

Structural Analysis II

T.E. Sem.V [CIVIL/CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. General

Types of structures occurring in practice and their classification. Stable and unstable structure, statical and kinematical determinacy and indeterminacy of structure. Symmetric structure, symmetrical and anti-symmetrical loads, distinction between linear and non-linear behaviour of material and geometric non-linearity.

2. Deflection of Statically

Review of general theorems based on virtual work and energy methods, introduction to the concept of complimentary energy, absolute and relative deflections caused by loads, temperature changes and settlement of supports, application to beams, pin jointed frames and rigid jointed frames.

3. Analysis of Indeterminate Structures by Flexibility Method

Flexibility coefficients and their use in formulation of compatibility equation. Theorem of three moments, Castigliano's theorem of least work, equations. Theorem of three moments, Castigliano's theorem of least work, application of above methods to propped cantilevers, fixed beams, continuous beams. Simple pin jointed frames including effect of lack of fit for members. Simple rigid jointed frames and two hinged parabolic arches.

4. Analysis of Indeterminate Structures by Stiffness Method

Stiffness coefficients for prismatic members and their use for formulation of equilibrium equations, direct stiffness method, slope deflection method, Moment distribution method. Application of the above methods to indeterminate beams and simple rigid jointed frames, rigid jointed frames with inclined member but having only one translational degree of freedom in addition to rotational degree of freedom including the effect of settlement of supports.

5. Introduction to Plastic Analysis of Steel Structures

Concept of plastic hinge and plastic moment carrying capacity, shape factor, determination of collapse load for single and multiple span beams.

References :

1. Basic Structural Analysis (*Reddy C.S.*) Tata McGraw Hill.
2. Matrix Method in Structural Analysis (*Pandit and Gupta*) Tata McGraw Hill.
3. Structural Analysis, Vol II: (*Junnarkar*) S.B. Charotar Publishers
4. Modern Methods in Structural Analysis (*Dr. B.N. Thadani and Dr. J.P.Desai*), Weinall Book Corporation.
5. Intermediate Structural Analysis (*Wang C.K.*) Tata McGraw Hill.
6. Analysis of Framed Structures (*Gere and Weaver*) East-West Press
7. Structural Analysis Vol.I and Vol.II : (*Pandit and Gupta*) Tata McGraw hill.
8. Structural Analysis (*L.S. Negi and R.S. Jangid*) Tata McGraw Hill.
9. Structural Analysis A unified approach (*Prakash Rao*) D.S. University press.
10. Matrix Methods of Structural Analysis (*Dr.A.S. Meghre, S.K.Deshmukh*) Charotar Publishing House.
11. Structural Analysis (*Chajes A*) Prentice Hall



Geotechnical Engineering – I

T.E. Sem.V [CIVIL/CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	25
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Introduction

Definitions : soils, soil mechanics, soil engineering, rock mechanics. **Geotechnical Engg** : scope of soil engineering, comparison between soil & rock.

2. Basic Definitions & Relationship

Soil as three phase system in terms of weight, volume, void ratio, porosity. **Definitions** : moisture content, unit weights, degree of saturation, void, ratio, porosity, specific gravity, mass specific gravity etc. Relationship between volume–weight, void ratio–moisture content, unit weight percent air voids, saturation–moisture content, moisture content specific gravity etc. Determination of various parameters such as moisture content by oven dry method, pycnometer, sand bath method, torsional balance method, radio activity method, alcohol method. Specific gravity by density bottle method, torsional balance method, radio activity method, alcohol method. Unit weight by water displacement method, submerged weight method, core cutter method, sand replacement method.

3. Plasticity Characteristics of Soil

Introduction to definitions of : plasticity of soil, consistency limits–liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of : liquid limit, plastic limit, shrinkage limit. Use of consistency limits.

4. Classification of Soils

Introduction of soil classification : particle size classification, textural classification, unified soil classification, Indian standard soil classification system. **Identification** : field identification of soils, general characteristics of soils in different groups.

