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 AND MANAGEMENT (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

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.

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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. DeterminationofrigiditymodulusofthematerialofthegivenwireusingTorsionalpendulum.
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- Elementalsemiconductors -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.