

SYLLABUS FOR COMPUTER SCIENCE AND ENGINEERING

MATHEMATICS (50 Marks)

Unit-I: Matrices

Matrices of 3rd order: Types of matrices-Algebra of matrices-Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Properties-Laplace's expansion-singular and non singular matrices-Adjoint and multiplicative inverse of a square matrix-System of linear equations in 3 variables-Solutions by Cramer's rule, Matrix inversion method,-Gauss-Jordan methods.

Partial Fractions: Resolving a given rational function into partial fractions.

Unit-II: Trigonometry

Properties of Trigonometric functions – Ratios of Compound angles, multiple angles, sub multiple angles – Transformations of Products into sum or difference and vice versa – Simple trigonometric equations – Properties of triangles – Inverse Trigonometric functions.

Complex Numbers: Properties of Modulus, amplitude and conjugate of complex numbers, arithmetic operations on complex number—Modulus-Amplitude form (Polar form)-Euler form (exponential form)-Properties- De Moivre's Theorem and its applications.

Unit-III: Analytical Geometry

Straight Lines – different forms of Straight Lines, distance of a point from a line, acute angle between two lines, intersection of two non- parallel lines and distance between two parallel lines. Circles-Equation of circle given center and radius, given ends of diameter-General equation-finding center and radius. Standard forms of equations of Parabola, Ellipse and Hyperbola – simple properties.

Unit-IV: Differentiation and its Applications

Functions and limits – Standard limits – Differentiation from the First Principles – Differentiation of sum, product, quotient of functions, function of function, trigonometric, inverse trigonometric, exponential, logarithmic, Hyperbolic functions, implicit, explicit and parametric functions – Derivative of a function with respect to another function-Second order derivatives – Geometrical applications of the derivative (angle between curves, tangent and normal) – Increasing and decreasing functions – Maxima and Minima (single variable functions) using second order derivative only – Derivative as rate measure -Errors and approximations - Partial Differentiation – Partial derivatives up to second order – Euler's theorem.

Unit-V: Integration and its Applications

Indefinite Integral – Standard forms – Integration by decomposition of the integrand of trigonometric, algebraic, exponential, logarithmic and Hyperbolic functions – Integration by substitution – Integration of reducible and irreducible quadratic factors – Integration by parts – Definite Integrals and properties, Definite Integral as the limit of a sum – Application of Integration to find areas under plane curves and volumes of Solids of revolution – Mean and RMS value.

Unit-VI: Differential Equations

Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solution of differential equation of the type first order, first degree, variable-separable, homogeneous equations, exact, linear differential equation of the form $dy/dx + Py = Q$, Bernoulli's equation, nth order linear differential equation with constant coefficients both homogeneous and non homogeneous and finding the Particular Integrals for

the functions e^{ax} , x^m , $\sin ax$, $\cos ax$.

Unit-VII: Laplace Transforms and Fourier series

Laplace Transforms and Inverse Laplace Transforms of Elementary functions. Shifting Theorems of LTs and ILTs.

Define Fourier series, Euler's Formulae Over the interval $(C, C+2\pi)$. Even and odd functions and their Fourier series

Unit-VIII: Probability and Statistics

Define Probability, addition Theorem, conditional Probability, Mean, Median, Mode, Mean deviation and standard deviation.

PHYSICS (25 Marks)

Unit-I: Units and dimensions: Physical quantity-fundamental and derived physical quantities-units-fundamental and derived units-SI units-multiples and sub-multiples in SI units-advantages of SI units-dimensions and dimensional formulae-dimensionless quantities- applications and limitations of dimensional analysis-problems.

Unit-II: Elements of vectors:

Scalar and vector quantities-examples-types of vectors- addition and subtraction of vectors-triangle law-parallelgram law and its cases-polygon law- resolution of a vector-unit vectors (i, j, k)-dot product and cross product of two vectors- characteristics of dot and cross products-examples-problems.

