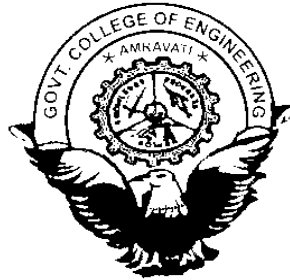


**GOVT. COLLEGE OF ENGINEERING,
AMRAVATI**



**B. TECH. (CIVIL)
VII and VIII Semester
CURRICULUM**

**Department of Civil Engineering
2010-11**

Govt. College of Engineering, Amravati
Department of Civil Engineering
Third Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	Internal	External		
CE301	Mathematics-III	4	1	-	5	10	15	15	60	-	-	100	5
CE302	Strength of Materials	4	1	-	5	10	15	15	60	-	-	100	5
CE303	Engineering Geology	2	-	-	2	4	8	8	30	-	-	50	2
CE304	Construction Materials	2	-	-	2	4	8	8	30	-	-	50	2
CE305	Building Construction	4	-	-	4	10	15	15	60	-	-	100	4
CE306	Fluid Mechanics-I	3	1	-	4	10	15	15	60	-	-	100	4
CE307	General Profeciency-I	-	-	2	2	-	-	-	-	50	-	50	1
CE308	Strength of Materials-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE309	Engineering Geology - Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE310	Building Construction -Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE311	Fluid Mechanics-I-Lab	-	-	2	2	-	-	-	-	25	25	50	1
	Total	19	3	10	32							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min. except courses CE303 and CE 304 for which the ESE duration will be 2 hrs.

Fourth Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	Internal	External		
CE401	Economics & Humanities	4	0	-	4	10	15	15	60	-	-	100	4
CE402	Water Resource Engg-I	3	1	-	4	10	15	15	60	-	-	100	4
CE403	Fluid Mechanics II	4	1	-	5	10	15	15	60	-	-	100	5
CE404	Concrete Technology	3	1	-	4	10	15	15	60	-	-	100	4
CE405	Surveying I	4	1	-	5	10	15	15	60	-	-	100	5
CE406	General Profeciency-II	-	-	2	2	-	-	-	-	50	-	50	1
CE407	Fluid Mechanics II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE408	Concrete Technology-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE409	Surveying I-Lab	-	-	4	4	-	-	-	-	50	50	100	2
	Total	18	4	10	32							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min.

Govt. College of Engineering, Amravati
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Fifth Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	Internal	External		
CE501	Theory of Structure I	4	1	-	5	10	15	15	60	-	-	100	5
CE502	Design of Reinforced Concrete Structures	3	1	-	4	10	15	15	60	-	-	100	4
CE503	Geotechnical Engineering -I	4	1	-	5	10	15	15	60	-	-	100	5
CE504	Surveying II	3	1	-	4	10	15	15	60	-	-	100	4
CE505	Building Design & Drawing	2	0	-	2	10	15	15	60	-	-	100	2
CE506	Computer Application in Civil Engineering-Lab	-	-	2	2	-	-	-	-	50	-	50	2
CE507	Design of Reinforced Concrete Structures-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE508	Geotechnical Engineering -I-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE509	Surveying II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE510	Building Design & Drawing-Lab	-	-	4	4	-	-	-	-	25	25	50	2
	Total	16	4	12	32							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min. except courses CE502 and CE505 for which the ESE duration will be 3 hrs.

Sixth Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	Theory				Practical		Total	
						TA	CT1	CT2	ESE	Internal	External		
CE601	Design of Steel Structures	3	1	-	4	10	15	15	60	-	-	100	4
CE602	Geotechnical Engineering -II	4	1	-	5	10	15	15	60	-	-	100	5
CE603	Environmental Engineering-I	4	0	-	4	10	15	15	60	-	-	100	4
CE604	Transportation Engineering-I	3	1	-	4	10	15	15	60	-	-	100	4
CE605	Estimating & Costing	3	1	-	4	10	15	15	60	-	-	100	4
CE606	Minor Project	-	-	2	2	-	-	-	-	25	25	50	2
CE607	Design of Steel Structures-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE608	Geotechnical Engineering -II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE609	Transportation Engineering-I-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE610	Estimating & Costing-Lab	-	-	2	2	-	-	-	-	25	25	50	1
	Total	17	4	10	31							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min. except courses CE601 and CE 605 for which the ESE duration will be 3 hrs.

