B.E. First Year Semester 1 & 2

Syllabus (Group A)

Engineering Mathematics-I

Unit I Differential Calculus: Successive Differentiation, Leibnitz's Theorem, Rolle's Theorem, Mean value theorem, Expansions of function using Taylor's and Maclaurin's theorems; Indeterminate Forms Using L'Hospital Rule.

Unit II Multivariable Differential Calculus: Partial differentiation, total differential coefficients, exact differential, Euler's theorem on homogeneous function, Maxima & Minima of a function of several connected independent variables (Lagrange's multipliers).

Unit III Complex Numbers: Demoivre's theorem and its applications, Hyperbolic and inverse hyperbolic functions, imaginary complex numbers and parts, Logarithm of

Unit IV: First order and First Degree Ordinary Differential Equations: Ordinary differential equations of first order and first degree in various Forms, (Variable separable, linear differential equation, homogeneous differential, exact differential equation) and reducible to above forms, methods of substitution.

Unit V: First order and Higher Degree Ordinary Differential Equations: Solution of differential equation of first order and higher degree by various methods.

Applications of Ordinary Differential Equations: Applications of differential equations of first order and first degree to the problems on orthogonal trajectories and Electrical engineering.

Unit VI: Sequences and Series: Convergence of Sequence and Series, Test for Convergence, Comparison Test, Ratio Test, Root Test, Raabe's Test, Range of Convergence.

Syllabus (Group A)

Engineering Physics

UNIT I: Solid State Physics: Classification of solids on the basis of energy band diagram, Covalent bonds, bound & free electrons, holes, electron and hole mobilities, Intrinsic and Extrinsic semiconductors, energy band diagram for semi-conductors. Fermi and Impurity levels, conductor conductivity with derivation, Law of (only statement), P-N junction diode, Emitting Diode. Hall Effect.

UNIT II: Modern Physics: Planck's hypothesis, Properties of Photons, Compton effect, De-Broglie's concept of matter waves, wave particle duality, Heisenberg's Uncertainty Principle (only statement), applications of uncertainty principle (electrons cannot exists in the nucleus and binding energy of electron in atom), wave function and its significance, time independent Schrodinger equation.

UNIT III: Electric and Magnetic Fields: Motion of electron in uniform transverse electric field and transverse magnetic fields, velocity selector (energy filter), positive rays, Bainbridge mass spectrograph, Cathode ray oscilloscope: block diagram and working of each block.

UNIT IV: Interference and Diffraction: Fundamental condition of interference, thin film interference due to reflected light, Newton's ring; equation for radius of bright and dark rings, determination of wavelength, R. I. of medium using Newton's ring. Fresnel and Fraunhoffer class of diffraction, single slit diffraction, plane transmission grating; construction and determination of wavelength of light using grating, dispersive power of grating.

UNIT V: Fibre Optics and LASER: Principle and construction of optical fibre, acceptance angle and acceptance cone numerical aperture, types of optical fibres and refractive index profile, attenuation in optical fibres, different mechanisms of attenuation, application of optical fibres.; LASER: spontaneous and stimulated emission of radiation, Pumping, Optical Pumping, Ruby LASER (Construction and Working), Characteristics & Applications of Laser in Industrial, Medical and Scientific field.

UNIT VI: Acoustics: Sound waves, reflection of sound waves, defects due to reflected sound (echo and reverberation), absorption of sound, Sabine's formula for reverberation of time, Factors affecting architectural acoustics and its remedies. Ultrasonics: Ultrasonic waves, Production of Ultrasonic waves (piezo-electric and magnetostriction methods), properties of Ultrasonic waves and applications. Fluid dynamics: Viscosity, Stoke's law, liquid flow (streamline and turbulent), flow of liquids through a capillary tube (Poiseuille's equation), Continuity equation, Bernoulli's theorem (only derivation).

Syllabus (Group A)

Engineering Mechanics

UNIT-I (STATICS): Resultant: Concept of a force, force systems, moment of a force about a point, couple, resolution and compositions of coplanar force system. Equilibrium: Free- body diagrams, equations of equilibrium, problems of equilibrium involving co-planar force system acting on a particle, rigid body and system of rigid bodies.

UNIT-II (STATICS): Trusses: Definitions, assumptions, types, Analysis of simple plane perfect trusses by method of joints and method of section. Friction: Definitions of friction, types, angle of friction, angle of repose, cone of friction, Coulomb's laws of friction. Applications to simple contact friction, wedges and belt friction.

UNIT-III: Centroid, First Moment of Area, Problem on Centroid of composite sections, Second Moment of Area, Radius of Gyration, product of inertia, perpendicular and parallel axis theorem, polar moment of inertia, radius of gyration, Definition of principal axes and principal moment of inertia.

UNIT-IV: (DYNAMICS-KINEMATICS): Definitions of displacement, velocity and acceleration and their relations, rectilinear motion under variable & constant accelerations, curvilinear motion using rectangular coordinates, normal and tangential components (involves Problems on calculation of total acceleration, radius of curvature and projectile motion).