Unit-III: Kinematics and Friction

Equations of motion-acceleration due to gravity-equations of motion under gravity- expressions for maximum height, time of ascent, time of descent, time of flight, velocity on reaching the point of projection in vertical motion--motion of a body projected from the top of a tower-projectile motion-examples-horizontal and oblique projections-expressions for maximum height, time of ascent, time of flight, horizontal range, problems. Friction- causes and types of friction-normal reaction-laws of friction-coefficients of friction- angle of friction-methods of reducing friction-advantages and disadvantages of friction- motion of a body over a rough horizontal surface, a smooth inclined plane and a rough inclined plane-problems.

Unit-IV: Work, Power and Energy

Work, power and energy-definitions and units-potential and kinetic energies-examples and expressions-work-energy theorem-law of conservation of energy-problems.

Unit-V: Simple harmonic motion and Sound

Definition-conditions of SHM-examples of SHM-expressions for displacement, velocity, acceleration, time period, frequency and phase of SHM-time period of a simple pendulum-second's pendulum-problems. Sound-musical sound and noise-noise pollution-Effects and methods of control of Noise Pollution-Beats and echo's-problems-Doppler effect – Explanation, and Applications - Acoustics of buildings-Reverberation-Sabine's formula- characteristics of a good building-problems.

Unit-VI: Heat and Thermodynamics

Expansion of gases-Boyle's law-Absolute scale of temperature-Charles laws-Ideal gas equation-Universal gas constant and its value-SI Units-problems-external work done by a gas-isothermal process-adiabatic process-first law of thermodynamics and its applications to

isothermal process and adiabatic process-two specific heats of a gas-relation between C_p and C_v - problems-second law of thermodynamics and its applications.

Unit-VII: Modern physics

Photoelectric effect – explanation and its laws-applications of photoelectric effect (photo cell)- Einstein's photoelectric equation – critical angle and total internal reflection – optical fibers - principle, working , types and applications-concept of super conductivity – its properties and applications.

CHEMISTRY (25 Marks)

Unit – I: Fundamentals of chemistry:

Atomic structure: Introduction-Fundamental particles – Bohr's theory – Quantum numbers – Aufbau principle – Hund's rule – Pauli's exclusion principle- Electronic configurations of elements up to atomic number 20, shapes of **s, p, d** orbital's.

Chemical Bonding: Introduction – types of chemical bonds – Ionic bond taking example of NaCl and MgO –characteristics of ionic compounds and covalent bond taking example H_2 , O_2 , N_2 , HCl , characteristics of covalent compounds-Coordinate covalent bond- Metallic bond .

Oxidation-Reductions:concepts of Oxidation-Reduction ,Oxidation number and its calculations, differences between oxidation number and Valency

Unit-II: Solutions: Introduction solution classification of solutions, solute, solvent, concentration, mole concept,–Molarity,–Normality, equivalent weight using acids, bases and salts, numerical problems on Molarity and Normality.

Unit-III: Acids and Bases: Introduction – theories of acids and bases – Arrhenius, Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water - p^H and related numerical problems – buffers solutions – Applications.

Unit – IV: Principles of Metallurgy: Characteristics of metals and distinction between metals and non- metals. Definitions of metallurgy , ore, gangue, flux, slag –concentration of ore-hand picking, levigation, froth floatation – extraction of crude metal – roasting calcination, smelting – alloys – composition and uses of brass, German silver and nichrome.

Unit-V: Electrochemistry: Conductors, insulators, electrolytes - Arrhenius theory of electrolytic dissociation – electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electro chemical series –emf and numerical problems on emf of a cell.

Unit –VI: Corrosion: Introduction - factors influencing corrosion - electrochemical theory of corrosion- composition cell, stress cell and concentration cells– rusting of iron and its mechanism – prevention of corrosion by (a) coating methods, (b) cathodic protection (sacrificial and impressive voltage methods).

Unit-VII: Water Technology: Introduction –soft and hard water – causes of hardness – types of hardness –disadvantages of hard water – degree of hardness, units and Numerical problems–softening methods – permutit process – ion exchange process – qualities of drinking water – municipal treatment of water for drinking purpose.- Osmosis and reverse Osmosis, advantages of reverse Osmosis.

