

## **CH 101 A: Engineering Chemistry**

**3L, 0T**

**100 Marks**

Water: Sources of water, requisites of wholesome water, Methods of treatment of water for domestic and industrial use, sedimentation filtration and industrial use, sedimentation filtration and industrial use, sedimentation filtration and sterilization of water, break point chlorination.

Water Analysis : Water as solvent, types of impurities present in water, Hardness of water, units of hardness, inter-relationship between various units, determination of hardness, alkalinity, chloride, sulphate, fluoride and iron, dissolved oxygen and carbon dioxide.

Solid fuels: Coal its original and classification, proximate and ultimate analysis, gross and net calorific values. Determination of calorific values by Calorimeter, soft and metallurgical coaks, Carbonisation process.

Liquid fuels: Merits and demerits, natural gasoline, different types of gasoline obtained from catalytic cracking reforming polymerization, synthetic gasoline.

Gaseous fuels : Water gas, producer gas, Semi water and carbureted gas, CNG, LPG, their preparation, composition and calorific values, Junker's calorimeter Analysis of the gases by Orsa apparatus [Numerical problems based on above].

Nuclear fuels: Nuclear binding energy, nuclear fission and nuclear fusion, elementary idea reactor concepts, nuclear power reactor and breeder reactor.

Corrosion: Classification and theories of corrosion, Factors effecting corrosion, corrosion control by alloying, passivators inhibitors and alternative by environment and by cathodic protection.

Cement: Raw materials and principles of manufacturing cement, chemistry of setting of cement and analysis of cement.

Abrasives : Abrasive power, natural and artificial abrasives, their general properties and uses.

Refractoriness: Definition, criteria, classification and uses.

Polymers: Classification types and mechanism of polymerization, methods of polymerization, important polymers and resins, constituents of plastics, fabrication of plastic material.

Natural and synthetic rubber, vulcanization of rubber, silicon oils.

## **CE 102 A – Civil Environmental Engineering**

**3L, 0T**

**100 Marks**

### **Section – A**

Various types of maps and their uses. Principles of Survey, Errors in measurement, measurement of horizontal distances, offsetting, rating and reciprocal ranging.

Compass Survey: Principle, declination, local attraction. Leveling: Basic Definition curvature & refraction, reciprocal levelling, fly leveling, calculations of levels.

Basic Building Materials: Cement, Bricks, Stone, Wood, Concrete. Function and requirements of foundation, Bricks masonry, Stone Masonry, Introduction of Building Component like stairs, floors Green Building, Basic of stair cases, roof.

### **Section- B**

Basics of Environment, Global Environmental issues, Environmental issues, Environmental Laws in India. Concept of Integrated built environment, concept of sustainable development, Role of an individual in conservation of natural resources. Sources of water, Water quality Impurities in Water & their removal. Eutrophication of lakes. Self purification of streams, Basics of waste water treatment.

Concept of Ecosystem – Structure and function of ecosystem cycles, food chains, Major Ecosystem. Bio diversity – definition, Genetic Biodiversity, species biodiversity, Ecosystem Biodiversity, value of Biodiversity, threats of biodiversity, conservation of biodiversity.

Types of solid wastes. Municipal solid waste collection and disposal methods, E-Waste handling. Nuclear waste Management.

*Note: Scope of study is limited to the basic knowledge and interpretation of topics given in all the units. Students have to attempt at least two questions from each section & total five questions.*

Recommended Books:

1. Basic Civil Engineering: S. Ramamurtham.
2. Fundamental of Surveying: S.K. Roy.
3. Surveying: B.C. Punmia.
4. Civil Engineering Materials : Parbin singh
5. Environmental Studies : Benny Joseph
6. Fundamentals of Ecology : M.C. Das
7. Introduction of Environmental Sciences : Y. Anjaneyulu
8. Environmental Engineering : D. Srinivasan
- 9.

### **MA 103 A : Mathematics – I**

**4L, 0T**

**100 Marks**

#### **Section A**

Differential Calculus: Partial differential and its applications, Maxima and Minima of two and more independent variables, Jacobians, Asymptotes, Curvatures (formulae without proofs), Envelopes and Curve tracing.

#### **Section B**

Integral Calculus: Gamma and Beta functions, Rectification, Volume and surface of solids of revolution. Differentiation under the integral sign. Double and triple integrals with their applications to area, volume, surface area and mass. Centre of gravity and moment of inertia.

