B.E. CSE Semester 3 Syllabus

Engineering Mathematics-II

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

Analog & Digital Electronics

Unit I: PN Junction Diode and Bipolar Junction Transistor: PN-Junction Diode, Characteristics and Parameters, BJT operation, BJT Voltages and Currents, BJT Amplification: Current and Voltage, BJT Switching, Common-Base Characteristics, Common-Emitter Characteristics, Common-Collector Characteristics

Unit II: Field Effect Transistors: Junction Field Effect Transistors, n-Channel and p- Channel JFET, JFET Characteristics, JFET Parameters, FET Amplifications and Switching, MOSFETS: Enhancement MOSFET, Depletion Enhancement MOSFET, Comparison of p-channel and n-channel FETS, Introduction to CMOS.

Unit III: Number System: Binary Number System, Signed and unsigned Number, Octal Number System, Hexadecimal Number System, Conversions between Number Systems, r's and (r-1)"s Complements Representation, Subtraction using 1"s and 2"s Complements, BCD, Gray Code, Excess 3 Code and Alpha numeric codes.

Unit IV: Minimization Techniques: Logic Gates, Boolean Algebra, Logic Operation, Axioms and Laws of Boolean Algebra, Reducing Boolean Expression, Boolean Functions and their representation, SOP Form, POS Form, Karnaugh Map (up to 5 variable), Limitation of Karnaugh Map, Quine-McCluskey Minimization Technique (up to 5 variable).

Unit V: Combinational Circuits: Introduction, Design Procedure, Adders, Subtractors, Binary Parallel Adder, 4 Bit Parallel Subtractor, Look ahead-carry Adder, BCD adder, BCD Subtractor, Multiplexer, De-multiplexer, Decoder, Encoder, Comparator, Parity bit Generator/Checkers, Boolean Expression Implementation using these ICs.

Unit VI: Sequential Circuits: Flip-flops: S-R, J-K, Master slave J-K, D-type, T-type, Flip flop Excitation Table, Conversion of Flip Flops, Registers: SISO, SIPO, PISO, PIPO, Universal Shift Register. Counters: Asynchronous and Synchronous counter, Up/Down counter, MOD-N counter, Ring counter, Johnson counter.

Syllabus

Discrete Structure & Graph Theory

Unit I: Foundations: Logic and Proofs: Propositions, Truth Tables, Compound Propositions, Logical Operators, Logic and Bit Operations; Logical Equivalences, De Morgan's Laws, Predicates, Quantifiers: Restricted Domains, Precedence, Logical Equivalences; Rules of Inference for Propositional Logic, Use to Build Arguments, Resolution, Combination for Propositions and Quantified Statements; Proofs Terminology, Methods, Direct Proofs, Proof by Contraposition and Contradiction;

Unit II: Sets, Functions and Relations: Introduction, Venn Diagrams, Subsets, Size of a Set, Power Sets, Cartesian Products, Set Notation with Quantifiers, Truth Sets and Quantifiers, Set Operations; Inverse Functions, Compositions and Graphs of Functions, Important Functions, Partial Functions; Sequences, Recurrence Relations, Special Integer Sequences, Summations; Countable Sets, An Uncountable Set; Functions as Relations, Relations on a Set, Properties of Relations, Combining Relations; n-ary Relations, Operations on n-ary Relations; Representing Relations Using Matrices; Closures, Transitive Closures.

Unit III: Number Theory and Induction: Division, The Division Algorithm, Modular Arithmetic, Arithmetic Modulo m; Primes, Trial Division, Conjectures and Open Problems About Primes, GCD and LCM, The Euclidean Algorithm, gcds as Linear Combinations; Linear Congruences, The Chinese Remainder Theorem, Fermat's Little Theorem, Pseudoprimes, Primitive Roots and Discrete Logarithms, Applications: Hashing Functions, Mathematical Induction and Examples of Proofs, Mistaken Proofs, Guidelines for Proofs; Strong Induction, Examples of Proofs.

Unit IV: Algebraic Structures: Algebraic Systems: Examples and General Properties; Semigroups and Monoids: Homomorphism of Semigroups and Monoids, Sub semigroups and Sub monoids; Groups: Definitions, Subgroups and Homomorphisms, Cosets and Lagrange's Theorem, Normal Subgroups, algebraic Systems with Two Binary Operations.

Unit V: Counting: Basic Counting Principles, Complex Counting Problems, Subtraction and Division Rule, The Pigeonhole Principle, The Generalized Pigeonhole Principle, Applications; Permutations, Combinations, Generating Permutations, Generating Combinations.

Unit VI: Graphs: Graph Models; Basic Terminology, Special Simple Graphs, Bipartite Graphs, Matchings, Applications of Special Types of Graphs, New Graphs from Old; Graph Representation, Adjacency and Incidence Matrices, Isomorphism of Graphs, Determining Isomorphism; Paths, Connectedness in Undirected Graphs and Directed Graphs, Paths and Isomorphism, Counting Paths Between Vertices; Euler Paths and Circuits, Hamilton Paths and Circuits, Applications of Hamilton Circuits; Planar Graphs: Euler's Formula, Kuratowski's Theorem; Graph Coloring: Introduction, Applications of Graph Colorings.

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).