UNIT-V: (DYNAMICS-KINETICS): Kinetics of rectilinear, curvilinear and rotatory motion of a particle acted upon by a force system, Application of D'Alembert's principle, concept of dynamic equilibrium, rectilinear motion of several interconnected particles, and rotation of rigid body about a fixed axis.

UNIT-VI (DYNAMICS - KINETICS): Application of work-energy equation and impulse-momentum equation, law of conservation of momentum for a particle and a system of particles in a rectilinear translation, direct central impact, collision of two particles, coefficient of restitution.

Syllabus (Group A)

Computer Programming

UNIT I: Fundamental of the Computer and Computing Concepts: Generation of computers, Classification of computers, Basic Anatomy of Computer System, Input Devices, Processor, Output Devices, Memory Management, Types of Computer Software, Overview of Operating system, Networking Concepts, Microsoft Office, Number systems: Decimal, Binary, Hexadecimal, Octal, Conversion of Numbers, Binary Arithmetic Operations, Programming Languages, Logic gates.

UNIT II: C Fundamentals: Introduction, Importance of C, Basic Structure of C Programs, Program execution, Basic programs based on C such as Printing Message, Adding two numbers, Interest calculations, Use of subroutines, math.h function. C tokens, Keywords and Identifiers, Character set, Data Types, Constant and Variables, Declaration of Variables, Declaration of Storage Class, Operators, Types of Operators: Arithmetic, Relational, Logical, Assignment, Increment-decrement, Conditional, Bitwise, Special. Arithmetic expression, Evaluation of Expression, Precedence of Arithmetic Operators, Input-Output Operation: Reading and Writing Character, Formatted Input, Formatted Output.

UNIT III: C Control Constructs: Decision-making using if, if-else, nested if, else if ladder and switch-case statements, ?: Operator, Goto Statement, Loops using for, while, do- while statements, break and continue statements, Jumps in Loops, Concise Test Expressions.

UNIT IV: Array, Strings and Structures: Introduction to array, One Dimensional Array: Declaration & Initialization, Two Dimensional: Declaration & Initialization, Multi-Dimensional, Strings: Declaration and Initialization, Reading String from terminal, Writing String to Screen, Putting Strings together, Comparison of Two Strings, String-Handling Functions, Table of Strings, Other features of String.

UNIT V: User Defined Functions, & Pointers: Functions, Need for User defined Functions, Multi-Function Program, Elements of User Defined Functions, Return Values and their types, Function Calls, Function Declaration, and Categories of Functions. Definition and uses of pointers, Address of operator, Pointer Arithmetic, pointers and functions, parameter passing mechanism using pointers, pointers and arrays, arrays of pointers, pointers and string.

UNIT VI: Structures and File Management: Structures Define, Declaration, Accessing the members of a Structure, Accessing address of variable, Introduction to File Management, Defining and Opening File, Closing File, Input/output Operations on File.

Syllabus (Group B)

Engineering Mathematics-II

Unit I: Matrices: Inverse by Partitioning, Rank of a matrix, Rank-nullity theorem (without proof), System of linear equations; Eigen values and Eigen Vectors, Cayley- Hamilton Theorem.

Unit II: Fourier series: Periodic function, Fourier expansion of periodic function in (C, C+2L), half range Fourier series, Parseval's Theorem, Harmonic Analysis.

Unit III: Integral Calculus: Reduction formulae, Beta and Gamma function, Evolutes and Involutes.

Unit IV:

a) Rule of differentiation under integral sign.
b) Tracing of curves (Cartesian, Parametric and polar forms).
c) Rectification (Cartesian, Parametric and polar forms).

Unit V: Multivariable Integral Calculus I: Double Integrals, Cartesian, Change of Order of Integration, Change of Variables Cartesian to polar coordinates), Evaluation of area by Double Integration.

Unit VI: Multivariable Integral Calculus II: Triple integrals, Cartesian, transformation to spherical polar coordinates, Volume by Triple Integration, Mean and RMS Value Theorem.

Syllabus (Group B)

Engineering Chemistry

Unit I: Water Treatment and Analysis: Hardness of water: Types of hardness, Unit of hardness, Determination of hardness of water by EDTA method. Disadvantages of hard of water, Boiler troubles: Scale and Sludge formation, Caustic embrittlement, Priming & Foaming. Boiler corrosion, Softening of water by Zeolite process, Ion exchange process and Reverse Osmosis (RO). Numerical problems based on calculations of hardness and Zeolite process.

Unit II: Corrosion and Energy Storage System: Corrosion: Introduction, Dry & Wet corrosion and their mechanism, Types of corrosion: Pitting corrosion, waterline corrosion, inter-granular corrosion, Galvanic and Stress corrosion. Pilling Bed worth rule.

Corrosion Control: a) Design and material selection

b) Cathodic protection,

c) Protective surface coatings - Hot Dipping (Galvanizing and Tinning)

Energy Storage System: Basic principles of batteries & their types, Construction, working and applications of lithium-ion battery, Ni-Cd battery.