*Note: Four questions will be set from each section. Students are required to attempt five questions selecting at least two from each section.*

### **SE 104 A : ENGINEERING MECHANICS**

**3L, 2P**

**100 Marks**

Systems of coplanar forces, Resultant of concurrent forces, parallel forces and non-concurrent non parallel system of forces, moment of force about any point, couples, Varignon's theorem, distributed forces in plane.

Introduction to centroid and centre of gravity, introduction to moment of inertia and its theorem.

Equilibrium of system of coplanar forces, condition of equilibrium for concurrent forces, parallel forces and non-current, non-parallel general system of forces and couples.

Simple Stresses and Strains: Concept of stress and strain in three dimensions and generalized, Hook's law; Direct Stress and strain: free body diagrams, Young's modulus; Tension Test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress: Stresses in prismatic and non prismatic members and in composite members: Temperature stresses; Shear stress, Shear Strain, Modulus of rigidity.

Elastic constants- Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, State of simple shear, Complementary shear stress.

Types of supports, loads, beams. Determination of reactions at supports for various types of loads on statically determinate beams. Introduction to Shear force and bending moment diagrams (concentrated loads and uniformly distributed loads over cantilever and simply supported beams).

Analysis of plane trusses by using method of joints and method of section.

Friction- Introduction to laws of friction, cone of friction, equilibrium of bodies on inclined plane.

Belt friction- Transmission of power by belts and ropes, centrifugal and initial tension in the belts and ropes, condition of maximum power transmission, flat belts & flat pulleys and ropes on grooved pulleys.

## EE 105 A : BASIC ELECTRICAL ENGINEERING

**3L, 2P**

**100 Marks**

Elements of Power System: Methods of Power Generation Hydroelectric, Thermal and Nuclear, Introduction to transmission and distribution.

D.C. Circuits: Kirchhoff's Laws, Superposition, Thevenin's and Norton's theorems, star-delta transformation, Power calculation.

A.C. Circuits: Generation of sinusoidal wave form amplitude, frequency and time –period; Concept of phase and phase difference, phasor representation, Average and R.M.S. Values, Form factor for various wave forms.

Concept of impedance, Analysis of A.C. Single- phase and balanced three-phase circuits, phasor diagrams, Power and Power factor.

Transformers: E.M.F. Equation of single phase transformer, constructional features relation between voltage, current and turns ratio, Losses, Efficiency and its determination by direct loading, Auto-transformer, 3 phase transformer connections.

D.C. Machines: Constructional features, principle of operation, E.M.F. Equation of D.C. generator, Torque equation of D.C. Motor, D.C. shunt motor starter.

Three phase Induction Motor: Constructional features, rotating magnetic field, principle of operation, concept of slip, D.O.L. Starting, star- delta starting, auto-transformer starting.

Alternators: Constructional features, EMF equation, Concept of voltage regulation.

## CH 122 B : CHEMISTRY LABORATORY

**2P**

**100 marks**

### LIST OF EXPERIMENTS

1. pH, Buffer, choice of indicators and pH titrations.
2. Determination of hardness of water by EDTA method.
3. Determination of dissolved oxygen in water.
4. Determination of COD of waste water.
5. Analysis of brass.
6. Analysis of iron ore.
7. Analysis of lime stone.
8. Analysis of Rock Phosphates.
9. Analysis of pyrolucite.
10. Analysis of cement.
11. Analysis of steel.
12. Determination of Na and K flame photometer.
13. Determination of iron, Chromium and Fluoride by spectrophotometer.

## CSE 151 A : INTRODUCTION TO COMPUTER PROGRAMMING

3L

100 Marks

**Introduction to Computer:** Overview of Computer organization, Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Introduction to Operating Systems, translators, compiler, interpreter and assembler.

**Programming in C Language:** Introduction to Problem Solving: Flow charts, Tracing flow charts, Problem solving methods, Need for computer Languages, Sample Programs written in C. C Language preliminaries: C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants Input-Output: getchar, putchar, scanf, printf, gets, puts, functions. Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators. Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, and goto statements, comma operators. Storage types: Automatic, external, register and static variables. Functions: Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions, Static functions Arrays: Defining and processing, Passing arrays to a function, Multi dimensional arrays. Strings: Defining and operations on strings. Pointers: Declarations, Passing pointers to a function, Operations on pointers, Structures: Defining and processing, Passing to a function, Unions, typedef, array of structure, and pointer to structure. File Processing: Concept of files, File opening in various modes and closing of a file, reading from a file, writing on to a file.