Govt. College of Engineering, Amravati
Department of Civil Engineering

Seventh Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
						Theory				Practical		Total	
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
CE701	Elective -I	3	1	-	4	10	15	15	60	-	-	100	4
CE702	Theory of Structure -II	3	1	-	4	10	15	15	60	-	-	100	4
CE703	Construction Management	3	1	-	4	10	15	15	60	-	-	100	4
CE704	Water Resource Engg. -II	3	1	-	4	10	15	15	60	-	-	100	4
CE705	Environmental Engg-II	3	1	-	4	10	15	15	60	-	-	100	4
CE706	Project & Seminar	-	-	4	4	-	-	-	-	50	-	50	3
CE707	Elective -I-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE708	Theory of Structure -II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE709	Water Resource Engg. -II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE710	Environmental Engg-II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
	Total	15	5	12	32							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min. except course CE702 for which the ESE duration will be 3 hrs.

Eighth Semester

Corse Code	Name of the Course	Teaching Scheme				Evaluation System							Credits
						Theory				Practical		Total	
		Theory Hrs/week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
CE801	Elective -II	3	1	-	4	10	15	15	60	-	-	100	4
CE802	Elective -III	3	1	-	4	10	15	15	60	-	-	100	4
CE803	Advance Structural Design	3	1	-	4	10	15	15	60	-	-	100	4
CE804	Transportation Engg-II	3	-	-	3	10	15	15	60	-	-	100	3
CE805	Project & Seminar	-	-	4	4	-	-	-	-	100	100	200	9
CE806	Elective -II-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE807	Elective -III-Lab	-	-	2	2	-	-	-	-	25	25	50	1
CE808	Advance Structural Design-Lab	-	-	2	2	-	-	-	-	25	25	50	1
	Total	12	3	10	25							750	27

Note: The ESE duration for all courses shall be 2 hrs. 30 min. except course CE 803 for which the ESE duration will be 3 hrs.

Govt. College of Engineering, Amravati
Department of Civil Engineering

Sr. no.	Elective I	Sr. no.	Elective II	Sr. no.	Elective III
1	Structural Dynamics	1	Earthquake Resistant Design	1	Adv. Hydraulic Structures
2	Advance Geotechnical Engineering	2	Adv. Structural Analysis	2	Adv. Design of Steel Structure
3	Matrix Analysis of Structures	3	Pavement Design & Construction	3	Finite Element Methods
4	Water Treatment Process & Technology	4	Adv. Waste Water Treatment	4	Ground Improvement Technology
5	Traffic Engineering & Control	5	Adv. Foundation Engineering	5	GIS & Remote Sensing
6	Advance Hydraulics	6	Adv. Construction Management	6	Environmental Pollution & Soild Waste Management

CE701 ELECTIVE-I
A) STRUCTURAL DYNAMICS

Teaching Scheme : 03 L + 01T Total 04

Credit : 04

Evaluation Scheme : 15 CT1 + 15 CT2 +10 TA+ 60 ESE

Total Marks :100

Duration of ESE: 2hrs.30 min.

Single degree freedom system, free vibrations, damped free vibrations, critical damping, and response, dynamic load factor

Single degree freedom system, response to impulsive loading, rectangular, triangular pulses, Duhamel Integral. Response to general dynamic loading, Numerical schemes such as constant, linear acceleration

Multi-degree freedom system, stiffness and flexibility approaches, Lumped-mass matrix, free vibrations fundamental Frequencies and mode shapes, orthogonality of modes, numerical schemes to find mode shapes and frequencies.

Multi degree freedom systems, response to dynamic loading, Formulations of equations of motion, normal coordinates mode superposition method, modal matrix.

Distributed systems, free vibrations of uniform beams, differential equation and Solution, boundary conditions, finite element, Ritz approach, free vibrations of simply supported plate. (Transverse vibrations)

Introduction to earthquake engineering

Textbooks:

1. Dynamics of Structures, R.W. Clough and J. Penzian, 2nd edition, McGraw-Hill Inc, 1993
2. Introduction to Structural Dynamics, J.M. Biggs ,McGraw-Hill Book Co.1964

Reference books

1. Vibration Problems in Engineering, W. Weaver, Jr., S. P. Timoshenko and D. H. Young. Chichester, 5th edition, John Wiley & Sons Limited,1990,
2. Structural Dynamics: Theory and Computation, Mario Paz, 2nd Edition, CBS Publishers, 1987

CE701 ELECTIVE-I
B) ADVANCED GEOTECHNICAL ENGINEERING

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Clay Mineralogy-Atomic bonds, clay minerals, clay -water relations, electrical effects, cation exchange, clay mineral identification

Soil bodies Exhibiting non-homogeneous attributes, Influence of anisotropy in soil bodies, consecutive equations and models

Soil strength- Yield criteria, theories of failure, Effective stress principal, Stress path in various drainage condition.

