Semester I

L	T	P	C
3	1	0	4

Course Title**:** **Mathematics I**
Course Code**:** **MA11101**

Pre-requisite**:** **Trigonometric formulae, concepts of lines, planes and spheres, integration and differentiation.**

Course Objective

Fundamental notions of solutions of the system of equations, vector spaces and linear transformation on these spaces have to be studied. Concept of ordinary and partial differential equations and their solutions with applications will be discussed. Students will learn numerical differential and numerical integration techniques, numerical methods for finding the roots of a given equation will alsobe studied.

Course Content

MODULE I: Linear algebra (9Hours)
Algebra of Matrices, rank and inverse of a matrix, solution of algebraic equations- consistency, Hermitian, skew Hermitian and unitary matrices, eigenvalues and eigenvectors. Vector space-linear dependence of vectors, basis, dimension, linear transformations.

MODULE II: Numerical Analysis (11 Hours)
Numerical Analysis: finite difference, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula, Numerical differentiation, Numerical integration: Trapezoidal rule and Simpsons $1/3^{rd}$ rules , Numerical differentiation, Solution of polynomial and transcendental equation- bisection, Newton-Raphson and Regula-falsi methods ,Differential equations: Taylor's series method, Euler's and modified Euler's method, Runge-Kutta method.

MODULE III: Differential equations (10 Hours)
Introduction, formation of differential equation from a given n-parameters family of curve; solution using separation of variables, solution of homogeneous equation, First order differential equation-exact, integrating factor, linear and Bernoulli's equations, higher order differential equation with constant coefficients, Beam problem.

MODULE IV: Partial Differential Equation (10 Hours)
Partial differential equation: formulation and classification; linear partial differential equation of the first order (Lagrange's method), Non-linear PDE of the first order (Charpit's method), Method of separation of variable for solving first orderPDE, Heat equation wave equation and Laplace equation, classification of second order linear partial differential equations as hyperbolic, parabolic, elliptic.

Text/ Reference Books

1. S. L. Ross, Differential Equations, 3rd edition, Wiley India, 1984.
2. I.N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1957.
3. G. Strang, Linear Algebra and Its Applications, 4th edn. Brooks/Cole India,2006.
4. Conte and De Boor, Elementary numerical analysis: an algorithmicapproach,McGraw- Hill, 1972.
5. K. Hoffman & R Kunze, Linear Algebra, 2th edn. Pearson Education India,2003.
6. Numerical Methods By M. K. Jain, S. R. K. Iyengar & R. K. Jain
7. S.S Sastry, Introductory methods of Numerical analysis, Fifth edition, PHILearning Pvt Ltd, 2012.
8. M.D Rai Singhania, Ordinary & Partial Differential Equations, 18th edition, S. Chand & Company Ltd.
9. 2. Hoffman K & Kunze R, Linear Algebra, Prentice Hall of India, New Delhi(1971).
10. S.J. Farlow, Partial Differential Equations for Scientists and Engineers, DoverPublications, 1993.
11. Erwin Kreyszig, Advanced Engineering Mathematics, 9th edn., Wiley India,2009.

L	T	P	C
3	0	0	3

Course Title: **Engineering Physics**
Course code: **PH11101**
Pre-requisite: **Nil**

Course Objective

To understand the basic principles of quantum mechanics, solve the Schrödinger equation for simple problems, apply the concepts of quantum mechanics to understand the behavior of semiconductors, to solve simple problems related to the working of semiconductor materials, to understand the preliminaries of computation based on the principles of quantum mechanics.

Course Content

MODULE I: Quantum Mechanics (16 Hours)
Schrödinger equation, wave function, probabilities and normalization, expectation values, uncertainty principle, eigenvalues and eigenfunctions, infinite potential well and energy quantization, free particle, finite square well, potential steps and barriers - notion of tunnelling, one-electron atom.

MODULE II: Quantum theory of solids (20 Hours)
Allowed and forbidden energy bands, electrical conduction in solids, density of states, Fermi-Dirac distribution function and the Fermi energy, charge carriers in semiconductors, dopant atoms and energy levels, the extrinsic semiconductor, statistics of donors and acceptors, charge neutrality, carrier drift, carrier diffusion, the Hall effect.

MODULE III: Introduction to Quantum Computation (6 Hours)
State vector and state space, quantum bits, tensor products, composite quantum systems, multiple qubits, Bell states, superdense coding, quantum teleportation, Deutsch algorithm.

Text /Reference Books

1. Introduction to Quantum Mechanics, David. J. Griffiths, Cambridge University Press.
2. Semiconductor Physics and Devices Basic Principles, Donald A. Neamen, McGrawHill.
3. Quantum Information and Computation, CIT Lecture Notes by J. Preskill, (http://theory.caltech.edu/~preskill/ph219/index.html#lecture)
4. Solid State Devices, Ben G. Streetman and Sanjay Kumar Banerjee, PHI.