### **Introduction to Cyber Security:**

Information security concepts, security threats and vulnerabilities, cyber offences and cyber crimes, awareness of cyber security and its measures, awareness of authentication and authorization, password management and biometrics, awareness of cryptography, cyber law, awareness of computer viruses, spyware and their remedies.

## PHY 152 A: ENGINEERING PHYSICS

3L

100 Marks

### SECTION A

Electricity and magnetism: Line integral of vector field, Potential difference, Field as gradient of potential and applications. Curl & Divergence of a vector function, Divergence theorem, Gauss's law- integral and differential form, Laplace's equation and simple applications, Stoke's theorem, Uniqueness theorem. Biot – savart law, curl and divergence of magnetic flux density. Ampere's Law – integral and differential form. scalar and vector magnetic potentials, fields due to finite, infinite wire, small current loop using potentials, Application of vector magnetic potential in polarization and magnetization, Electronic currents in atoms and gyro magnetic ratio with its uses.

Faraday's law – integral and differential form. Self and mutual inductance in terms of Neumann equation charging and discharging of a capacitor through a resistor, growth and decay of current in a L-R circuit, energy stored in electric and magnetic fields, Equation of continuity, Displacement current, modified Ampere's law, Maxwell's equations-in source free, dielectric and conducting media, equation of electromagnetic wave propagation of plane electromagnetic wave in free space, Poynting vector and Poynting theorem. Maxwell's equations in terms of electromagnetic potentials. Boundary conditions between two dielectric media for E, D, B and H. Snell's law, Fresnel's equations, Total internal reflection and Brewster's law.

Interference: Wedge film interference, Newton's rings and Michelson's interferometer-theory method of measurement of wave length of light and difference of two close wave lengths.

Diffraction : Double slit Fraunhofer diffraction pattern, Fraunhofer diffraction by a transmission grating, formation of spectra, Rayleigh's criterion for resolving power, resolving power of transmission grating and prism.

Polarization : O & E waves, quarter wave and half wave plates, Different types of polarized electromagnetic waves. Laurent's half shade polari meter and determination of strength of sugar solution.

### **SECTION B**

Relativistic mechanics: Galilean transformation. Postulates of special theory of Relativity, Lorentz transformation, Law of addition of velocities, mass variation with speed, mass energy and momentum relation.

Quantum mechanics: Planck's hypotheses, Planck's radiation law, Einstein equation for photoelectric effect, Compton scattering. Uncertainty principle, ground state energy and size of hydrogen atom. Schrodinger wave equation in one dimension, Interpretation of wave function, normalization condition, current density, solution of Schrodinger wave equation for a particle in one dimensional box and step potential.

Solid state Physics: Crystal lattice, sc, bcc, fcc and hcc structures and their properties, Miller indices relation between interplaner distance and Miller indices, lattice Plane.

Bragg's law, Bragg's spectrometer-its use in study of crystal structures, Laue equations for X-ray diffraction and reciprocal lattice vectors.

Statistical distribution laws: Maxwell- Boltzmann distribution, Bose – Einstein distribution, Fermi-Dirac distribution.

Lasers : Einstein's coefficients, spontaneous and stimulated emission, population inversion, basic features of laser systems, principle of operation of He- Ne laser and solid state laser, optical fibers and properties.

Nuclear physics : Properties of Alpha, Beta, Gamma radiations. Basic features of a gas filled detectors and Geiger- Muller counter.

## **MA 153 A : MATHEMATICS – II**

**4L**

**100 Marks**

### **SECTION A**

Ordinary Differential Equations: Differential equations of the first order and first degree, Differential equations of the first order but not of the first degree. Linear differential equations with constant coefficients, Linear homogeneous differential equations. Linear Differential Equations of second order including method of variation of parameters.

Solid Geometry: Sphere-Equation in different forms, section by a plane, sphere through a given circle. Intersection of a sphere and a line, and of two spheres, tangent plane, Orthogonal sphere. (Cartesian form) Cone and Cylinder-Equations and their properties (Cartesian form).

### **SECTION B**

Mechanics: Equilibrium of a rigid body under the action of three coplanar forces. Friction (excluding braking carriage). Common catenary (excluding approximation). Virtual work.