Three dimensional consolidation- Equation, Solution of 3-D consolidation equation, consolidation by vertical sand drain and its design aspects, free strain consolidation with no smear, effect of smear zone on radial consolidation, calculation of degree of consolidation with radial drains and solution of problems based on it.

Seepage- Flow net for anisotropic soil media, construction of flow net for hydraulic structures on non-homogeneous soil, directional variation of permeability in anisotropic medium, Anisotropy governing differential equations for flow through porous media in Cartesian co-ordinate & polar co-ordinate system for Laplace Equations, Numerical analysis of seepage in layered soil, computation of seepage force.

Expansive soil- Black cotton soil, nature & characteristics of it, chemical composition, clay minerals, swelling potentials & its measurements, detrimental effects, measures to control its detrimental effects.

Collapsible soils – causes, properties of collapsible soils, collapse potential, collapse settlement, single & double oedometer test, single plate load test for determination of collapse potential treatment, foundations on collapsible soils.

Text Books:

1. Theoretical Soil Mechanics, M.E.Harr, 5th edn, McGraw Hill Publication, 1987.
2. Principles of Foundation Engineering, B.M. Das, 5th edn, Thomson Asia Pvt. Ltd, 2004.

Reference Books:

1. Geotechnical Engineering Principles & Practices, D. P. Couduto, 1st edn, Pearson Prentice Hall Publication, 2007.
2. Basic and Applied Soil mechanics, Gopal Ranjan & A. S. R. Rao, 2nd edn, New Age Int. Publication Pvt, Ltd, 2000.

CE701 ELECTIVE-I

C) MATRIX ANALYSIS OF STRUCTURES

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Flexibility method, static redundancy, flexibility coefficients, basic determinate, released structure, geometric compatibility conditions, matrix formulation, application to single bay single storey portals, pin jointed plane trusses. Settlement of supports and elastic supports.

Stiffness method, kinetic redundancy, degree of freedom, stiffness coefficient, joint equilibrium equations, structure and member approaches, member stiffness matrix,

structure matrix, assembly procedure, application to plane frame with and without axial deformations, pin jointed trusses, numerical examples up to three unknowns.

Stiffness matrix of plane frame member with axial deformation (6x6), grid member (6x6), transformation of forces and displacements, member and global coordinate system.

Computer programs for solution of simultaneous algebraic equations, Gauss elimination method. (FORTRAN / C language)

Data and program organization for stiffness method, various coding system, member-joint and joint-coordinate relations, member-displacement relation, code number approach, methods of introducing boundary conditions for restrained displacements, half band matrices.

Text Books:

1. Matrix Methods of Structural Analysis, Dr A.S. Meghre and S. K. Deshmukh, Charotar Publishing House, Anand, India, 2003.
2. Structural Analysis- A Matrix Approach: G. S. Pandit and S. P. Gupta, Tata McGraw Hill Publishing Company Limited, New Delhi, 1986.

Reference Books:

1. Analysis of framed structures: James M. Gere and William Weaver Jr., D Van Nostrand Company Inc., Affiliated East West Press Pvt. Ltd., 1965.
2. Matrix, Finite Element, Computer and Structural Analysis: M. Mukhopadhyay, Third Edition, Oxford & IBH publishing Co. Pvt. Ltd. 1993.

CE701 ELECTIVE-I

D) WATER TREATMENT PROCESS AND TECHNOLOGY

Teaching scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs. 30 min.

Requirement of water treatment facilities different unit operation and unit processes. Coordination of unit operations. Common attributes of water affected by conventional unit operation and processes

Aeration: rate of gas absorption and desorption, objectives of aeration, Types of aerators, Factors governing design of aerator.

Flocculation: objectives, chemical coagulation, concept of surface charge, coagulating effects of electrolytes, zeta potential, coagulants and coagulant aids, factors influencing coagulation. Perikinetic and orthokinetic flocculation. Mixing and stirring devices, construction and operation of flocculators, Design of flocculator. Pebble bed flocculators.

Principles of sedimentation and floatation. General equations for settling of discrete particulates. Hindred settling, effect of Temperature, efficiency of an ideal basin, short-circuiting. Design , construction and operation of sedimentation tank.

Inlet and outlet arrangements, sludge removal. Tube settler and plate settler. High rate solid contact clarifier.

Filtration: Objective, design, construction and operation of rapid and slow sand filters. Filter media, grain size distribution, preparation of filter sand , hydraulics of filtration and hydraulics of fluidized beds. Scour intensification, Type of filter, high rate, contact rate, declined rate, up flow, dual media, Pressure filters, diatomaceous earth filter.