L	T	P	C
3	0	0	3

Course Title: **Principles of Electrical Engineering**
Course Code: **EE11101**
Pre-requisite: **Nil**

Course Objective

After completion of the course, students will be able to:

- ✓ Implement the knowledge of electrical circuits to solve different problems of theDC & AC circuits
- ✓ Demonstrate the connection & use of different measuring instruments.
- ✓ Explain the operation of transformers, electric generators & motors and discussthe importance & use of different special machines.
- ✓ Demonstrate the structure of any electrical energy system and implement theknowledge of fuse, MCB, Earthing, LA for power system protection.
- ✓ Recognize the necessity of sensors in different applications and explain theoperation of some common type of sensors.

Course Content

MODULE I: Introduction to Electrical Circuits (11 Hours)
Types of sources and elements, Kirchoff's Laws, Mesh and node analysis of DC networks, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, superposition theorem; Single phase A.C. circuits – concept of phasor, impedance, admittance, conductance and susceptance; Active, reactive and apparent power in AC circuits, power factor, three phase A.C. circuits - phasesequence, power in three phase system.Measurement of voltage, current, power and energy.

MODULE II: Introduction to Electrical Machines (10 Hours)
Working principles of Transformer and its applications, working principle of DC Machines and its applications; working principle of AC Machines and its applications; working principle and applications of Special machines such as Stepper motor, Universal Motor, BLDC motor, PMSM motor, SRM motor.

MODULE III: Introduction to Electrical Power Systems (11 Hours)
Introduction to electrical energy generation from different types of conventional and non-conventional energy resources, transmission, distribution and utilization; AC and DC power transmission; protection systems - fuse, MCB, Earthing, lightening arrestor; brief introduction to microgrid and smart grid.

MODULE IV: Sensors (10 Hours)
Applications of sensors - Inertial sensing, linear and rotary displacement sensors, acoustic and thermal sensing - ultrasonic sensor, infrared thermography, navigation sensors - GPS, motion capture systems, force and torque sensors, tactile and pressure, gas sensors, potentiometer, optical encoder,photoelectric sensor, Hall effect sensor, inductive and capacitive proximity sensor, pressure sensor - piezoelectric sensor.

Text/ Reference Books

1) **A. K. Sawhney**, A course in Electrical and Electronic Measurements andInstrumentation, Dhanpat Rai & Co., 19th Edition, 2018.
2) **A. Chakrabarti and S. Nath**, Basic Electrical and Electronics Engineering,TataMcGraw-Hill Education, 2nd Edition, 2011.
3) **J. W. Nilsson and S. Riedel**, Electric Circuits, Pearson, 11th Edition, 2020.
4) **R. L. Boylestead and L. Nashelsky**, Electronic Devices and Circuit Theory,Pearson,11th Edition, 2015.
5) **E. W. Golding and F. C. Widdis,** Electrical Measurements and MeasuringInstruments, Medtech, 6th Edition, 2019.
6) **P.S. Bimbra**, Electrical Machinery, R.C. Khanna & Vineet Khanna, FirstEdition,2021.
7) **Vincent Del Toro,** Electrical Engineering Fundamentals, Pearson EducationIndia, Second Edition, 2015

L	T	P	C
3	0	0	3

Course Title: **Computer Programming and Problem-Solving**

Course Code: **CS11101**

Pre-requisite: **Nil**

Course Content

MODULE I: **(3 Hours)**

Problem Solving Skills, Identify the Problem, Analyze the problem, Identify Decision Criteria, Develop Multiple Solutions, Choose the Optimal Solution, Problem Implementing Solutions.

MODULE II: **(3 Hours)**

Overview of C language, Basic Structure of C program, Constants, Variables and Data Types, User-defined Data Types, Operators and Expressions, Precedence and Associativity.

MODULE III: **(10 Hours)**

Input-Output Operations, Decision Making, Branching and Looping Statements, Arrays, Character Arrays and Strings.

MODULE IV: **(12 Hours)**

User-defined Functions, Structures, Unions, Debugging Strategies.

MODULE V: **(12 Hours)**

Pointers, Dynamic Memory Allocations, File Management, Introduction toPreprocessor Commands and Macro Processing, argv, argc.

Text /Reference Books

1) C Programming by Deital and Deital.
2) Programming in ANSI C, E. Balaguruswamy, 5th Edition McGraw Hill.
3) The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, PrenticeHall.
4) Programming With C, Byron Gottfried, McGraw Hill.