5. Permeability of Soils

Introduction to hydraulic head, Darcy's law, validity of Darcy's law. Determination of coefficient of permeability, **Laboratory methods** : constant head method, falling head method, **Field methods** : pumping–in test, pumping–out test. **Permeability aspects** : permeability of stratified soils, factors affecting permeability of soil.

6. Seepage Analysis

Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets, use of flow nets.

7. Effective Stress Principle

Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuation of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

8. Compaction of Soils

Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in the field, compaction specification and field control.

9. Consolidation of Soils

Introduction, comparison between compaction & consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, consolidation test results, basic definition, Terzaghi's theory of consolidation, final settlement of soil deposits, consolidation settlement : one-dimensional method, secondary consolidation.

10. Shear Strength

Principal planes parallel to the coordinate axes, Mohr's circle, important characteristics of Mohr's circle, Mohr-Coulomb theory, types of shear tests, direct shear test, merits of direct shear test, tri-axial compression tests, test behaviour of UU, CU and CD tests, relation between major and minor principal stresses, unconfined compression test, vane shear test.

11. Soil Exploration

Introduction, methods of investigation, methods of boring, soil samplers and sampling, number and disposition of trial pits and borings, penetrometer tests, borehole logs, geophysical methods.

References :

1. Soil Engineering in Theory and Practice (*Alam Singh*) CBS Publishers & Distributors, New Delhi.
2. Soil Mechanics and Foundation Engineering (*V.N.S. Murthy*) Saitech Publications.
3. Soil Mechanics and Foundation Engineering (*K.R. Arora*) Standard Publishers and Distributors, New Delhi.
4. Geotechnical Engineering (*C.Venkatramaiah*) New Age International
5. Fundamentals of Soil Engineering (*Taylor, D.W.*) John Wiley & Sons
6. An Introduction to Geotechnical Engineering (*Holtz, R.D.*) Printice Hall, New Jersey
7. Soil Mechanics: (*Craig, R.F.*) Chapman & Hall
8. Soil Mechanics: (*Lambe T.W. & Whitman R.V.*) John Wiley & Sons
9. Theoretical Soil Mechanics (*K. Terzaghi*) John Wiley & Sons
10. Relevant Indian Standard Specifications & Codes, BSI Publications, New Delhi



Building Design and Drawing – II

T.E. Sem.V [CIVIL/CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	4 Hrs.	100
Practical (Sketching & Oral) Exam	–	25
Oral Exam	–	–
Term Work	–	50

SYLLABUS

- 1. Planning & Design of public building such as**
 - Buildings for education : schools, colleges, institutions, libraries
 - Buildings for health : hospitals, health centres, dispensaries, maternity homes, sanatoriums
 - Industrial buildings
 - Buildings for entertainment : theatres, cinema halls, club houses, sports clubs
 - Offices
 - Hostels hotels, boarding houses, rest houses
- 2.** Architectural planning, massing and composition, concept of built environment and its application in planning.
- 3.** Perspective drawing : One point and two point perspective
- 4.** Principles of modular planning, planning as recommended by National Building Organization
- 5.** Town planning : objectives and principles, master plan, road systems, zoning, green belt, slums
- 6.** Use of computers in building planning and designing
- 7.** Understanding certification methods (TERI, LEEDS) for Green buildings.

References :

1. Building Drawing (*M.G. Shah, C.M.Kale, S.Y. Patil*) Tata McGraw Hill, Delhi
2. Civil Engineering Drawing (*M.Chakraborty*) Monojit Chakraborty Publication, Kolkata
3. Building Drawing and Detailing (*BTS Prabhu, K.V.Paul and C. Vijayan*) SPADES Publication, Calicut.
4. Planning and Designing Buildings (*Y.S.Sane*) Modern Publication House, Pune.



Applied Hydraulics – I

T.E. Sem.V [CIVIL]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Dynamics of Fluid Flow

Momentum principle (applications : Force on plates, pipe bends) and moment of momentum equation (applications : sprinkler)

2. Dimensional Analysis

Dimensionless homogeneity, Buckingham's π theorem, Rayleigh's method, dimensionless groups, similitude, model studies, distorted & undistorted models.

