-element-i/description/

Valid Parentheses: https://leetcode.com/problems/valid-parentheses/description/

Largest Rectangle in Histogram:

https://leetcode.com/problems/largest-rectangle-in-histogram/description/

LAB MODULE VI:

STL -2: Maps, Bit set, Stack, Queue, De queue, Priority queue

https://www.hackerrank.com/challenges/cpp-maps/problem?isFullScreen=true

Twice counter: https://www.geeksforgeeks.org/problems/twice-counter4236/1

Frequency Game: https://www.geeksforgeeks.org/problems/frequency-game/1

Check if a string is repetition of its substring of k-length: https://www.geeksforgeeks.org/problems/check-if-a-string-is-repetition-of-its-substring-of-k-length3302/1

Dequeue: https://www.hackerrank.com/challenges/deque-stl/problem?isFullScreen=true

LAB MODULE VII:

Problem solving approaches : precomputation, Two pointer

Two Sum II : https://leetcode.com/problems/two-sum-ii-input-array-is-sorted/description/

Rotate Array: https://leetcode.com/problems/rotate-array/description/

Container With Most Water: https://leetcode.com/problems/container-with-most-water/description/

Remove Duplicates from Sorted Array:

https://leetcode.com/problems/remove-duplicates-from-sorted-array/description/

Product of Array Except Self:

https://leetcode.com/problems/product-of-array-except-self/description/

Reverse Words in a String II:

https://leetcode.com/problems/reverse-words-in-a-string-ii/description/

LAB MODULE VIII:

Problem solving approaches:

Sliding Window approach, fixed window approach and varying window approaches

Max Consecutive Ones I:

https://leetcode.com/problems/max-consecutive-ones/description/

Max Consecutive Ones II:

https://leetcode.com/problems/max-consecutive-ones-ii/description/

Longest Substring with At Most Two Distinct Characters:
https://leetcode.com/problems/longest-substring-with-at-most-two-distinct-characters/description/

Longest Substring Without Repeating Characters:
https://leetcode.com/problems/longest-substring-without-repeating-characters/description/

Find All Anagrams in a String:
https://leetcode.com/problems/find-all-anagrams-in-a-string/description/

SQL Part1:

SQL Command, Data Types, Operators and Expressions, DDL statements, DML statements, Functions, Sorting Data, Grouping Data

Practice problems:-

https://www.hackerrank.com/domains/sql?filters%5Bsubdomains%5D%5B%5D=select
https://www.hackerrank.com/domains/sql?filters%5Bsubdomains%5D%5B%5D=aggregation
https://www.sqlzoo.net/wiki/SQL_Tutorial

SQL Part2: Cartesian Product and Inner Join, Self Join, Outer Join, Subquery, Independent Subquery, Correlated Subquery

Practice problems:-

https://www.hackerrank.com/domains/sql?filters%5Bsubdomains%5D%5B%5D=join
https://www.hackerrank.com/domains/sql?filters%5Bsubdomains%5D%5B%5D=advanced-join
https://www.sqlzoo.net/wiki/SQL_Tutorial

Text Books:

1. The Complete Reference C++ by Herbert Schildt ,4th Edition
2. E. Horowitz. et.al., Fundamentals of computer Algorithms, Universities Press, 2008, 2nd Edition.

Reference Books:

1. Competitive Programming 3: The New Lower Bound of Programming Contests Book by Felix Halim and Steven Halim, 423 pages
2. Programming Pearls Book by Jon Bentley, 258 pages.T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005
3. S.Dasgupta et.al. – Algorithms, TMH, New Delhi – 2007.
4. SQL Quickstart Guide: The Simplified Beginner's Guide to SQL by Clydebank Technology

Resources:

1. https://leetcode.com/problems/
2. https://nptel.ac.in/courses/106106145/
3. https://www.spoj.com/problem

D.C MACHINES & TRANSFORMERS LAB

Subject Code: 23EEL203	L	T	P	C
	0	0	3	1.5

Course Objective

- This lab aims to understand the characteristics and performance of DC machines through the conduction of experiments.

Course Outcomes

CO1: Analyze the performance of DC motor under loaded and unloaded conditions.
CO2: Analyze the characteristics of DC generator
CO3: Determine the critical field resistance and critical speed of DC Generator
CO4: Determine the efficiencies of DC Series and Shunt generators
CO5: Examine various speed control methods of DC shunt motor and understand losses of motor.

LIST OF EXPERIMENTS:

1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC shunt motor.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne's test on D.C shunt machine.
8. Speed control of DC shunt motor by Field and armature Control.
9. O.C. &S.C. Tests on single phase transformer.
10. Separation of core losses of a single-phase transformer.