L	T	P	C
1	1	0	2

Course Title**: English Language and Literature**

Course Code**: HS11102**

Pre-requisite**: Nil**

Course Objective

The key objective is to develop in the under-graduate students of engineering a level of aptitude in English language learning incorporated through literature studies that will help them acquire the independent and effective communication skill required for academic and social needs.

Course Content

MODULE I: Basics of English Grammar (12 Hours)

Synonyms, Antonyms, One-word substitution, Idioms and Phrases, Article and Preposition**,** subject-verb agreement.

MODULE II: Language through Literature (07 Hours)

Essays:

1. **"***A Wedding in Russia"* by Sudha Murthy**.**
2. **"***English in India"* by R. K. Narayan.

Poems:

1. **"***If"* by Rudyard Kipling
2. **"***Because I could not stop for Death"* by Emily Dickinson.

MODULE III: Non-Detail Study

Short Stories:

O'Henry's **"***The Gift of the Magi*"

OR

R.K. Narayan *"An Astrologer's Day"*

OR

Edgar Allan Poe's **"***The Black Cat"*

OR

Katherine Mansfield *"The Fly"*

Text/ Reference Books

1. **Swan, Michael.** Practical English Usages. Oxford University Press.
2. **Wood, F.T**. A Remedial English Grammar for Foreign Students. Macmillan.
3. **Pleasures of Reading:** An Anthology of Poems, Orient Longman.
4. **Selected Essays and Short Storie**s, Oxford University Press.
5. **Selected Poems,** Oxford University Press.

L	T	P	C
0	0	4	2

Course Title: **Computer Programming Laboratory**

Course Code: **CS11201**

Pre-requisite: **Nil**

Course Content

- ✓ Input and Output programs
- ✓ Control Loop programs
- ✓ Conditional Execution programs
- ✓ Structure and Nesting programs
- ✓ Functions and Prototype programs
- ✓ Array programs
- ✓ Pointer programs

Text /Reference Books

1) C Programming by Deital and Deital.
2) Schaum's Outline of Programming with C by Byron Gottfried
3) Programming in ANSI C by E. Balagurusamy

L	T	P	C
0	0	2	1

Course Title: **Engineering Physics Laboratory**
Course code: **PH11201**
Pre-requisite: **Nil**

Course objectives

The course focuses on developing students' practical skills in experimental physics through a range of hands-on activities. Students will learn techniques such as determining semiconductor properties using the Four Probe Method, measuring the Numerical Aperture of optical fibers, studying magnetic field variations with current- carrying coils, calculating Hall Coefficient and carrier properties using the Hall Effect, determining lens curvature with Newton's Ring apparatus,measuring susceptibility of liquids/solutions with Quincke's Method, determining Planck's Constant using LEDs, measuring magnetoresistance of semiconductors, and determining light wavelength with a Michelson Interferometer. These experiments enhance students' understanding of fundamental concepts and foster proficiency in experimental physics.

Course Content

1) Four Probe: This experiment involves using the Four Probe Method todetermine the band gapenergy and resistivity of semiconductors.
2) Fiber Optics: The objective is to measure the Numerical Aperture of an opticalfiber.
3) Magnetic Field: This experiment has two parts - studying the variation of the magnetic field with distance along the axis of a circular current-carrying coiland calculating the coil's diameter,and exploring the superposition of magnetic fields from two coils at different distances.
4) Hall Effect: The goal is to calculate the Hall Coefficient, Carrier Density, and Carrier Mobilityof sample material.
5) Newton's Ring: Using Newton's Ring apparatus, this experiment focuses on determining the radius of curvature of the lower surface of a plano-convex lens.
6) Quincke's Method: The objective is to measure the susceptibility of a liquid or a solution usingQuincke's Method.
7) Planck's Constant: This experiment involves determining Planck's Constantusing LEDs.
8) Magnetoresistance: The objective is to measure the magnetoresistance of semiconductors.
9) Michelson Interferometer: Using a Michelson Interferometer, the goal is todetermine the wavelength of sodium light.
10) Reference: Experimental Manuals

L	T	P	C
0	0	3	2

Course Title: **Workshop Practice**
Course Code: **ID11201**
Pre-requisite: **Nil**

A. Experiments Related of Mechanical Engineering

Course Objectives

To impart knowledge and skill in using tools, machines, equipment and measuring instruments. The students will use different tools and equipment for workshop practice by taking safety precautions. Students will acquire skills for the preparation of different carpentry/fitting/welding models as well as application-oriented tasks.

Course Content

Introduction to Mechanical Workshop:
Study of Materials, tools, equipment, measuring instruments in Mechanical Workshop, Study of Safety Rules.

Carpentry:
Planning, chiseling, marking and sawing practice, one typical joint- Tee halving/Mortise and Tenon/ Dovetail.