Kinematics of uniplanar motion. Rectilinear motion: Simple Harmonic Motion and other laws. Motion in resisting medium.

Note: Four questions will be set from each section. Students are required to attempt five questions selecting at least two from each section.

## ME 154 A – ELEMENTS OF MECHANICAL ENGINEERING

**3L**

**100 Marks**

Introduction to Thermodynamics: First and second laws of thermodynamics. Thermodynamics properties, closed and open systems, cyclic and non-cyclic processes, gas laws, internal energy. First law, application to non-flow processes, steady flow process and steady flow energy equation (SFEE) : Kelvin-Planck and Clausius statements of second law of thermodynamics. Reversible processes.carnot cycle, change of entropy of gases in thermodynamics processes [Numerical problems based on simple processes and Carnot cycle only].

Internal Combustion Engine: Introduction, Classification and brief description of I.C.Engine mechanism, 4 stroke and 2 Stroke petrol, gas and diesel engines; Otto, Diesel and dual cycles and their air standard efficiencies. Valve timing diagrams, comparison of petrol and diesel engines. Simple carburetor. Ignition systems of S.I. Engine. Diesel fuel pump and injector. Measurement and calculations of I.P., B.P., B.S.F.C.. engine performance, efficiencies.

Properties of steam & Cycles: Difference between gas and vapour, generation of steam, triple point and critical point, Enthalpy, internal energy and entropy of steam. Use of steam table, Mollier chart and T-S chart. Heating and expansion of vapour in non-flow processes. Dryness fraction and its measurement. Vapour power cycles; Carnot, Rankine and modified Rankin cycles.

Introduction to Primary Mechanical Processes: Introduction to Casting : pattern making and sand molding ; smithy operations, cutting, upsetting, drawing, bending and piercing : Elementary knowledge of gas welding and manual arc welding. Brazing and soldering.

Introduction to Engineering Materials and their Properties: Basic Iron-carbon diagram, mechanical properties of ferrous and non-ferrous materials. Brief discussion of plain carbon steels. Effects of alloying element in steel. Cast iron, bearing materials, copper and aluminum. Elementary heat treatments: hardening annealing, tempering and normalization of plain carbon steels.

## ECE – 155 A: BASIC ELECTRONICS

**3L**

**100 marks**

Electronic Components & Devices: Construction and characteristics of Carbon composition, wire wound & Film resistors. Colour codes and ratings of resistors. Construction and characteristics of Capacitors for electronic circuits. Air core, Iron core & Ferrite core magnetic components. Qualitative theory of PN junction. Characteristic & Ratings of junction diode, zener diode, LED, photo diode, BJT,FET & SCR.

Regulated Power Supply: Circuit configuration and analysis of half wave and full wave rectifiers. Various filter circuits. Elementary study shunt and series regulators.

Amplifiers: Classification of Amplifiers. Concepts of voltage and power Amplification. Qualitative study of different single stage audio and power amplifiers. Concept of Gain & Frequency response and input & out put impedance of amplifiers. Small signal equivalent circuit of BJT.

Concept of Positive & Negative feedback. Qualitative study of Sine wave Oscillators.

Basic Electronic Instruments: Principles of general purpose CRO and its elementary application. Characteristics of Electronic analog and digital voltmeters. Concept of multimeters.

Basic Electronic Entertainment systems: Concept of AM & FM Elementary block diagram of super heterodyne receiver. AM transmitter. Basic principl of Television. Television transmission standards. Block diagram of Television transmitter and receiver.

**PHY 172 B: PHYSICS Lab.**

**3P**

**100 marks**

1. To convert a moving coil galvanometer into a voltmeter.
2. To convert moving coil galvanometer into an ammeter.
3. To study charging and discharging of a capacitor through a resistor.
4. To study phase relationship of voltages in a C-R, A.C. circuit.
5. To study phase relationship of voltages in series L-C-R, A.C circuit.
6. To study growth and decay of current in L-R circuit.
7. To study L-C-R series Resonant Circuit.
8. To study L-C-R Parallel Resonant Circuit.
9. To find wavelength of light by Newton's rings.
10. To determine the slit width from the study of single slit Fraunhofer diffraction pattern using He-Ne Laser.
11. To determine wavelength of light with a transmission grating.
12. To find refractive index and dispersive power of material of prism by spectrometer.
13. To determine Planck's constant using a solar cell.