Disinfection: objectives, different disinfectants, chemical disinfection, theory, kinetics, factors affecting disinfection. Disinfection by chlorine, ozone and UV. Free available and combined available chlorine, Break point chlorination, disinfection in rural w/s.

Miscellaneous methods of treatment: Water softening, lime soda and zeolite process, split method, Calculation of dose of lime and soda ash. Methods of Iron and Manganese removal. Desalination. Removal of taste and adour.

Industrial Wastewater Treatment: Introduction, variation in quality and quantity of industrial wastewater. Indian standards for discharge of treated wastewater on land, into public sewer and inland surface water.

Text Books:

1. Water and Waste Water Engineering, Fair Geyer and Okun, John Willy and Sons, 1968.
2. Water and Waste Water Technology, Mark J. Hammer, 6th edition, John Willy and Sons, 2007.

Reference Books:

1. Water Supply and Sewerage, E.W.Steel and McGhee, 6th edition, Mc Graw Hill Company, 1991.
2. Manual on Water Supply & Treatment, CPHEEO, New Delhi, 1999.
3. Physico-Chemical Processes for Water Quality Control, Weber, John Wiley & Sons, 1972.

CE701 ELECTIVE-I

E) TRAFFIC ENGINEERING & CONTROL

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

Introduction: 3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Concept of PCU.

Traffic Characteristics: Road user characteristics. Traffic flow characteristics, Traffic flow forecast, Capacity, traffic studies, Speed and delay, Origin and destination, parking and accident

Traffic Facilities Design: Design of intersection, Rotary intersections, grade separated intersection

Traffic operation and Safety: Traffic regulations, Controls on vehicles, drivers and flow, One way street tidal flow operation, Traffic control devices, Temporary traffic control devices, Traffic safety, Traffic signs, Traffic signals, Design of Traffic signals, islands and marking, Design of isolated traffic signals by IRC method, Highway lighting, Awareness of Traffic safety, Factors affecting traffic safety.

Traffic and Environment: Pollution problem, Noise pollution, Air pollution, Environmental impact assessment due to different aspects of Traffic Engineering.

Text Books:

1. Principles of Traffic Engineering, G.J. Pingnataro, Mc Graw Hill, 1970
2. Traffic System Analysis for Engineering and Planners, Wohl and Martin, Mc GrawHill, 1983.

Reference Books:

1. Traffic Flow Theory, Ronald D. Drew, Mc Graw Hill, 1964.
2. Fundamentals of Traffic Engineering, Homburger, Kell and Perkins, 13th edition, Institute of Transportation Studies, University of California, Berkeley, 1992.
3. Traffic flow Fundamentals, A. D. May, Prentice Hall Publication , 1990

CE701 ELECTIVE-I

F) ADVANCED HYDRAULICS

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Computation of uniform flow. Computation of critical flow. Theory of gradually varied flow. Analysis of surface profile of gradually varied flow.

Computation of gradually varied flow, Bresse's method, Chow's method, Direct step method, standard step method, Numerical method.

Equation of unsteady flow in a pipe line for incompressible fluid, Time of flow establishment, Rigid water column, theory of water hammer and computation of water hammer pressures.

Equation of unsteady flow in a pipe line for incompressible fluid, Time of flow establishment. Rigid water column theory of water hammer and computation of water hammer pressures.

Equation describing water hammer phenomena when compressibility of fluid and elasticity of pipe is considered, computation of water hammer pressure of frictionless flow in horizontal pipe, for sudden and slow closer of valve, Application of allievi's method of charts for calculation of approximate pressures. Water hammer pressures in pumping systems. Method of characteristics.

Computation of water hammer pressures in branched pipe system and in surge tank system. Various devices used for protection from water hammer pressures. Function of surge tank and different type of surge tanks. Equations governing the flow in the simple surge tank system. Analysis of flow in a simple surge tank system.

Computation of maximum surges in a simple surge tank, study of problem of hydraulic stability in a simple surge tank system.

Fluvial hydraulics including sediment transport, mode of sediment motion and bed formation, threshold movement, total sediment load, suspended and bed load theories.

Text Books:

1. Flow through open channels; Ranga Raju K.G.; Tata McGraw Hill, 1998
2. Open channel hydraulics; Ven Te Chow; McGraw Hill, (International Student Edition), 1980.

Reference Books:

- 1 Flow in open channels; Subramanys K. Tata McGraw Hill, 1999
- 2 Fluid Mechanics; Streeter & Wylie; McGraw Hill, International Student Edition, 1996
- 3 Fluid Mechanics; Narasimhan S.; Engineering Vol. II, Orient Longman Publication, 1981.
- 4 Mechanics of Sediment Transport and Alluvial River Problem; Garde, R. J. New Age Publication, New Delhi.