Fitting:
Chipping, filing, cutting, drilling, tapping and threading about male and female joints, stepped joints- one simple exercise of single V joint for welding exercise.

Sheet Metal Work:
Selection of different gauge sheets, types of joints, fabrication of a tray or a funnel.

Lathe Exercise and Welding Practice:
Study of the basic lathe operations, Demonstration of manual metal arc welding (MMAW).

B. Experiments Related of Electrical Engineering

Course Objectives

After performing the experiments, students will be able to: Acquire knowledge on different electrical, electronic components, motors, sensors and measuring devices used in different home appliances and also in industrial applications. Students will also get adequate knowledge on electrical wiring and also get an overview of distribution system

1. Familiarization with Electrical and Electronic components

a. Different types of cables/wires and switches and usage of those
b. Wiring tools, lighting and wiring accessories, various types of wiring

2. Assembling of a given Electrical/Electronic circuit (e.g. power supply)

a. On a bread board
b. Soldering on PCB
c. Wiring of a multi-pin extension board

3. Wiring for light (e.g., fluorescent lamp/CFL/LED light) or Fan

a. controlled by one switch,
b. controlled by two SPDT switch
c. controlled by one switch from board with MCB

4. Study of measuring devices for current, voltage, power and energy measurement,

a. Ammeter, voltmeter, wattmeter and multi-meter
b. Single phase and three phase energy meters

5. Hands on with Microcontroller and IoT devices e.g., PIC, Arduino, Raspberry Pi and peripheral components and sensor.

6. Field visit for the demonstration of distribution transformer, DG, electrical distribution panel, earthing, lightening arrester etc.

Text /Reference Books

1. Chapman W.A.J., Workshop Technology. Parts 1 & 2, 4th Edition, Viva Books P. Ltd., K.New Delhi, 2002.
2. Hajra Choudhury, Workshop Technology Vol 1 & 2, Media Promoters & Publishers Pvt. Ltd, Bombay, 2004.
3. Miami, Welding Handbook, American Welding Society, 2000.
4. K.B Raina, Electrical Design Estimating and Costing, S K Kataria & Sons Publications, 2013.
5. Electrical Estimation and Costing, Nirali Prakashan Publications, edition-3, 2022

L	T	P	C
0	0	2	1

Course Title**:** **Language Laboratory**

Course Cod**e:** **HS11201**

Pre-requisite**:** **Nil**

Course Objective

The prime objective of the course is to implement result-oriented learning that not only aids in language learning, but also enhances students' overall personality through advanced courses in grooming and personality development

Course Content

MODULE I: The sounds of English

- Practicing correct pronunciation through IPA (International Phonetic Alphabet), Stress, Intonation, Rhythm, and Speech Elocution.
- Vocabulary Building.
- **Exercises:**
  - Online Format: pre-designed to focus on development in vocabulary and other communication skills.
  - Offline Format: comprises group discussions, Story Writing, and other activities for communication building)

MODULE II: Communication Skills

- Practicing situational conversation
- Developing Reading Skills through lectures and monologue
- Exercises:
  - Online Format: pre-designed to focus on development in vocabulary and other communications skill.
  - Offline Format: comprises debates, Reading Practices and other activities for communication building)

Text/ Reference Books

1. **Lewis, Norman.** *Word Power Made Easy (Latest Edition, 2020).* Goyal Saab Publications
2. **Philip, Carr.** *English Phonetics and Phonology: An Introduction (2019).* Wiley- Blackwell

Semester II

L	T	P	C
3	1	0	4

Course Title: **Mathematics II**
Course Code**: MA12101**
Pre-requisite**: Functions, integration, basic of vectors, limit, continuity &differentiability.**

Course Objective

It will help to understand the electrical circuit analysis, conduction of heat in bodies, fluid flow in mechanics. Also helps to measure the degree of certainty/uncertainty of happening/non happening of event and analyze the distribution of continuous and discrete data. To be able to analyze the nature of functions and sequence & series of any data.

Course Content

MODULE I: Laplace and Fourier Transform (13Hours)

Laplace and inverse Laplace Transform, Existence of Laplace Transform, Linear property, Convolution Theorem, Solution of ordinary differential equation by Laplace Transform.

Fourier series, Fourier transforms, properties of Fourier Transform, sine and cosine transforms Inverse Fourier Transform, Z-transform.

MODULE II: Vector Calculus (8 Hours)

Vector Calculus: Scalar and vector fields, level surfaces, Directional derivative, Gradient, Divergence, Curl, Laplacian, irrotational, solenoidal vectors and scalar potential, line, surface and volume integrals, Green's, Stokes and Gauss divergence theorem (statement only).

