



**CE- 401 RCC DESIGN-I**

**Unit - I.**

**Basic Principles of Structural Design :** Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

**Unit - II.**

**Design of Beams:** Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

**Unit -III**

**Staircases:** Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase

**Unit-IV**

**Design of Slabs:** Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Flat slabs, Circular slabs, Yield line theory.

**Unit -V**

**Columns & Footings:** Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

**NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)**

**Suggested Books: -**

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
3. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
4. Plain & reinforced concrete - Rammuttham
5. Plain & reinforced concrete – B.C. Punnia
6. Structural Design & Drawing by N.K.Raju.



## CE- 402 Surveying

### **Unit-I**

Traversing by theodolite, Field work checks, traverse computations, latitude and Departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling.

### **Unit-II**

**Hydrographic Surveying:** Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, remote sensing, simple equipments, elements of image interpretation, image-processing systems.

### **Unit-III**

**Tachometry:** Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

### **Unit-IV**

**Control Surveys:** Providing frame work of control points, triangulation principle, co naissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

### **Unit-V**

**Curves:** Classification and use; elements of circular curves, calculations, setting out Curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscate, vertical curves, setting out.



**Reference**

1. T.P. Kanetkar, Surveying & Leveling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
5. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co.
6. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
7. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
8. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

**List of Experiments/ Field work (Expandable):**

1. Theodolite traversing
2. Profile leveling, contouring & cross sectioning
3. Determination of tachometric constants & uses of tachometer in various field works
4. Curve setting by different methods.



**CE- 403 HIGHWAY & AIRPORT ENGINEERING**

**Unit - I**

**High way planning, Alignment & Geometric Design: Principles of highway planning,** road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location.

**Cross sectional elements- width, camber, super-elevation, sight distances, extra** widening at curves, horizontal and vertical curves, and numerical problems.

**Unit – II**

**Bituminous & Cement Concrete Payments: Design of flexible pavements, design of mixes** and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cements concrete pavement design, fatigue and reliability.

**Unit – III**

**Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning:**

Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures.

**Surface and sub-surface drainage, highway materials: properties and testing etc.**

Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

**Unit - IV**

**Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic** and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, classification of airports.

**Geometrical elements: taxi ways and runways, pattern of runway capacity.**

**Unit - V**

**Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach** area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.



**List of Experiments:**

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

**Reference Books & Study Materials:**

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherty
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Manual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker



CE- 404 Fluid Mechanics

**Unit-I**

**Review of Fluid Properties:** Engineering units of measurement, mass, density, specific weight, specific volume, specific gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

**Unit-II**

**Dimensional Analysis and Dynamic Similitude:** Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, roto dynamic machines etc.)

**Unit-III**

**Kinematics of Flow :** Types of flow-ideal & real , steady & unsteady, uniform & nonuniform, one, two and three dimensional flow, path lines, streaklines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets- their utility & method of drawing flow nets.

**Unit-IV**

**Dynamics of Flow:** Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturimeter, weirs and notches).

**Unit-V**

**Laminar Flow:** Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

**References: -**



1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechnics and machinery; TMH
3. Essential of Engg Hyd. By JNIK DAKE; Afrikan Network & Sc Instt. (ANSTI)
4. A Text Book of fluid Mech. for Engg. Student by Franiss JRD
5. Fluid Mechanics: RK Bansal
6. Fluid Mechanics; Gupta Pearson.

### **List of Experiment (Expandable):**

- 1  
. To determine the local point pressure with the help of pitot tube.
- 2  
. To find out the terminal velocity of a spherical body in water.
- 3  
. Calibration of Venturimeter
4. Determination of  $C_c$ ,  $C_v$ ,  $C_d$  of Orifices
5. Calibration of Orifice Meter
6. Calibration of Nozzle meter and Mouth Piece
7. Reynolds experiment for demonstration of stream lines & turbulent flow
8. Determination of metacentric height
9. Determination of Friction Factor of a pipe
10. To study the characteristics of a centrifugal pump.
11. Verification of Impulse momentum principle.



**CE- 405 Concrete Technology**

**Unit I**

Introduction Classification, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications.

**Unit II**

**Properties of Fresh and Hardened Concrete :** Introduction, Workability, Testing of concrete, Factors affecting, Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, thermal properties & micro-cracking of concrete.

**Unit III**

**Design of Concrete Mix :** Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolan materials, design of plastic concrete mix, computer aided design of concrete mix.

**Unit IV**

**Production and Quality Control of Concrete:** Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater, hot & cold weather condition, statistical quality control, field control, non-destructive testing, repair technology for concrete structures, Inspection & Testing of Concrete.

**Unit V**

**Special Concretes :** Ready mix concrete, Vacuum concrete, Ferrocement Light weight concrete, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Rubble concrete, Resin concrete, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.

**References:**

1. Varshney RS; Concrete Technology; Oxford & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH
3. Sinha SN; Reinforced Concrete Technology; TMH
4. New Building Materials Published by B.M.T.P.C., New Delhi
5. Hand books on Materials & Technology - Published by BMTPC & HUDCO
6. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
7. Jackson N; Civil engineering materials.
8. Properties of Concrete - A.M. Neville - Pearson Education





### **CE-406 AUTO CAD**

Practical's and Work with AUTO CAD Latest version

### **CE-407 Self Study / Seminar / Group Discussion (Internal Assessment)**

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.

### **CE-408 MENTALABILITY**