Unit III: Engineering Materials: Cement: Raw materials, Ingredients of cement and their functions, Wet process of manufacturing of cement, Properties of cement: Setting & Hardening, Heat of hydration & Soundness of cement.

Lubricants: Introduction, Functions of Lubricant, Classification of lubricant: Thick Film, Thin Film & Extreme Pressure lubrication. Physical Properties of lubricants (Definitions): Viscosity & Viscosity index, Flash & Fire point, Cloud & Pour point, Carbon residue. Industrial Material: Definition, properties and Applications of ceramics & refractories, Nanomaterial.

Unit IV: Energy Science: Introduction of chemical fuels its classification, Calorific value: Gross & Net calorific values, and its relation. Analysis of coal: Proximate & Ultimate analysis and their significance, Characteristic of Good fuel, Cracking of petroleum fractions, use of gasoline and diesel in IC engine.

Knocking, octane number, cetane number. Numerical based on combustion (Mass to Mass, Volume to Volume and less air supplied type)

Unit V: Polymer Chemistry: Introduction and Classification of polymers, Methods of polymerization: Addition polymerization: Free radical, Cationic & Anionic mechanism of polymerization, Preparation, properties and uses of Polyethylene, Poly vinyl chloride, Teflon. Condensation polymerization: Preparation, properties and uses of Bakelite. Thermosetting & Thermoplastic, Rubber: Natural rubber, Drawbacks of natural rubber & Vulcanization. Synthetic rubbers: Preparation, Properties & Applications of Styrene rubber, Nitrile rubber, Butyl rubber. Biodegradable polymers: properties and applications, Conducting polymers: Introduction, types of conducting polymer and their examples.

Unit VI: Phase Rule and Spectrophotometric Techniques: Phase Rule: Gibb's Phase rule, Explanation of the terms: Phase, Components and Degree of Freedom, Application of Phase rule to One Component System (Water System), Condensed phase rule and its application to two component system (Bi-Cd).

Spectrophotometric Techniques: Qualitative and quantitative analysis, Principles and instrumentation of spectrophotometry: U.V and.IR spectroscopy. Principle & instrumentation of NMR spectroscopy. Applications of spectroscopy technique. Surface characterization technique: X-ray diffraction.

Syllabus (Group B)

Engineering Graphics

Unit 1: Introduction to Engineering Drawing and Projection: Use of various drawing instruments, concept of dimensioning and scales, geometric construction, projection of point, line and plane, projection on auxiliary plane.

Unit 2: Projection of Solids: Projection of solids for prism, pyramid, cone and cylinder.

Unit 3: Section of Solids: Section of solids for prism, pyramid, cone and cylinder.

Unit 4: Orthographic Projection: Conversion of pictorial view of objects to orthographic projections by using first and third angle projection methods.

Unit 5: Isometric Views and Projections: Construction of isometric views and projection of given two dimensional views.

Unit 6: Introduction to CAD Software: Drafting environment and drafting screen, coordinate systems, drafting and dimensioning commands, editing commands, drafting of basic geometrical shapes, display commands, CAD software customization.

Syllabus (Group B)

Basic Electrical Engineering

Unit I: Basic Concepts: Basic concepts of Voltage, Current, Power, Energy and relationship between them Resistance, Resistivity, Conductivity, Temperature effect on resistance and temperature coefficient of resistance. Series and parallel circuits, Ohm's law, Kirchoff's laws, Superposition theorem, Thevenin's theorem, Star-Delta transformation.

Unit II: Magnetic Circuit & Electromagnetism: Basic concept of Magnetic flux, Flux density, MMF, Reluctance, Magnetic field intensity and their relationship, Series and Parallel Magnetic circuits, Principles of Electromagnetic induction, self and mutual inductance, Leakage and fringing of flux, coefficient of coupling and Magnetization curves.

Unit III: A.C. Fundamentals, RMS, Average values, form factor, peak factor for Sinusoidal Wave form only, Single phase A.C. Series circuit with Resistance, Inductance and Capacitance, phasor Diagram. Single phase A.C. Parallel circuit with Resistance, Inductance and Capacitance, phasor Diagrams. Impedance Triangle, Active and Reactive power.

Unit IV: Polyphase Circuits, Balanced Three phase circuits, Production of three phase emf, Star and Delta connections. Relationship of Phase and line values of voltage and current for Star and Delta circuits, Star and Delta balanced load.

Unit V: Electrical machines A) Single Phase Transformer, Construction and working (no load & on load), EMF Equation, Losses, Efficiency, Regulation and phasor diagram. B) Electromechanical Energy Conversion, Working principle, Construction of D.C. Motors, types of de motor, characteristics and applications of D.C. Motors.

Unit VI: Electrical Apparatus and safety, Measurement of Current, Voltage, Power, Energy, Construction and working of PMMC, MI, Electro-dynamometer & Induction type Measuring Instruments. Necessity of earthing and types of earthing (Plate earthing & Pipe earthing).