

GANPAT UNIVERSITY

B.Tech. Sem. IV – Civil Engineering

C – 401 Structural Analysis -I

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-------|-----------------|----------|-------|-------------|
| Lect. | Pract. | Total | Theory | | | | Practical | | | Grand Total |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | Total | |
| | | | | Marks | Hrs | | | | | |
| 3 | 2 | 5 | 30 | 70 | 3 | 100 | 25 | 25 | 50 | 150 |

COURSE CONTENT:

I SLOPE AND DEFLECTION OF BEAMS:

Differential equation of elastic curve, relation between moments, slope and deflection, double integration method Macaulay's method, moment area method & conjugate beam method applied to beams including varying moment of inertia. Slope and Deflection of all types of beams , Analysis of simple portal frame with sway.

II CONSISTENT DEFORMATION METHOD: Analysis of propped cantilever beams, rigid and elastic supports, beams of varying moment of inertia.

III FIXED BEAMS:

Computation of fixed-end actions for point load, u.d.l. varying load and couples, settlement and rotation of supports, beams of varying moment of inertia.

IV Analysis of continuous beams by moment distribution method.

V Analysis of three hinged arches, segmental and parabolic shapes

VI SHEAR CENTRE

Introduction, Shear centre of channel section, Shear centre of different sections.

VII INFLUENCE LINES FOR BEAMS

Definition and use of influence lines for support reaction, shear force and bending moment of statically determinate beams, influence lines for girders with floor system, properties of influence lines, computation of maximum moment and maximum shear for a series of concentrated loads and uniformly loads for beams, load positions and computation of max. Values, absolute maximum shear, bending moments and axial force.

(Muller-Breslau's principle, Influence Line Diagrams for reaction and internal forces in propped cantilever and continuous beams having one static indeterminacy, qualitative ILD for statically indeterminate structures such as beams & frames)

VIII SPACE TRUSS: Classification of 20 and 30 truss, analysis of simple ball-socket jointed three

dimensional statically determinate space trusses by tension-coefficient method.

TERM WORK

This will consist of graphical and/or analytical solutions of atleast problems based on the syllabus of structural analysis.

REFERENCE BOOKS:

- I Mechanics of structures Vol I S.B.Junarkar & H.J.Shah, Charotar publishing house, Anand
- II Intermediate Structural Analysis Wang C.K., Tata McGraw Hill book Company, New Delhi
- III Mechanics of Materials E.P.Popov. ,Prentice Hall of India, New Delhi
- IV Strength of materials G.H.Ryder., Mcmillan
- V Mechanics of Materials Timoshenko & Gere., CBS Publishers & Distributors, Delhi
- VI Analysis of Statically Determinate Structures –By P. Dayaratnam
Affiliated east and West Press Pvt. Ltd., New Delhi
- VII Basic Structural Analysis - By C.S. Reddy
Tata Mc Graw Hill Pub. Co. Ltd. New Delhi.
- VIII Theory of Structures By Ramamrutham.
- XI Hibbler R C; Mechanics of Materials; Pearson
- X Hibbler R C; Structural Analysis; Pearson

GANPAT UNIVERSITY
B.Tech. Sem. IV – Civil Engineering
C – 402 Surveying

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-------|-----------------|----------|-------|-------------|
| Lect. | Pract. | Total | Theory | | | | Practical | | | Grand Total |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | Total | |
| | | | | Marks | Hrs | | | | | |
| 3 | 4 | 7 | 30 | 70 | 3 | 100 | 25 | 25 | 50 | 150 |

COURSE CONTENT:

I PLANE TABLE SURVEY:

Plane table and accessories, plane table techniques, two point and three point problems, error in plane tabling, advantages and disadvantages of plane tabling.

II LEVELLING:

Methods of levelling, setting out levels, permanent adjustments of level, applications of levelling in sewer line, road alignment, precise levelling, levelling errors.

III COMPUTATION OF AREAS AND VOLUMES:

Areas from field measurements and plans, different methods, Trapezoidal and Simpson's rule, Planimeter.

Volume by trapezoidal and prismoidal formula, calculation of earthwork in cutting and embankment for civil engineering works, mass haul diagram, volume by spot levels, capacity of reservoir.

IV THEODOLITE SURVEY:

Introduction, types of theodolite, temporary and permanent adjustment of theodolite, field operations with theodolite, theodolite traversing, latitude and departure, Gale's traverse table, omitted measurements in theodolite traversing, errors in theodolite traversing

V CURVE SURVEYING:

Introduction, classification of curves, simple, compound and transition curves, methods of setting the curves, vertical curves.