Additional Experiments:

11. Brake test on DC compound motor.
12. Separation of losses in a DC shunts motor.
13. Retardation test on DC shunt motor.
14. Load test on DC series generator.

CONTROL SYSTEMS LAB

Subject Code: 23EEL204	L	T	P	C
	0	0	3	1.5

Course Objective:

- To understand the modeling, simulation, transfer function and implementation of a physical dynamicalsystem by a linear time invariant ordinary differential equation.
- To examine electrical modeling of a second order system and analyze the under-damped, over-dampedand critically damped cases
- To interpret the effects of poles and zeros location in the s-plane on the transient and steady statebehavior.
- To Measure the characteristics of Servo-Motor.
- To Design Lead, Lag and Lag-Lead series compensator on a second order system.

Course Outcomes:

CO1: Students can predict transfer function and implementation of a physical dynamical system by a lineartime invariant ordinary differential equation.
CO2: Students can examine electrical modeling of a second order system and analyze the under- damped, over-damped and critically damped cases.
CO3: Students can interpret the effects of poles and zeros location in the s-plane on the transient and steadystate behavior.
CO4: Students can measure the characteristics of Servo-Motor, understand Characteristics of magnetic amplifiers
CO5: Students can design Lead, Lag and Lag-Lead series compensator on a second order system.

ANY TEN OF THE FOLLOWING EXPERIMENTS ARE TO BE CONDUCTED:

1. Time response characteristics of a second order system.
2. Characteristics of synchros.
3. Effect of feedback on DC servo motor
4. To study speed-torque characteristics and to determine transfer function of DC motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. To determine transfer function of a DC generator
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. To study characteristics of AC servo motor
11. Root locus and bode plot from MATLAB
12. State space model for classical transfer function using MATLAB-verification.
13. Simulation of transfer function using operational amplifiers.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, PHI Publications.

MATLAB and its Tool box user's manual and – Math works, USA.

DESIGN THINKING
(Common To All Branches)

Subject Code: 23BHT208	L	T	P	C
	1	0	2	2

Course Objectives:

- Understand the significance of Design Thinking in engineering disciplines and develop empathy-building skills.
- Explore various ideation techniques to generate innovative design solutions.
- Learn to incorporate user feedback into design iterations for continuous improvement.
- Apply Design Thinking principles to real-world engineering problems.
- Collaborate in teams to solve complex engineering problems using Design Thinking principles.

Course Outcomes:

CO 1. Students will be able to explain the importance of Design Thinking in engineering contexts and use empathy-building techniques
CO 2. Students will be able to generate a diverse range of design ideas using creative ideation techniques.
CO 3. Students will demonstrate the ability to iteratively refine design solutions based on user feedback.
CO 4. Students will be able to apply Design Thinking methodologies to solve engineering challenges effectively.
CO 5. Students will effectively collaborate in teams to develop innovative solutions to engineering challenges during workshop activities.

Unit I: Introduction to Design Thinking

Entrepreneurship Challenges and prospects, Design Thinking- definition and Importance, Core principles of Design Thinking, Techniques for empathy building, User research methods,

Unit II: Ideate and Prototype

Creative ideation techniques (Brainstorming, Mind Mapping, SCAMPER, etc.), Prototyping fundamentals and materials, Rapid Prototyping Methods, Iterative Design Processes

Unit III: Test and Iterate

User testing principles and methodologies, Iterative design cycles, Evaluation criteria for design solutions

Unit IV: Design Thinking in Engineering Applications

Case studies of Design Thinking in engineering projects, Applying Design Thinking to product design, process improvement, and problem-solving, Challenges and opportunities in integrating Design Thinking into engineering practice

Unit V: Workshop: Application of Design Thinking

Hands-on workshop sessions to practice empathy building, ideation, prototyping, and iteration, Presentation of workshop outcomes and reflections on the Design Thinking process

References:

1. Lockwood, T. (2010). Design Thinking: Integrating Innovation, Customer Experience, and Brand Value. Allworth Press.
2. Brown, T. (2009). Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. Harper Business.
3. Norman, D. (2013). The Design of Everyday Things (Revised and Expanded Edition). Basic Books.
4. Knapp, J., Zeratsky, J., &Kowitz, B. (2016). Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days. Simon & Schuster.
5. Cross, B. (2018). Design Thinking for Engineers and Technologists. Wiley.
6. Kumar, V. (2012). 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization. Wiley.
7. Kelley, T., & Kelley, D. (2013). Creative Confidence: Unleashing the Creative Potential Within Us All. Crown Business.
8. Mootee, I. (2013). Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School. Wiley.
9. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
10. Polaine, A., Løvlie, L., & Reason, B. (2013). Service Design: From Insight to Implementation. Rosenfeld Media.