CE 702 - THEORY OF STRUCTURES – II

Teaching Scheme: 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 3hrs.

Slope deflection method: Application to portal frames with side sway.

Moment Distribution method: Application to portal frames with side sway, multibay, multistory symmetrical frames subjected to symmetric load only

Kani's method: Continuous beams and single bay single storey portal frames, Frames with side sway, Multi-bay multi storeyed frames subjected to symmetric loads.

Influence line diagram upto two span for non determinant structures.

Catigliano's theorems, principle of least work, Analysis of single bay single storey portal frames (upto two degree of redundancy)

Analysis of redundant trusses (up to second degree of redundancy) using Catigliano's theorem

Introduction to Matrix Methods, Flexibility method, static redundancy, flexibility coefficients, application to beams

Stiffness method, kinematics redundancy, application to continuous beams

Text Books:

1. Basic Structural Analysis, Reddy C. S., 2nd edn, Tata – McGraw Hill, New Delhi, 2004.
2. Intermediate Structural Analysis, Wang, C. K., International Edition, McGraw Hill Inc, 1983

Reference Books:

1. Elementary Structural Analysis, Utku, Norris and Wilbur, 4th edition, McGraw Hill Inc, 1991
2. Structural Analysis, R.C. Hibbler, 4th edition, Prentice Hall, 1999
3. Theory of Structures, Stephen P. Timoshenko and D. H. Young, 2nd edition, McGraw-Hill, 1965

CE 703 - CONSTRUCTION MANAGEMENT

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

General Management – Evolution, applicability, definition, theories, Comparison between traditional management and modern scientific management, roles of Frederick Winslow Taylor, Henry Fayol, Elton Mayo, Mary Parker Follet, A.H.Maslow, Gilbren and Douglas Mcgregor, Management functions and Management styles.

Project management : Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality , project clearance Procedures and necessary documentation for major works like dam, multi-storied structures, ports, tunnel, bridges, roads.

Resource Planning and Scheduling: PERT/CPM :Critical path theory and application. Bar chart , Grant chart Construction Scheduling – Work break down structure, activity cost and time estimation in CPM, PERT , Network compression and resource leveling / smoothing.

Materials Management-Role and objectives of materials management, Materials Procurement and Delivery, Inventory control- EOQ techniques

Construction Equipment-Choice of Equipment and Standard production Rates, Economic Cost of Equipment, Replacement analysis, downtime cost and obsolescence costs.

Personnel management: Importance, functions and mechanism of implementation of the functions.

Text Books:

1. Construction Equipment and its Planning and Application, Dr. Mahesh Varma, Metropolitan Book Company, New Delhi-, 1983,
2. Construction Accounting and Financial Management, William Palmer, 5th edn, McGraw-Hill Professional Publishing, 1999.
3. Materials Management, D. S. Ammer, 3rd edn., Pub.: R. D. Irwin, 1974
4. CPM in Construction Management – James O'Brien, Tata McGraw Hill, New Delhi, 6th edn., 1999

Reference books:

1. Construction Project Management Planning, Scheduling and Controlling- B. Sengupta & H. Guha , Tata McGraw Hill, New Delhi
2. Principles of Construction Management, Roy Pilcher, 3rd edition, McGraw-Hill, June 1992.
3. CPM in Construction Practices, Antil and Wood Head, 4th edn., John Wiley Pub., 1990.

CE704 - WATER RESOURCE ENGG. II

Teaching scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Different types of Dams and their suitability, factors governing the selection of types of dam, various components of dams, control levels,

Reservoir Planning, selection of site, various investigations,

Reservoir Capacity, Sedimentation & factors governing the sedimentation, Life of Reservoir.

Types and elements of earth dam, seepage and drainage arrangement, phreatic line, design of section, stability analysis, causes of failure, seepage control measures

Types of Gravity Dams, forces acting, Elementary and practical profile, design of gravity dams, Earthquake and its effect on dams, Galleries, construction of Gravity Dam, preparation of foundation, grouting, concrete for dams, rolled concrete construction.

Spillway capacity, Flood routing through spillways, Types of spillway and their principles of design and construction, energy dissipation below spillway including its type, objectives different types of crest gates.

Selection of site and layout of Diversion Head Works, its components, safety against piping and uplift, Bligh, Lane, and Khosala's Theories, design of weirs on permeable foundation.

Types of canals, Parts of Canal irrigation system, Canal alignment, Design of unlined and lined Canals, Balancing depth, cross section of canal, propose and types of canal lining

Types and only design principles and description of Canal fall's, Head Regulator, Cross regulator, Canal escapes and canal outlets, Aqueduct, Siphon aqueducts, super passage, canal siphon, level crossing, Non modular modules, flexible modules, rigid modules.