VI CONSTRUCTION SURVEYS:

Introduction, setting out buildings, pipe lines and sewers, roads.

VII HYDROGRAPHIC SURVEYS:

Introduction, controls in hydrographic surveying, shore line survey, soundings, reduction in soundings, methods of locating and plotting of soundings.

REFERENCE BOOKS:

- I** Dr. K. R. Arora, " Surveying and Levelling, Vol. I & II ", Standard Publications
- II** Kanitkar & Kulkarni, " Surveying and Levelling, Vol. I & II ", Vidyarthi Gruh Prakashan.
- III** K. S. Duggal, " Surveying and Levelling, Vol. I & II", TMH Edition.
- IV** Surveying Vol.I, II and III by Dr. B.C. Punamia
- V** Surveying and Levelling by N.N. Basak
- VI** Surveying and Levelling by R. Agor
- VII** Advanced Surveying by R. Agor.
- VIII** Roy, S.K., Fundamentals of Surveying, Prentice Hall India, New Delhi
- IX** Subramanian, R., Surveying and Leveling, Oxford University Press, New Delhi

GANPAT UNIVERSITY

B.Tech. Sem. IV – Civil Engineering

C – 403 Building Construction

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-----------|-----------------|----------|-------------|-------|
| Lect. | Pract. | Total | Theory | | | Practical | | | Grand Total | |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | | Total |
| | | | | Marks | Hrs | | | | | |
| 3 | 2 | 5 | 30 | 70 | 3 | 100 | 25 | 25 | 50 | 150 |

COURSE CONTENT:

I INTRODUCTION:

Overview of construction practices, theory and methods

II SUBSURFACE INVESTIGATION:

Objectives, methods of boring like wash boring, percussion etc.

III SHALLOW FOUNDATIONS:

Necessity, types, setting out, excavation, construction, failures of foundation and remedial measures.

IV MASONRY CONSTRUCTION:

Stone masonry: Technical terms, lifting appliances, joints, types - random (un-coursed) rubble, coursed rubble, dry rubble masonry, Ashlars masonry- Ashlars fine, chamfered fine.

Brick masonry: Technical terms, bonds in brick work- English bond, single & double Flemish bond, garden wall bond, raking bond, Dutch bond.

Composite masonry: Stone facing with brick backing, brick facing with concrete backing.

Hollow concrete blocks and construction

Cavity walls: Brick cavity walls, position of cavity at foundation, roof and at opening levels.

Lintels & arches: Lintels - types, construction. Arches - technical terms, types - brick arches, rough, axed, stone arches, flat - semi circular.

V PLAIN AND REINFORCED CONCRETE CONSTRUCTION:

Pre-cast and cast-in-situ construction

VI DOORS AND WINDOWS:

Doors: Location, technical terms, size, types, construction, suitability.

Windows: Factors affecting selection of size, shape, location and no. of windows, types, construction, suitability, fixtures and fastenings.

Ventilators: Ventilators combined with window, fan light.

VII STAIRS AND STAIRCASES:

Definition, technical terms, requirements of good stair, fixing of going and rise of a step, types of steps, classification, example - stair planning, elevators, escalators.

VIII FLOORINGS:

Introduction, essential requirements of a floor, factors affecting selection of flooring material, types of ground floors, brick, flag stone, tiled cement- concrete, granolithic, terrazzo, marble, timber flooring, upper floor- timber, timber floor supported on RSJ flag stone floor resting on RSJ, jack arch floor, reinforced concrete floor, ribbed floor, pre cast concrete floor.

IX ROOFS AND ROOF COVERINGS:

Introduction, requirements of good roof technical terms, classification, types of roof coverings for pitched roof. A.C. sheet roofs - fixing of A.C. sheets, laying of big six sheets, G.I. Sheets roofs, slates, flat roof - advantages, dis-advantages, types of flat terraced roofing.

X WALL FINISHES:

Plastering, pointing and painting.

XI TEMPORARY WORKS:

Timbering in trenches , types of scaffoldings, shoring, underpinning

XII SPECIAL TREATMENTS:

Fire resistant, water resistant, thermal insulation, acoustical construction and anti-termite treatment

TERM WORK

Term work shall be based on the above mentioned course content.

