

SEVENTH SEMESTER		CIVIL ENGINEERING				
COURSE CONTENTS (Grading)						
CE-7001	Advanced Structural Design-II (Steel)	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	0	70	22

UNIT – I

Chimneys : Guyed and self supporting steel stacks.

UNIT – II

Bunkers, Silos.

UNIT – III

Water Tanks : Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

UNIT – IV

Design of industrial multiplex – multi storey frames, bracings, gantry girder. Design of Tubular structure

UNIT – V

Design of Plate girder and truss girder bridges.

Reference Books :

- (i) Design of Steel Structures – Ramammutham.
- (ii) Design of Steel Structures – Punia.
- (iii) Steel Structure by Ramchandra Vol.II.
- (iv) Steel Structure by Arya & Ajmani.
- (v) Design of Steel Structures – L.S. Negi.

SEVENTH SEMESTER				CIVIL ENGINEERING		
COURSE CONTENTS						
CE-7002	Advanced Environmental Engineering	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	70	22

UNIT – I

Air Pollution : Definition Sources of air pollution, effect of air pollution on health, animal, plant & materials, properties of typical air pollutants, standards of air pollution, indoor air pollution.

UNIT – II

Role of metrological conditions, Air diffusion and concentration of pollutants, plum pattern height of chimney, pollution control legislation.

UNIT – III

Principle of air pollution control, various control methods, process and equipment design and operation of various pollution control equipment.

UNIT – IV

Noise Pollution : Basics of noise pollution, measurement of noise, permissible noise levels in different zones, effects of noise, noise control measures.

UNIT – V

Common Effluent Treatment Plant.

References :

- (i) "Water Supply & Sanitary Engineering", B.S. Bidve, Dhoupai Rai & Co.
- (ii) "Wastewater Engineering", B.C. Punima, Laxmipuhetciss.
- (iii) "Water & Wasterwater Engineering", S.K. Garg.
- (iv) "Water & Wastewater Technology", J.Hammer, PHI Ltd.
- (v) State of Art on CETP by NEERI, Nagpur.

List of Practical :

- (i) NO_x analysis by high volume sampler.
- (ii) SO_x analysis by high volume sampler.
- (iii) SPM analysis by high volume sampler.
- (iv) Study of Noise Meter
- (v) Case study of Noise Pollution
- (vi) Case study of CETP
- (vii) Study of Gas Chromatograph

SEVENTH SEMESTER				CIVIL ENGINEERING		
COURSE CONTENTS						
CE-7003	Geotechnical Engineering - II	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	70	22

UNIT – I

Shallow Foundations : Type of foundations shallow and deep. Selection criteria, bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity – Prandle, Terzaghi, Brinch Hansen’s, Skempton, Meyerhoj’s. IS code on B.C. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

UNIT – II

Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils, static and dynamic formulae. Pile load test, Settlement of pile group, negative skin friction, under – reamed piles and their design. Piles under tension, inclined and lateral load foundation on expansive & swelling soil, caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

UNIT – III

Soil Improvement Techniques : Compaction, Field and laboratory methods & their choice, proctor compaction test, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness.

Soil Stabilization : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical – Stabilization and stabilization by grouting. Geo – synthetics, types, functions, materials and uses.

UNIT – IV

Soil Exploration and Foundations on Expansive and Collapsible Soils : Methods of soil exploration. Planning of exploration programme for buildings, for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

UNIT – V

Sheet Piles/ Bulkheads and Machine Foundation : Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, cofferdams, materials, types and application. Modes of vibration. Mass – spring analogy, Natural frequency. Effect of Vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

Laboratory Work : Laboratory work will be based in the course of Geo-tech. Engineering I & II as required for soil investigations of engineering projects and covered in the lab. Work of Geotech. Engineering - I.

List of Experiments :

- (i) Indian Standard Light Compaction Test / Standard Proctor Test.
- (ii) Indian Standard Heavy Compaction Test / Modified Proctor Test.
- (iii) Determination of Field Density by Core Cutter Method.
- (iv) Determination of Field Density by Sand Replacement Method.
- (v) Determination of Field Density by Water Displacement Method.
- (vi) The Continued Compression Test.
- (vii) CBR Test.
- (viii) Demonstration of Plate Load Test.
- (ix) Demonstration of SPT & CDPT.

Reference Books :

- (i) Soil Mechanics & Foundation Engineering By Dr. K.R. Arora – Standard Publishers, Delhi.
- (ii) Soil Mechanics & Foundation Engineering By B.C. Punmia – Laxmi Publications, Delhi.
- (iii) Modern Geo-tech. Engineering By Dr. Alam Sigh – IBT Publishers, Delhi.
- (iv) Geo-tech. Engineering By C. Venkatramaiah – New AGE International Publishers, Delhi.
- (v) Foundation Engineering By GALEonards McGraw Hill Book Co. Inc.
- (vi) Relevant IS Code.

SEVENTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE-7004	Water Resource Engineering – II	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	70	22

UNIT – I

Canal Irrigation : Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings – objectives, materials used, economics. Canal falls and cross drainage works – description and design, head and cross regulators, escapes and outlets, canal transitions.

UNIT – II

Water resources planning and Management : Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects – introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

UNIT – III

Floods and Ground Water : Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects, reclamation of water logged and salt affected lands.

UNIT – IV

Spillways : Ogee spillway and its design, details of siphon, shaft, chute and side channel spillways, emergency spillways.

UNIT – V

Hydropower Plants : Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Reference Books :--

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engineering – G.S. Birdi
3. Quantity Surveying & Costing – Chakraborty
4. Estimating & Costing – S.C. Rangwala
5. Engineering for Dams (Vol.I,II&III) by Creager, Justing & Hinds.
6. Hydroelectric Hand Book by Creager
7. Hydraulic Structures by Varshney
8. Irrigation & Water Power Engineering by Purnia & Pandey
9. Water Power Engineering by Dandekar.

SEVENTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE-7011	Earthquake Engineering	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	0	70	22

UNIT – I

Single DOF systems : Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations.

UNIT – II

Numerical Evaluation of Dynamic Response : Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson - q method, Analysis of Nonlinear Response, Introduction to frequency domain analysis.

UNIT – III

Elements of seismology : Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs.

Earthquake Response of structures : Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.

UNIT – IV

Multiple DOF systems : Stiffness and Flexibility matrices for shear buildings, free and forced vibrations-undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity.

UNIT – V

Earthquake Resistant Design of Structures, Design of structures for strength & serviceability, Ductility and energy absorption, Provisions of IS : 1893 and IS : 4326 for aseismic design of structures, Code for ductile detailing IS : 13920.

Reference Books :--

1. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Engineering, Prentice Hall of India, New Delhi.
2. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
4. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.

SEVENTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE-7012	Traffic Engineering	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	0	70	22

UNIT – I

Traffic Characteristics : (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

UNIT – II

Traffic Studies : (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies-purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and Destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

UNIT – III

Traffic Operations and Control : (i) Traffic regulations and various means of control. (ii) One way streets-advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

UNIT – IV

Street Lighting : (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

UNIT – V

Accident Studies & Mass Transportation : (i) Accident Studies : Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Reference Books :

- (i) Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi.
- (ii) Traffic Engineering by Matson, W.S.Smith & F.W. Hurd.
- (iii) G.J. Pingnataro, Principles of Traffic Engineering.
- (iv) D.R.Drew, Traffic Flow Theory.
- (v) W.R. Mchsn and R.P. Roess "Traffic Engg".
- (vi) Wohl & Martin, Traffic System Analysis for Engineering & Planners

SEVENTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE-7013	Computational Methods in Structural Engineering	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	0	70	22

UNIT – I

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom. Axial, bending, shear and torsional deformations.

Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beam-column, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. nonprismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

UNIT – II

Basics of the Direct Stiffness method - Analysis of pin jointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Nonsway)

UNIT – III

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints - Lagrange Multiplier and Penalty Methods.

UNIT – IV

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalized element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)

UNIT – V

Two Dimensional Iso parametric elements, shape functions for Simplex. Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.

Reference Books :

- (i) Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
- (ii) Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
- (iii) Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
- (iv) Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
- (v) Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.
- (vi) Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London.

SEVENTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE-7014	Cost Effective & Eco-Friendly Construction	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	0	70	22

UNIT – I

Concepts of energy efficient & environment friendly materials and techniques.

Cost effective materials : Soil, Fly ash, Ferro cement, Lime, Fibers, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer.

Energy Efficient & Environment friendly building material products : Walls - Stabilized and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferro cement partitions.

Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferro cement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof, M.C.R. tile.

UNIT-II

Cost effective construction techniques and equipments :-

- (a) Techniques : Rat trap bond construction, Energy Efficient roofing's, Ferro cement technique, Mud Technology.
- (b) Equipments : Brick moulding machine, Stabilized soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferro cement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.

UNIT-III

Cost effective sanitation :-

- (a) Waste water disposal system.
- (b) Cost effective sanitation for rural and urban areas.
- (c) Ferro cement Drains

UNIT-IV

Low Cost Road Construction : Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.

UNIT-V

Cost analysis and comparison :-

- (a) All experimental materials
- (b) All experimental techniques