River Training Works: Need and types of river training works.

General features of Hydro-power, general layouts of different types, main components of Hydro-power schemes,

Text books:

1. Irrigation Water Resources and Water Power Engineering, Dr. P.N. Modi, Standard Book House, New Delhi, 2009
2. Irrigation Engineering and Hydraulic Structures, R. K. Sharma, Oxford and IBH Publishing Company, New Delhi, 1994.

Reference books:

1. Concrete Dams, R. S. Vershney, Oxford and IBH Publishing Co., New Delhi, 1982
2. Theory and Design of Irrigation Structures, R.S. Varshney, S. C. Gupta and R.L. Gupta, Nemchand & Brothers, Roorkee, 1992.
3. Water Resources Engineering, R.K. Linsley and J.L.H. Paulhus, McGraw Hill Book Co., 1992.

CE 705 – ENVIRONMENTAL ENGG. – II

Teaching scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Quantity and Quality of sewage: Components of sewage, Dry weather flow, Peak factor, Quantity of storm water, Rational formula, Ground water infiltration, Variation in flow rates, Waste water characteristics, First order BOD equation, COD, solids, Effluent standards for disposal of wastewater on land, into streams, in sewers; Stream pollution, Self purification, DO sag curve, Stream classification, Fair's factor, Problems DO sag curve

Sewerage systems: Separate, partially separate, and combined sewerage systems; Types of sewer pipes: material and shape; Sewer appurtenances, Manholes, drop manholes, inverted siphon, Over flow weirs, ventilation, Flushing tanks; Layout generation; Sewage pumping: Necessity, Location, Sewage pumping station.

Design of sewers: Manning's equation, Self-cleansing velocity, Non-scouring velocity, Full-flowing sewer, Partially-full flowing sewers, Self cleansing slope, Design and analysis of sewer, Cost of sewer based on cost of excavation and pipe

Sewage Treatment: Flow diagram of conventional STP; Primary treatment, Screen chamber: Types, Function; Grit chamber: Function, Velocity control, Oil and Grease tank; Primary settling tank: Surface over flow rate, Weir loading, Design problems; Secondary treatment, Trickling filters: Standard rate, High rate, Rate of filtration, Recirculation, Efficiency, Modifications, Design of trickling filters; Activated sludge process: Process description, loading rates, MLSS, MLVSS, SVI, F/M, Mean cell residence time, Design of conventional ASP; Secondary clarifier; Sludge treatments: Aerobic and anaerobic digestion, Effect of pH and temperature, sludge drying beds

Low cost waste treatments: Oxidation ponds, facultative pond, Oxidation ditch, Septic tank, soak pits, dispersion trenches, problem on design of oxidation pond, oxidation ditch and septic tank

Air and noise pollution: Sources of air pollution: Primary and secondary, Stationary and mobile sources, Effect of air pollution on man, material, and plants; Bhopal gas tragedy, Principle and working of Settling chambers, Electrostatic precipitators, Air quality standards, Sources, Noise Pollution Measurement, Decibel scale, Computation of noise, Effect, Control measures, tolerance levels

Solid waste management: Types, Sources, Composition, Collection systems, Frequency of collection, Sanitary land fill, Composting,

EIA and Acts: Introduction to EIA; Water Act, 1974; Air Act, 1981; Environmental Protection Act (1986)

Text Books:

1. Environmental Engineering, H. S. Peavy, D. R. Rowe and T. George, McGraw-Hill Book Company, New Delhi, 1985.
2. Environmental Engineering, Gerard Kiely, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

Reference Books:

1. Manual on Sewerage and Sewage Treatment, Central Public Health and Environmental Engineering Organization, Government of India Publication, New Delhi, 1993
2. Waste Water Treatment, M. N. Rao and A. K. Datta, Oxford and IBH Publishing Co. Private Limited, New Delhi, 2003.
3. Wastewater Engineering, Metcalf and Eddy, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2003.
4. Air Pollution, Rao, M. N., and Rao, H. V. N., Tata McGraw Hill Publishing Company Limited, New Delhi, 1989.
5. Solid Waste Management in Developing Countries, Bhide, A. D., and Sundrasen, B. B., Indian National Scientific Documentation Centre, New Delhi.

CE 706 PROJECT AND SEMINAR

Teaching Scheme: 04 P Total = 04
Evaluation Scheme: Internal = 50

Credit : 3
Total Marks: 50

50 marks divided in two parts, 25 marks for seminar and 25 marks for project work.