FIELD VISIT

Field visits based on course content are suggested

REFERENCE BOOKS:

- I Building Construction by Dr. B. C. Punamia
- II Building Construction by Sushil Kumar
- III Building Construction by Gurcharan Singh
- IV Building Construction by S. C. Rangwala
- V Building Construction by P.C Varghese, Prentice-Hall of India, New Delhi
- VI Indian Standard Institution, National Building Code of India, ISI, 1984, New Delhi

GANPAT UNIVERSITY

B.Tech. Sem. IV – Civil Engineering

C – 404 Basic Transportation Systems

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-------|-----------------|----------|-------|-------------|
| Lect. | Pract. | Total | Theory | | | | Practical | | | Grand Total |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | Total | |
| | | | | Marks | Hrs | | | | | |
| 3 | 0 | 3 | 30 | 70 | 3 | 100 | - | - | - | 100 |

COURSE CONTENT:

I Introduction :

Role of transportation in society, Objectives of transportation system, different types of modes, planning & Co-ordination of different modes for Indian conditions

II Railway Engineering

Merits of rail transportation, railway gauges and gauge problems.

Cross section of permanent way and track components. Sleepers-function and types, sleeper density, ballast functions and different ballast materials.

Rails: coning of wheels and titling of rails, rail cross sections, wear and creep of rails, rail fastening.

Geometric design: Gradients, transition curves, widening of gauges on curves, cant and can deficiency.

Point and crossing: Design of turnouts and description of track junctions.

Yards: details of different types of railway yards and their functions.

Signaling and interlocking: classification of signals, interlocking of signals and points control of train movements. Construction and maintenance of railway track, methods of construction, material requirements, special measures for high speed track, maintenance of tracks and traffic operations.

III Airport Engineering:

1. Aircraft characteristics and their influence on airport planning.

2. Airport planning: Topographical and geographical features, air traffic characteristics and development of new airports, factors affecting airport site selection.

3. Airport obstruction: Zoning laws, classification of obstruction, imaginary surfaces, approach zones, turning zones.

4. Airport layout: runway orientation, wind rose diagrams, and basic runway length.

Correction of runways length, airport classification, geometric design, airport capacity, location of terminal buildings, aircraft hangers and parking.

5. Airport marking and lighting: marking and lighting of runways, taxiways and approach areas.

6. Terminal area and airport layout: Terminal area, planning of terminal building, Apron size of the gate position, number of gate position, aircraft parking system: Hanger: general planning considerations, blast considerations.

7. Air traffic control: Air traffic control aids, Enroute aids, landing aids.

8. Airport Drainage: requirement of airport drainage, design data, surface drainage design, subsurface drainage design.

IV Water Transportation

1. Harbors: Selection of site, entrance and channel requirement, ship characteristics and their influence on ports management and operations, harbor maintenance.

2. Harbor layout: harbor works, break waters, jetties, wharves, piers, berthing facilities, types and construction dolphins.

3. Navigational aids: buoys and lighthouses etc.

4. Port facilities: docks, transit sheds and warehouses, general layout, containers and container yard,

REFERENCE BOOKS:

- I** Saxsena S C and Arora S P A course of railway engineering. Dhanpat Rai and sons, New Delhi.
- II** Khanna and Arora, Airport planning & design, Nemchad Bros, Roorkee
- III** Agrawal M M (1991). Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi
- IV** Bindra S P Docks & Harbour engineering, Dhanpat Rai and sons
- V** R Shirinivasan, Harbour dock and tunnel engineering
- VI** Rao G V , Airport engineering, Tata McGraw Hill
- VII** Horonjeff & Mcklerey, planning & design of airports
- VIII** Quinn A D, Design and construction of ports and marine structures

GANPAT UNIVERSITY

B.Tech. Sem. IV – Civil Engineering

C – 405 Fluid Mechanics - II

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-------|-----------------|----------|-------|-------------|
| Lect. | Pract. | Total | Theory | | | | Practical | | | Grand Total |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | Total | |
| | | | | Marks | Hrs | | | | | |
| 3 | 2 | 5 | 30 | 70 | 3 | 100 | 25 | 25 | 50 | 150 |

COURSE CONTENT:

- I KINEMATICS AND DYNAMICS:** Types of fluid flow, continuity equation in three dimensions in Cartesian coordinates, velocity and acceleration, velocity potential and stream function. Types of motion Vortex flow, Euler’s Equation of motion, Bernoulli’s Equation from Euler’s Equation.
- II VISCOUS FLOW:** Flow of viscous fluid through circular pipe and two parallel plates, loss of head due to friction in viscous flow, methods of determination of coefficient of viscosity (capillary tube method, orifice type, falling sphere Resistance method, rotating cylinder method), network of pipes (Hardy-cross method)
- III TURBULENT FLOW :** Reynolds’s experiments, friction loss in pipe flow, velocity distribution in turbulent flow in pipe, shear stress in turbulent flow, Nikuradse work on artificially rough pipe, Cole brooks and white equations : Moody’s diagram.
- IV BOUNDARY LAYER FLOW:** Definitions, growth, thicknesses, drag forces, laminar and turbulent boundary layer on a flat plate, and separation of boundary layer.
- V Dimensional and Model Analysis:** Concept of dimensions and dimensional homogeneity dimensionless parameters, methods of dimensional analysis, model analysis, types of similarities, types of forces acting on moving fluid, dimensionless numbers, model laws, classification of model.
- VI OPEN CHANNELS:** Classification of flow in channel, velocity distribution, discharge through open channel, most economical section, specific energy and specific energy curve, critical flow, standing wave flume and parshall flume, gradually varied flow, hydraulic jump and its application.

TERM WORK

Term work shall be based on the above mentioned course content.

FIELD VISIT

Field visits based on course content are suggested.

REFERENCE BOOKS:

- I Fluid mechanics & Hydraulic Machines By Dr.R.K.Bansal
- II Fluid mechanics By Dr.D.S.Kumar
- III Fluid mechanics & Hydraulic Machines By Dr.P.N.Modi & Sheth
- IV Fluid mechanics By Dr.A.K.Jain
- V Hydraulic Fluid mechanics & Fluid Machines By S.Ramamurthan
- VI Engineering Fluid Mechanic By R.J.Garde & A.C.Mirajgaoker

GANPAT UNIVERSITY

B.Tech. Sem. IV – Civil Engineering

C – 406 Concrete Technology

| Teaching Scheme (Hrs) | | | Examination Scheme (Marks) | | | | | | | |
|-----------------------|--------|-------|----------------------------|---------|-----|-----------|-----------------|----------|-------------|-------|
| Lect. | Pract. | Total | Theory | | | Practical | | | Grand Total | |
| | | | Internal Asses. | Sem End | | Total | Internal Asses. | Sem. End | | Total |
| | | | | Marks | Hrs | | | | | |
| 3 | 2 | 5 | 30 | 70 | 3 | 100 | 25 | 25 | 50 | 150 |

COURSE CONTENT:

- I **GENERAL:** Historical background, composition of concrete, general note on strength mechanism, current practice and future trends.

- II **INGREDIENTS OF CONCRETE**

Cement- Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard.

Aggregates-Function in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards.

Water- General Requirements & limiting values of impurities.

Admixtures- Additives and admixtures, types, need and benefits

Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials.

Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage.

- III **FRESH CONCRETE:** Methods of mixing, transporting and placing of concrete. Workability – Definition and need, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, microcracking.

- IV **HARDENED CONCRETE** – Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, and effect of age, maturity, and aggregate cement-paste interface various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and non- destructive tests with their limitations, test methods as per IS and ASTM.

- V **DURABILITY AND PERMEABILITY OF CONCRETE:** Definitions, causes, carbonation, cracking

- VI CONCRETE IN AGGRESSIVE ENVIRONMENT:** Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.
- VII SPECIAL CONCRETE:** Review of behavior and characteristics of high strength concrete, high performance concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete.
- VIII SPECIAL CONCRETING TECHNIQUES:** Pumped concrete, shotcrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete.
- IX CONCRETE MIX DESIGN:** Principles of mix proportioning, probabilistic parameters, factors governing selection of mix. Road note - 4, DOE, ACI and IS method of concrete mix design, Variability of test results, acceptance criteria, various IS code provisions.
- X REPAIR AND REHABILITATION:** Distress in structure – causes and precautions, damage assessment of structural elements, repairing techniques and repairing materials.

TERM WORK

- I A) Term work shall consist of tests on cement and aggregate, fresh concrete and hardened concrete. It includes destructive, partial destructive and non- destructive tests.
 - (B) Term work shall include report on topic assigned by respective lab in-charge.
 - (C) Term work shall include field visit and students will have to submit a report on it.
 - (D) Oral/Practical marks include viva-voce on practical performed and submitted reports.

REFERENCE BOOKS:

- I A.M.Neville ; Properties of Concrete
- II D.F.Orchard; Concrete Technology
- III P Kumar Mehta, Monteiro; Concrete Technology
- IV A R Santhakumar; Concrete Technology
- V M S Shetty; Concrete Technology
- VI M L Gambhir; Concrete Technology