Unit-VIII: Polymers: Introduction – polymerization – types of polymerization – addition , condensation polymerization with examples – plastics – types of plastics – advantages of plastics over traditional materials – Disadvantages of using plastics ,thermo plastics and thermo setting plastics– differences between thermo plastics and thermo setting plastics- preparation and

uses of the following plastics: 1. Polythene, 2. PVC, 3. Teflon, 4. Polystyrene, 5. Urea formaldehyde – Rubber – natural rubber – processing from latex –Vulcanization – Elastomers – Butyle rubber Buna-s, Neoprene rubber and their uses.

Unit-IX: Fuels: Definition and classification of fuels based on physical state and occurrence – characteristics of good fuel - composition and uses of gaseous fuels. (a) Water gas, (b) producer gas, (c) natural gas, (d) coal gas, (e) bio gas, (f) acetylene.

Unit-X: Environmental Chemistry: Introduction – environment –understand the terms lithosphere, hydrosphere, atmosphere bio sphere, biotic component, energy component pollutant, receptor, sink, particulate, DO, BOD, Threshold limit value, COD- Air pollution - causes-Effects- Forest resources ,uses and over exploitation ,deforestation acid rain, green house effect –ozone depletion – control of Air pollution – Water pollution – causes – effects – control measures. Renewable and Non Renewable energy sources – concept of ecosystem –producers, consumers and decomposers – Biodiversity ,threats to Biodiversity .

COMPUTER SCIENCE AND ENGINEERING (100 Marks)

1. Digital Electronics: Logic Families: TTL, ECL, MOS – Logic gates AND,OR,NOT,NOR,NAND and XOR – Boolean Expressions – K-map –Combinational Circuits – Flip-flops – registers – Counters – decoders, multiplexers and semiconductor memories.

2. Microprocessors: 8086 microprocessor – architecture, segmentation concepts – register organization – addressing modes – instruction set – preliminary features of 80286, 80386 and 80486.

3. Computer Organization: Functional blocks of CPU – Fixed point, floating point number representations –instructions – addressing modes – stored program concept – instruction execution – memory hierarchy – virtual memory, associative memory – cache memory – I/O organization – methods of data transfer – programmed I/O, DMA, Interrupts – IOP.

4. C and Data Structures: Data types, storage classes, operators and expressions – control statements – functions, parameter passing – arrays and pointers, structures, unions – type definitions – pre processor directive statements – files – Data Structures – Linked Lists – queues and stacks – trees – sorting : bubble, selection, quick and merge sorts - Searching : linear and binary search techniques.

5. Computer Networks: OSI reference model, TCP/IP reference model –Network topologies: Bus, Ring, Star, Mesh, Hybrid – LAN components – Coaxial, twisted pair, optical fiber cables and connectors – LAN devices - repeaters, hubs, switches, NIC, Higher-Layer protocols: HTTP, FTP, SMTP, Telnet – TCP/IP addressing scheme – IP address classes – IP sub netting.

6. Operating Systems: Operating system concepts, functions, types, system calls – process management – CPU scheduling algorithms – deadlocks – memory management – overlays, paging, segmentation, virtual memory, page replacement algorithms – disk scheduling- free space management – allocation methods – disk scheduling algorithms.

7. RDBMS: Need of database systems, data independence, Data models, E-R model – structure of relational database – normal Forms : 1st, 2nd, 3rd and BCNF – SQL – data types, operators, DDL and DML commands – views, sequences, synonyms, indexes and clusters – PL/SQL – data types, control structures, cursor management, exceptions, functions, procedures and packages.

8. Object Oriented Programming Through C++: Concept of OOPs – classes and objects – Constructors and destructors – arrays, pointers, references – function overloading and operator overloading – inheritance – virtual functions – friend functions –this pointer – i/o manipulators – file and i/o functions.

9. Java Programming: Java – data types, variables, operators, arrays – Classes and objects – methods – constructors – overloading –inheritance - Visibility mode – packages – interfaces – multithreading – exception handling – applets.

10. Internet Programming : Internet fundamentals – HTML, tags, attributes, formatting text – Java script –data types, operators – control structures – procedures, functions and arrays – PHP – data types, variables, operators, control structures, arrays, functions, concept of accessing databases.

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