A. Seminar

1. Student shall select a topic for seminar which is not covered in curriculum.
Student shall complete the conceptual study of the selected topic and expected to know functional and technical details of selected topic.
2. Before end of semester student shall deliver a seminar and submit the seminar report in proper format.
Introduction
Literature Survey
Concept
Functional and Technical Details
Future scope
Applications
Comparison with similar topics / methods
References

3. Student shall deliver a seminar on submitted report which shall be assessed for 25 marks by two examiners
 - 1) Project Guide
 - 2) Senior faculty appointed by HOD

B. Project

1. In general a group of 4-5 students should be allowed to complete one project.
2. Student should complete the literature survey and finalized the topic for the project
3. They shall submit the synopsis on the selected topic to HOD
4. On approved topic base work should be complete.
5. At end of semester, group should submit the progress in proper format.
6. Oral examination for 25 marks shall be conducted on the progress report by the examiner panel as follows
 - 1) Project Guide
 - 2) Senior faculty appointed by HOD

CE707 ELECTIVE-I LAB

A) STRUCTURAL DYNAMICS - LAB

Teaching Scheme: 02 P

Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum five experiments should be performed.

1. Dynamics of a three storied building frame subjected to harmonic base motion.
2. Dynamics of a one-storied building frame with planar asymmetry subjected to harmonic base motions.
3. Dynamics of a three storied building frame subjected to periodic (non-harmonic) base motion.
4. Vibration isolation of a secondary system.
5. Dynamics of a vibration absorber.
6. Dynamics of a four storied building frame with and without an open ground floor
7. Dynamics of one-span and two-span beams.

A Report based on above shall be submitted by each student.

Practical Examination;

Practical examination shall consist of oral examination based on Report.

CE707 ELECTIVE-I LAB

B) ADVANCED GEOTECHNICAL ENGINEERING - LAB

Teaching Scheme: 02 P Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum eight experiments should be performed.

1. Model Field Swelling Pressure test.
2. Differential & Free swell Index
3. Design of vertical sand drains
4. Drawing of flow net for hydraulic structures on non-homogeneous section
5. Report of field visit to any project under construction
6. Computation of seepage in layered soil.
7. Laboratory Swelling Pressure test.
8. Stress-path in various drainage condition.
9. Determination of collapse potential by single oedometer test
10. Determination of collapse potential by double oedometer test

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE707 ELECTIVE-I LAB

C) MARTIX ANALYSIS OF STRUCTURES - LAB

Teaching Scheme: 02 P

Credit : 1

Evaluation Scheme: Internal = 25, External=25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum eight experiments should be performed.

1. Write a program for Gauss elimination method of solving simultaneous equations.
2. Analyse a truss by flexibility method.
3. Analyse a continuous beam by flexibility method.
4. Analyse a continuous structure with elastic support by flexibility method.
5. Analyse a frame by stiffness method.

6. Develop a program for generating element stiffness matrix of a typical plane truss element.
7. Develop a program for generating element stiffness matrix of a typical plane frame element.
8. Develop flowchart for a computer program for analyzing a plane frame/plane truss by stiffness method.
9. Develop assembly subroutine of program for analysis of plane frame/plane truss by stiffness method.
10. Generate input data software for analyzing a plane frame/plane truss by stiffness method. Use both types of code numbering.
11. Develop subroutine of program for feeding data of plane frame/plane truss by stiffness method.
12. Develop subroutine of program for adding joint loads to stiffness formulation of a structure to be analysed by stiffness method.
13. Matrix operations using Excel, MATLAB or any computing tool.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE707 ELECTIVE-I LAB

D) WATER TREATMENT PROCESS AND TECHNOLOGY- LAB

Teaching scheme : 02 P

Credits: 01

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Design of various individual treatment units such as Aeration, sedimentation, flocculation, computation of quantity of coagulant filtration, softening. (Any Five)
2. Design of water treatment plant for the given population along-with hydraulic computations and layout plan and sectional elevation for each unit.
3. Report based on visit to water treatment plant.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE707 ELECTIVE-I LAB

E) TRAFFIC ENGINEERING & CONTROL - LAB

Teaching scheme : 02 P

Credits: 01

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Any five experiments should be performed.

1. Design problem on Traffic study
2. Design of intersection
3. Design problem on Traffic flow forecast
4. Design of Traffic signals
5. Case study on Environmental impact assessment due to different aspects of Traffic Engineering.
6. Case study of traffic at any square with all aspect.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE707 ELECTIVE-I LAB

F) ADVANCED HYDRAULICS

Teaching Scheme: 02 P Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.
Design and drawing of surge tank

1. Plotting of various GVF surface profiles
2. Plotting of GVF using standard step method
3. Analysis of pipe flow for water hammer pressure
4. Field visit report to any hydropower station

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE 708 - THEORY OF STRUCTURES – II - LAB

Teaching Scheme: 02 P Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum five experiments should be performed.