MODULE III: Probability (10 Hours)

Random experiments, sample space, events, probability and conditional probability, Baye's theorem, Probability space, random variables, probability distribution and density functions, Expectation (mean and variance). Discrete distributions: Binomial and Poisson distributions Continuous distributions: normal distribution.

MODULE IV: Single variable calculus (9 Hours)

Rolle's Theorem, Mean Value Theorem, Maxima and Minima, Sequences, Limits of a sequence and its properties, Series of positive terms, Necessary condition for convergence, Comparison test, D Alembert's ratio test, Cauchy's root test, TaylorSeries.

Text/ Reference Books

1. G. B. Thomas Jr. and R. L, Finney, Calculus and Analytic Geometry, 9th edition,PearsonEducation, India, 1996.
2. Robert Bartle & Donald Sherbert, Introduction to Real Analysis, John Wiley&Sons(2014).
3. T. M. Apostol, Calculus- Vol 2, 2nd Edition, Wiley India, 2003.
4. D. Bhatta and L. Debnath, Integral Transforms and their applications, 3rdedn.,CRC,2014.
5. Gupta and Kapoor, Probability and Statistics
6. S.C Malik and S. Arora, Calculus
7. Johnson, R. A., Miller and Freund's Probability and Statistics for Engineers, 6thedition.PHI, 2004.
8. S. R. Ghorpade and B.V. Limaye, An Introduction to Calculus and Real Analysis,SpringerIndia, 2006.
9. Levin R. I. & Rubin D. S., Statistics for Management, 7th edition, PHI, New Delhi,2000.
10. S.M. Ross, Introduction to Probability and statistics for Engineers, 3rd edition,AcademicPress, Delhi, 2005.

L	T	P	C
3	0	0	3

Course Title: **Engineering Chemistry**
Course Code: **CY12101**
Pre-requisite: **NIL**

Course Objective

To introduce students to Conventional and non-conventional Energy sources,Electrochemistry and Engineering materials

Course Content

MODULE I: ENERGY& FUELS (14 hours)

Sources of Energy, Fuels- classification, examples, relative merits, types of coal, determination of calorific value of solid fuels, Bomb calorimeter, theoretical oxygen requirement for combustion, proximate & ultimate analysis of coal, manufacture of metallurgical coke, flue gas analysis, problems. Lubricants - Definition, theories of lubrication, characteristics of lubricants, viscosity, viscosity index, oiliness, pour point, cloud point, flash point, fire point, additives to lubricants, Solid lubricants. Renewable sources of Energy (Solar Energy): Photovoltaic Cells and how it converts Light into Electricity.

MODULE 2: ELECTROCHEMISTRY & CORROSION (8 hours)

Basic idea about Electrode Potentials and Cells, Galvanic *vs.* Electrolytic Cell, Nernst Equation, Battery, Fuel Cells. Corrosion- types, Electrochemical theory, Different forms of wet corrosion, Galvanic (or Corrosion) series, Corrosion control, Techniques of metal Coating (Organic, Inorganic), Cathodic protection, Corrosion inhibitors.

MODULE 3: SOLID STATE (12 hours)

The solid state, Structures of Simple ionic compounds, Close packing in solids, bcc, fcc, structures of rock salt - caesium chloride- spinel - normal and inverse Spinels, Stoichiometric Defect, controlled valency & Chalcogen semiconductors, Non - elemental semiconducting Materials, Preparation of Semiconductors-steps followed during the preparation of highly pure materials and further treatments. Semiconductor Devices-p-n junction diode. Steel and important alloys.

MODULE 4: NANOSCIENCE & TECHNOLOGY (8 hours)

Introduction, scope of Nanoscience & Technology, Types of nanomaterials, Categories of nanomaterials, Nanotechnology, Quantum dots, Organic nanoparticles, Inorganic-organic Hybrid nanoparticles, Nano-intermediates, Nanocomposite materials.

OUTCOME: Students would become familiar with the important practical applications of fuels, electrochemistry, and nanotechnology**.**

Text Books/ Reference Books

1) Engineering Chemistry, P.C. Jain, M. Jain, Dhanpat Rai Publishing Company,NewDelhi, 2005.
2) Wiley Engineering Chemistry, 2nd Edition, Wiley (India)
3) R1: A Textbook of Engineering Chemistry, Shashi Chawla, 3rd Edition,DhanpatRai & Co,New Delhi, 2007
4) R2: Engineering Chemistry, 2nd Edition, O.G. Palanna, McGraw Hill Education(India) Pvt. Ltd., Chennai, 2017
5) R3: Engineering Chemistry, B.K. Sharma, Krishna Prakashan Media (P) Ltd

L	T	P	C
3	1	0	4

Course Title: **Electronics Devices and Circuits**
Course Code: **EC12102**
Pre-requisite: **Nil**

Course Objective

Understand electronic devices and circuits, including semiconductors, junctions, and carrier transport. Apply diodes for rectification, clipping, and voltage regulation. Analyze transistors, including BJTs, UJTs, and FETs, and their configurations. Study thyristor devices, like SCRs, and their characteristics. Explore the principles and applications of operational amplifiers

Course Content

MODULE I: **(10 Hours)**
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier- concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

MODULE II: **(10 Hours)**
PN junction– PN junction diode, V-I characteristics of junction diode, static and dynamic resistance, diode capacitance. Applications- Rectifiers, Clipper and clamper circuit, Voltage regulator, Zener diode, LEDs, LCD, Photodiodes, Solar cells.
- minor losses in pipes.

