

Vibrational spectroscopy of diatomic molecules: SHO model, selection rule, determination of bond energy.

Group – C

9. Configuration and conformation

Representation of molecules in three dimension Fischer, Saw-horse and Newman projection; configuration (R and S) of chiral carbon, priority rule.

Conformation of acyclic and alicyclic molecules; gauche-butane interaction; chair-boat in cyclohexane.

10. Chirality and stereoselectivity

Chirality: asymmetric carbon, axial and planar chirality. Optical activity; resolution of optically active compounds; enantioselective and diastereoselective synthesis; enantiomeric excess; Prelog's rule for configuration determination; Cram's rule.

11. Organic Synthetic methods

Condensation reactions; Aldol, Claisen, Diemann, Perkin, Knoevenagel, Stobbe, Acyloin

Oxidation; epoxidation, dihydroxylation, periodate, chromate, permanganate, lead tetraacetate, allylic oxidation.

Reduction; catalytic hydrogenation, metal hydrides, dissolving metal reduction.

Organometallic, catalysis; palladium-catalyzed coupling reaction and allylic substitution; Wilkinson catalyst; alkene metathesis.

12. Pericyclic and photochemical reactions

Photochemical reaction; singlet and triplet state; Norrish Type I and Type II. Paterno-Buchi. Photochemical generation of radicals.

Pericyclic reaction; conservation of orbital symmetry; electrocyclic reactions; cycloaddition reactions, sigmatropic rearrangements.

CIVIL ENGINEERING :

Paper – I :

Strength of Materials :

Stress-strain, elastic modulus, shear force and bending moment diagrams of determinate beams, deflection of beams by different methods.

Structural Analysis :

Application of Area moment theorem & Conjugate beam method, Castigliano's theorems I & II, Slope deflection & Moment distribution method. Introduction of Matrix method of analysis : force and displacement method. Application of displacement method to truss, beam & frame structure, Introduction of plastic analysis.

Design of steel structures :

Concept of design by working stress method and Limit state method. Application of Limit state method : Design of tension and compression member, design of flexure members : Beams – rolled section and plated beam. Design of column for axial and eccentric loads. Design of connection : Bolted and welded.

Design of concrete structures :

Concept of working stress method and limit state method. Application of limit state method to design of singly reinforced rectangular, T and L beams, doubly reinforced beam, column for axial and eccentric loads, isolated footing.

Geotechnical Engineering :

Type of soils. Weight-volume relationship. Grain size distribution. Index properties – Atterberg's limit, relative density, identification and classification of soils.

Water in soils, Effective pressure, Pore water pressure, Permeability – laboratory and field tests, Seepage, Quick sand condition.

	<p>Shear strength - Mohr-Coulomb failure criteria, pole, Determination of shear strength parameters - laboratory and field tests.</p> <p>Compressibility and consolidation - normally consolidated and over consolidated soils, compression and swelling indices. Determination of coefficient of Consolidation. Settlement Computation.</p> <p>Soil stabilization - Compaction, Laboratory test, field methods and uses of admixtures.</p> <p>Soil exploration - Spacing, depth and number of exploratory borings. Methods of boring & sampling. Standard penetration test, Static cone penetration test, Seismic refraction method.</p> <p>Earth pressure theories - Rankine and Coulomb, Different types of back fill. Determination of earth pressure. Stability of retaining walls. Sheet piles, Braced excavation.</p> <p>Shallow Foundations - Estimation of bearing capacity and settlement. Allowable bearing pressure. Effect of ground water table. Field tests. Types of footing - Isolated, combined, strip, grid and raft foundations.</p> <p>Deep foundations - Types of piles, material, suitability and uses. Determination of pile capacity. Negative skin friction, Testing of piles.</p>
Paper - II :	<p>Construction: Materials, Planning & Management :</p> <p>Physical Properties of Cement and cement concrete, stone, bricks and mortars, Stress-strain behaviour of reinforcing steels, Nondestructive tests - Rebound Hammer, Ultrasonic Pulse velocity tests, Construction activities schedules, organization for construction industry. Quality assurance principles. Network analysis, CPM & PERT analysis: their use in construction monitoring, Cost optimization and resource allocation.</p> <p>Surveying :</p> <p>Chain surveying; Principles, Methods of linear measurement; Instruments for Chaining; Chaining tape corrections including sag corrections; Chain triangulation; Selection of stations, locating ground features; Plotting of chain survey.</p> <p>Compass survey; Use of prismatic compass; Measurement of bearing, Computations of angles from bearings, Chain and Compass traversing, Plotting compass traverse;</p> <p>Plane table survey; Introduction and method; Errors in plane tabling;</p> <p>Leveling; Adjustment of dumpy level; Reciprocal leveling and profile leveling; Counteracting and interpretation of contour maps;</p> <p>Theodolite Surveying and Traversing. Uses of Total Station.</p> <p>Basic elements of Remote sensing and photogrammetry</p> <p>Transportation Engineering :</p> <p>Principles of Highway Planning. Functional classification of road. Highway alignment, Geometric design - Cross section, Camber, Superelevation, Horizontal and Vertical curve, Pavement structure and Materials - Subgrade soil, Sub base, Base materials, aggregates & bitumen. Pavement design - flexible and Rigid by IRC and other methods. Construction method of WBM, Bituminous work and cement concrete roads. Highway drainage system.</p> <p>Traffic surveys and their application in traffic planning. Design of intersection, rotary signals. Standard traffic signs and marking.</p> <p>Water Resources Engineering :</p> <p>Concept of storm and unit hydrograph, type of aquifers, Ground Water: Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers, aquitards, radial flow into a well under confined and unconfined conditions. Flood-flow estimation. Rainfall-frequency distribution and analysis. Water requirements of crops, Canals : rectangular and trapezoidal, design of lined and unlined canal, Types of dam, design, principles of design of rigid gravity & earth dams including statistical analysis, River training : Objectives and methods.</p> <p>Environmental Engineering :</p> <p>Water Demand, Population estimate. Water quality : Physical, Chemical and bacteriological. Water treatment principle and design of coagulation, flocculation, sedimentation and filtration. Principle of Chlorination and softening. Waste water : Types and characteristics, BOD, COD estimation, Design of separate and combined sewer. Wastewater treatment: Grit chamber, setting tank, activated sludge process, stabilization pond.</p> <p>Solid waste : Composting and land fill methods</p> <p>Air Pollution : Types, sources and effects, control measures - ventury, wet scrubber, Electrostatic precipitator, Cyclone.</p> <p>Noise Pollution : Equivalent noise level, Determination of Leq.</p>
COMMERCE & ACCOUNTANCY :	
Paper - I :	<p>Financial Accounting: Accounting as a Financial Information System, Basic Concepts & Conventions, Accounting Standards, Final Accounts of Profit-seeking and Non-profit seeking organisations.</p>