3. Impact of Jets and Jet Propulsion

Jet striking – stationary, moving, inclined and perpendicular flat plates, hinged flat plates, impact on stationary curved vane, series of curved vanes, jet propulsion of ships.

4. Turbines

General layout of hydro–electric power plant, heads and efficiencies of turbine, classification, Pelton wheel, reaction turbine, Francis turbines, Kaplan turbine, draft tube theory, specific speed, unit quantities, characteristics curves, Governing of turbines, cavitations.

5. Centrifugal Pumps

Work done, heads and efficiencies, minimum speed series and parallel operation. Multistage pumps, specific speed, model testing, priming, characteristic curves, cavitation.

6. Hydraulics Machinery

Hydraulic ram, press, accumulator, intensifier, crane and lift

References :

1. Hydraulics and Fluid Mechanics (*Modi P.M. and Seth S.M.*) Standard Book House
2. Theory and Applications of Fluid Mechanics (*Subramanya K.*) Tata McGraw Hill.
3. Fluid Mechanics (*Dr.Jain*) A.K. Khanna Publishers
4. Fluid Mechanics (*Nagarathnam S.*) Khanna Publishers
5. Flow in Open Channels (*Subramanya K.*) Tata McGraw Hill



Transportation Engineering – I

T.E. Sem.V [CIVIL/CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Introduction

Role of transportation in Society, objectives of transportation system, different types of modes, planning & coordination of different modes for Indian conditions.

2. Railway Engineering

- Merits of rail transportation, railway gauges and problems due to non uniformity of gauges.
- Cross section of permanent way and track components, sleeper – functions and types, sleeper density, ballast functions and different ballast materials.
- Rails : coning of wheels and tilting of rails, rail cross sections, wear and creep of rails, rail fastenings.
- Geometric : gradients, transition curves, widening of gauge on curves, cant and cant deficiency.
- Points and crossing : design of turnouts, description of track junctions different types of track junctions.
- Yards : details of different types of railway yards and their functions.
- Signalling and interlocking : classification of signals, interlocking of signals and points, control of train movement.
- Construction and maintenance of railway track, methods of construction, material requirements, maintenance of tracks and traffic operations.
- Modernization of track and railway station for high speed trains special measures for high speed track.

3. Airport Engineering

- Aircraft component parts and its function, aircraft characteristics and their influence on airport planning.
- Airport planning : topographical and geographical features, existing airport in vicinity, air traffic characteristics, development of new airports, factors affecting airport site selection.
- Airport obstruction : zoning laws, classification of obstructions, imaginary surfaces, approach zones, turning zones.
- Airport layout : runway orientation, wind rose diagrams, basic runway length, corrections for runway length, airport classification, geometric design, airport capacity, runway configuration, taxiway design, geometric standards, exit taxiways, holding aprons, location of terminal buildings, aircraft hangers and parking.
- Airport marking and lighting marking and lighting of runways, taxiway, approach and other areas.
- Terminal area & airport layout : terminal area, planning of terminal buildings, apron : size of gate position, aircraft parking system, hanger, general planning considerations and blast considerations.
- Air traffic control : Air traffic control aids, en–route aids, landing aids.
- Airport drainage : requirement of airport drainage, design data, surface drainage design.

- Airport airside capacity and delay : runway capacity and delays, practical hourly capacity, practical annual capacity, computation of runway system, runway gate capacity, taxiway capacity.
- Air traffic forecasting in aviation : forecasting methods, forecasting requirement and applications.

4. Introduction of water transportation system, harbors and docks, port facilities.

References :

1. A Course of Railway Engineering (*Saxena S.C. and Arora S.P.*) Dhanpat Rai and Sons, New Delhi
2. Airport Planning and Design (*Khanna & Arora*) Nemchand Bros, Roorkee
3. Indian Railway Track (*Agarwal M.M.*) Suchdeva press New Delhi.
4. Docks and Harbour Engineering (*Bindra S.P.*) Dhanpat Rai and Sons
5. Harbour, Dock and Tunnel Engineering (*R Shrinivas*) Chrotar Publishing House
6. A Text Book on Highway Engineering and Airports (*Sehgal S.E. Bhanot K.L.*) S.Chand & Co.
7. Planning and Design of Airport (*Horonjeff and Mckelrey*) Tata McGraw Hill
8. Design & Construction of Ports and Marine Structures (*Quinn A.D.*) Tata McGraw Hill
9. Airport Engineering (*Rao G.V.*) Tata McGraw Hill