MODULE III: **(16 Hours)**
Bipolar Junction Transistors (BJT): PNP and NPN transistors, basic transistor action, input and output characteristics of CB, CE, and CC configurations; Uni-junction Transistor (UJT): Construction, working, and I-V characteristics of UJT; Thyristor Devices: Basic Construction and Characteristics of Thyristor, Semiconductor Controlled Device (SCR): Characteristics and two transistor models of SCR.Field Effect Transistors (FET): Construction of JFET, the idea of channel formation, pinch-off voltage, Transfer, and output characteristics; MOSFET: MOS Diode, Basic Construction of MOSFET and working I-V characteristics, enhancement, and depletion modes. Complimentary MOS (CMOS).

MODULE IV: **(6 Hours)**
Introduction to Operational Amplifiers: Ideal Op-amp, Inverting and Non-inverting Op-amp circuit, Op-amp application.

Text/ Reference Books

1) **Boylested & Nashesky**, Electronic Devices, and Circuit Theory, Prentice HallofIndia, 2015.
2) **Streetman and Banerjee,** Solid State Electronic Devices, Pearson, 2015.
3) **Jacob Millman and Christos CHalkias,** Integrated Electronics, TataMcGraw-HillEducation, 2017.

L	T	P	C
3	0	0	3

Course Title: **Foundation of Computing**
Course Code: **CS12102**
Pre-requisite: **Nil**

Course Content

MODULE I: Linear Data Structure (12 Hours)
Introduction of Data Structure; Need and Applications; Abstract Data Type; Dynamic Memory Allocation; Array; Linked List; Stack and Queues; Priority Queues - Implementation and Applications.

MODULE II: Sorting, Searching (6 Hours)
Sorting techniques- need; Types of Sorting, selection sort, Quick Sort; Searching techniques: need; Linear Search, Binary Search; Implementation and Applications of all.

MODULE III: Introduction to Logic (6 Hours)
Propositional Logic, Predicate Logic.

MODULE IV: Computer Networks and Internet Basics (8 Hours)
Computer Networks and Internet, Categories of Networks: Wired, Wireless, Sensor, LAN, WAN, PAN; network topologies need, and type, network switching: Packet and Circuit Switching, Protocol Layers and their functions (example protocol on each layer), Application Layer Protocols, E-mail, FTP, WWW and HTTP. Introduction to Cyber Security and Forensics with needs.

MODULE V: Introduction to AI and Machine Learning (8 Hours)
Introduction to Machine Learning, Artificial Intelligence and Fuzzy logic, Internet of Things, Natural Language Processing, Big Data, Mobile Computing, Cloud Computing.

Text /Reference Books

1) Data structures in C by H. Sahani
2) Computer Networking: A Top-Down Approach Featuring Internet by J. F.Kurose and K. W.Ross, 3/e, Pearson Education, 2005.
3) Machine Learning by Tom Mitchel, TMH
4) Data Structures by Tanenbum
5) Data Communications and Networking by Forouzan

L	T	P	C
2	0	0	2

Course Title: **Health, Safety and Environment**
Course Code: **CY12102**
Pre-requisite: **Nil**

Course Objective

To help realize the importance of and their role in the protection and maintenanceof a healthy environment for sustainable development. To enable students to grasp the significance and issues related to ecosystems, biodiversity, and natural resources, as well as ways of managing/ protecting them. To make students aware of environmental policies and movements and the role of individuals and communities in environmental protection for the purpose of educating and inspiring young minds.

Course Content

MODULE I: **(8 Hours)**

Renewable and non-renewable resources, Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles. Concept of an ecosystem, Structure and functions of an ecosystem. Biodiversity Definition, Genetic, species and ecosystem diversity. Conservation: general information, types and importance. Biogeochemical cycles: Carbon, Nitrogen, Sulfur etc.

MODULE II: **(8 Hours)**

Environmental pollution Definition, causes, effects and control measures, Types of pollution:(general) for water, soil, marine, noise, nuclear and thermal pollution. Air pollution and control sources, pollutants and their health effects. Solid waste management Generation, on site handling and storage, transfer and transport. Role of an individual in prevention of pollution. Case studies. Legislation in India Conservation Act, Other acts, Issues involved in enforcement of environmental legislation, public awareness.