Building Services & Utilities

T.E. Sem.V [CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Electrical Installation

Introduction to electric power generation, terms and units used in connection with electric installation, materials, accessories and fittings used for electric installation, wiring layout, types of wiring, earthing, protection of building from lighting, safety in electric installation.

2. Lighting

- Relevant terms and units used in connection with lighting such as illumination, brightness ratio or contrast, luminance, luminous flux, illumination level, candela flux, lumen, etc.
- Day lighting, day light area, day light factor, components of day light factor like sky component, internal reflected component, external reflected component, corrections for various factors, computation of day light factor.
- Glare: causes and effect of glare, rejected glare veiled glare, ways to minimize glare.
- Aims of good lighting for building, values for illumination recommended for various tasks, lighting for various areas such as work space, corridors, passages, entrances, foyers and staircases.
- Artificial lighting to supplement day lighting.

3. Ventilation objectives of ventilation, method of ventilation, natural ventilation, mechanical ventilation, rate of ventilation.

4. **Air conditioning** : necessity of air conditioning, various terms used in connection with air conditioning, centralized air conditioning, plant rooms, air handling unit, risers, cooling towers.

5. Telephones and other communication services in the buildings.

6. **Acoustics**: various terms and units used in connection with acoustics, sources and layout of different types of buildings from the point of view of acoustics, use of various materials, Sabine's formula, sound insulation, relevant construction techniques.

7. **Lifts**: necessity of lifts, types of lifts, various terms used in connection with lifts, location of lift-factors that need consideration, quantity of lift services, quality of service, passenger handling capacity, control of lifts, lift well and machine room, maintenance of Lift service, escalators.

8. Plumbing for house water supply, gas supply & drainage

- **Water supply**: sources of water and supply of water for domestic use, storage capacity, factors influencing the storage calculation, material and fixtures used in plumbing for domestic water supply, hot water supply water meters maintenance of plumbing for water supply.
- **Drainage**: wastes and their classification, methods of disposing wastes, drainage/sewerages, requirements of good building drainage, sanitary fittings such as kitchen sinks, wash basins, w.c. pans, urinals, their installation, materials and accessories used in plumbing for drainage, traps -

different types and their uses, flushing cisterns, their working, connection, their sizes etc., systems of sewerages such as combined and separate systems, one pipe system, two pipe system etc., their merits and demerits, septic tanks, their working, sizes, construction etc., disposal of rain water from roof and surroundings of a building, typical layout for the drainage of building.

- Gas lines for domestic use, sources of supply, precautions for safety and maintenance.

- 9. Fire Protection:** fire hazards, classification of fires, classification of buildings on the basis of fire loads, prevention of fire and protection from fire, provisions in buildings, fire proof exits and escapes.

Reference :

1. Building Construction (*S. P. Bindra & S. P. Aurora*) Dhanpat Rai & Son 1992.
2. Building Construction (*B. C. Punmia & A K Jain*) Laxmi Publications, No. 1984.
3. National building code and other Indian standard codes for different topics.
4. Building drawing (*M. G. Shah, C. M. Kale. S. Y. Patki*) Tata McGraw Hill, Delhi
5. Services in building complex (*V. K. Jain*) Khanna Publishers
6. Materials of construction (*D. N. Ghose*) Tata McGraw Hill. Delhi
7. Architectural materials science (*D. Anapetor*) Mir Publishers
8. Introduction to engineering materials (*B. K. Agrawal*) Tata McGraw Hill New Delhi
9. Engineering materials (*Rangwala*) Charotar Publications
10. Engineering materials (*P. Surendrasingh*) Vani Education Books New Delhi.
11. Building construction (*Rangwala*) Charotar Publications