MODULE III: **(7 Hours)**

Human population and the environment Population growth and characteristics, commonly occurred diseases (air borne, water borne etc.), Environment and human health, water conservation, rain water harvesting etc. Millets- Types, advances in millet research as a sustainable food source.

MODULE IV: **(5 Hours)**

Basic objective of Disaster and safety management, floods, earthquakes, cyclone and landslides: Causes, Effects and Management.

Text/Reference Books

1) **Bharucha, E.,** Textbook of Environmental Studies, University Press, 2nd Edition,2018.
2) **Basu, M. and Xavier, S.,** Fundamentals of Environmental studies**,** CambridgeUniversity Press, 2015**.**

L	T	P	C
0	0	3	2

Course Title: **Engineering Chemistry Laboratory**
Course Code: **CY12201**
Pre-requisite: **NIL**

Course Objective

To learn basic analytical techniques useful for engineering applications, applications of Spectroscopic measurements

List of Experiments

1) Determination of alkalinity in a given water sample.
2) Determination of available chlorine in the given sample of bleaching powder.
3) Alkaline Hydrolysis of Benzamide to Benzoic Acid
4) Estimation of Fe(II) in Mohr's salt using standard K2Cr2O7 solution.
5) Standardization of KMnO4 by oxalic acid.
6) Estimation of Fe(II) in Mohr's salt using standard KMnO4 solution.
7) Conductometric titration of an unknown acid solution using a standard basesolution.
8) Determination of total hardness of water
9) Estimation of sodium carbonate and sodium bicarbonate in a given mixture.
10) Calculation of Viscosity coefficient of sucrose using Ostwald's Viscometer
11) Standardization of Na2S2O3 solution with standard K2Cr2O7.

Text Books/ Reference Books

1) Vogel's Quantitative Chemical Analysis (6th Edition) Prentice Hall
2) Practical Chemistry by R.C. Bhattacharya

L	T	P	C
0	0	4	2

Course Title: **Computing Laboratory**
Course Code: **CS12201**
Pre-requisite: **Nil**

Course Content

1) You are required to write the programs in c on the integer array for following operations:

a) To insert the elements in the integer array and to display the number of negative elements of thearray and also to display the prime elements of the array.

b) Write function that can find the largest element in the array. Array must be used as parameter.

c) Write a program that invokes the above function (b) to find the largest element and print it out.

d) Write function that can find the largest element in the integer array using pointer arithmetic.

e) Write a program that invokes the above (d) function to find the largest element and displays theresult out.

2) You are required to write the program in C to:

a) Define a structure with two fields: width and height for rectangle. Input an array of rectangle,then display each area and perimeter of each rectangle in array.

b) Use the pointer to loop around the array for the same (a).

3) Write a program in c that receives a number n and return a pointer to the character string containingthe name of the corresponding month.

4) You are required to define a structure named UP with the following threemembers:

- A character array city[] to store names.
- A long integer to store the population of the city.
- A float member to store the literacy level.

Then write a program to do the following:

a) To read the details of 5 cities randomly using an array variable.

b) To sort the list alphabetically.

c) To sort the list based on literacy level.

d) To sort the list based on population.

e) To display the sorted lists.

5) As you have studied structure and pointer in the last semester. You are required to write programs using structure containing a pointer member name to represent the information about a person.

a) To read the information about a person and to print it on the screen.

b) To initialize data of several employees and print it in tabular format. Usethe function emp_print() the data of a single employee.

c) To create and print a list of persons and their mobile number. Use nestedstructure and pointermembers.

6) Write a program to implement a single link list to perform the following operations:

a) Insertion at the beginning, at end and at any position of the list.

b) Deletion at the beginning, at end and at any position of the list.
c) Traverse the single link list

7) Write a program to implement stack using static and dynamic representationand perform Insertion and Deletion.

8) Write a program to implement queue using static and dynamic representationand perform Insertion and Deletion.

9) Write a program to implement binary tree using link list.

10) Write a program to implement linear and binary search.

11) Write a program to sort a list of elements using bubble sort and selection sort

L	T	P	C
0	0	2	1

Course Title: **Electronics Engineering Laboratory**
Course Code: **EC12201**
Pre-requisite: **Nil**

Laboratory Syllabus

1) (a) Testing of Active and Passive Components
(b) Identification of terminals in diodes, transistors etc.

2) (a) Measurements of waveform characteristics like amplitude, frequency etc inDigital Storage Oscilloscope.
(b) Generation of various waveforms with varying amplitude, frequency, dutycycle etc using function generator.
(c) Familiarisation with operation of power supply in different modes.

3) Plot the V-I characteristics of PN Junction diode and determination of cut-involtageof PN Junction diode.

4) Plot the V-I characteristics of Zener diode and determination of ZenerBreakdownvoltage.

5) Plot the line and load regulator characteristics using Zener Diode.

6) Design of Half Wave Rectifier with and without shunt capacitor. Calculate theefficiency, ripple factor with and without filter.

7) Design of Centre Tapped Full Wave Rectifier with and without shunt capacitor.Calculate the efficiency, ripple factor with and without filter.

8) Design of Bridge Wave Rectifier with and without shunt capacitor. Calculatetheefficiency, ripple factor with and without filter.

9) Plot the input and output characteristics of a transistor in common emitterconfiguration.

10) Design a single stage RC Coupled Amplifier using a transistor and trace theamplified output.

11) Familiarization with soldering and de-soldering using a amplifier using andverifythe output.

L	T	P	C
0	0	3	2

Course Title: **Engineering Graphics**
Course Code: **ME12202**
Pre-requisite: **Nil**

Course Objective

This course is designed to introduce the students to the "universal language of Engineers" for effective communication through drafting exercises of variousgeometries. To learn the technical drawing is an important part of the engineering profession. The objective of the course is to teach students to communicate using graphic techniques. To create awareness and emphasize the need for Engineering Graphics in all the branches of engineering. To follow basic drawing standards and conventions and to develop skills in three-dimensional visualization of engineering component. To graphically construct and understand the importance of mathematical curves in Engineering applications by solving specific geometrical problems in plane geometry involving lines, plane figures and engineering Curves.

Course Content

Introduction:
Overview of the course, Examination and Evaluation patterns.

Lines Lettering and Dimensioning:
Types of lines, Lettering, Dimensioning, Geometrical Constructions, Polygons, Scales, and Curves.

Orthographic projection:
Principles of Orthographic Projection, Projections ofPoints, Straight Lines and traces, Projections of Laminas, Projections of Solids.

Development of Surfaces:
Draw the development of surfaces for Prisms, Cylinders, Pyramid and Cones.

Section of Solids:
Sectional planes, Sectional views - Prism, pyramid, cylinder andcone, true shape of the section. Development of truncated objects.

Isometric views:
Isometric axis, Isometric Planes, Isometric View, Isometricprojection

Text /Reference Books

1) Bhatt N. D, Elementary Engineering Drawing, Charotar Publishing House, Anand,2002.
2) Dhawan, R. K., A Textbook of Engineering Drawing, S. Chand Publishing, 2012.
3) Narayana K L & Kannaiah P, Engineering Graphics, Tata McGraw Hill, NewDelhi,1992.
4) Luzadder W J, Fundamentals of Engineering Drawing, Prentice Hall of India, NewDelhi,2001.
5) Venugopal K, Engineering Drawing & Graphics, New Age International Pvt.Ltd., NewDelhi, 1994

L	T	P	C
0	1	2	2

Course Title**:** **Human Values and Effective Communication**

Course Code**:** **HS12202**

Pre-requisite**:** **Nil**

Course Objective

The prime objective of the course is to implement result-oriented learning that not only aids inlanguage learning but also enhances students' overall personality through advanced courses ingrooming and personality development.

Course Content

Module-I

- **Communication:** definition, process of communication, types and forms of communication, barriers to communication, role and importance in the corporate world, tools of communication and group discussion.
- **Writing:** definition, process of writing, different forms of writing
- Skills for Professional Conversations

Exercise:

Online Format: pre-designed to focus on development in vocabulary and other communication skills.

Offline Format: comprises Extempore, Film Appreciation, Poetry Appreciation, LetterWriting, Paragraph Writing, Essay Writing, and other activities for communication building and improving writing skills

Module-II

- Learning public speaking and body language through role play
- *Communication for practical purposes:* Developing reading, writing, listening, and speaking skills, Importance & barriers to them.
- Interview: definition, types, forms, plan and preparation.
- Presentation: definition, types and forms
- Proposal: definition, types and forms
- Public speaking: types and forms. Visual communication: types and forms

Exercises:

Online Format: Pre-designed to focus on development in vocabulary and other communication skills.

Offline Format: Comprises role play to learn language skills in professionalscenarios, public speaking, and other communication-building activities.

Text/Reference Books

1. **Lewis, Norman.** *Word Power Made Easy (Latest Edition, 2020)*. Goyal SaabPublications
2. **Philip, Carr.** *English Phonetics and Phonology: An Introduction (2019).* Wiley-Blackwell
3. **Raman, M & S. Sharma**. *Technical Communication: Principles and Practice*. (2015).OUP, New Delhi.