1. Electrical resistance linear strain gauge for measuring static strains.
2. Influence line diagram for reactions of continuous beams
3. Influence line diagram for moment at fixed support for propped cantilever beams
4. Experimental study of buckling of slender columns and to find collapse load for various fixing conditions
5. Forces and displacements in redundant trusses and frames.
6. Study of polariscope
7. Experimental study of beam end rotations
8. Verification of Betty theorem
9. Verification of Maxwell Reciprocal Theorem.
10. Experimental study of beam deflections under different fixing conditions
11. Experimental study of rectangular portal frame subjected to vertical loads
12. Application for moment indicator.
13. Horizontal reaction of two hinge arch

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE709 - WATER RESOURCE ENGG. II – LAB

Teaching Scheme: 02 P Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum seven experiments should be performed.

1. Using Topo-sheet, average annual rainfall; determining yield including Fixing control levels of Reservoir.
2. Design and Stability analysis of Gravity dam
3. Design & Stability analysis of an Earth Dam
4. Design of a spillway and stilling Basin.
5. Design of canals
6. Design and analysis of a weir on permeable foundation

7. Drawing of cross drainage works
8. Study of any one type of river training work.
9. A typical layout of a high head hydropower plant, function of the components
10. A report based on field visit to any irrigation project during the academic term

A Report based on above along with drawings on drawing sheets shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE 710 – ENVIRONMENTAL ENGG. II - LAB

Teaching Scheme: 02 P	Total = 02	Credit : 1
Evaluation Scheme: Internal = 25; External = 25		Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Analysis of water and waste water samples: pH, Hardness, Chloride, DO and BOD, COD, Alkalinity, Acidity and Turbidity, Solids, Iron, Calcium, Residual chlorine, Alum Dose (Any six)
2. Demonstration of high volume air sampler and Measurement of sound level (Any one)
3. Design of Grit Chamber, Primary settling tank, High rate trickling filter, Septic tank, Sludge Digester (Any Three)
4. Report based on visit to WWTP / Sewage Treatment Plant.

A Report based on above along with drawings on drawing sheets shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE801 ELECTIVE-II

A) EARTHQUAKE RESISTANT DESIGN

Teaching Scheme : 03 L + 01 T	Total = 04	Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks: 100
Duration of ESE: 2hrs.30 min.		

Indian seismic codes, seismic design philosophy for buildings, concept of earthquake resistant structures

Behavior of reinforced concrete building in earthquake

Introduction to IS 1893-2002, Structural response to earthquake, analysis of multistoried frames by Equivalent static analysis method

Introduction to IS 13920, design strategy, strength, ductility of reinforced concrete members

Ductile design and detailing of reinforced concrete beams

Ductile design and detailing of reinforced concrete columns

Design strategy, strength, ductility of beam column joints

Seismic analysis of water tank resting on ground

Text Books:

1. Earthquake resistant Design of Structures, S. K. Duggal, Oxford University Press Publications, First edition, 2007
2. Earthquake resistant design of structures, Pankaj Agrawal and Manish Shrikhande, Prentice Hall of India Pvt, Ltd. Publications, 2006.

Reference Books:

1. IS 1893:2002, Criteria for Earthquake Resistant Design of Structures, Part I, Bureau of Indian Standards, New Delhi, 2002.
2. IS 13920: 1993, Ductile Detailing of Reinforced Concrete Structures subjected to Seismic forces - Code of practice, Bureau of Indian Standards, New Delhi, 1993.
3. Earthquake Design Practice for buildings, Davide Key, Thomas Telford Ltd., Landon, First edition, 1988.
4. Seismic Design of Reinforced Concrete and Masonry Buildings, Paulay, T., M.J.N. Priestley, John Willey and Son's Publications, First edition ,1992
5. Handbook of seismic analysis and design of structure, Farzad Neaim
6. www.nicee.org

CE801 ELECTIVE-II

B) ADV. STRUCTURAL ANALYSIS

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Approximate methods of analysis of multi-bay multi-storey Frames by- Cantilever method, Portal method & Factor method.

Shear centre for thin walled beam section symmetrical about one axis

Cantilever moment distribution method, application to rigid jointed plane frames.
Vierendeel girders-analysis for vertical sway cases only.

Minimum potential principal, Rayleigh & Rayleigh-Ritz method, application to simply supported and cantilever beams using power series and trigonometric series

Introduction to theory of elasticity – (treatment in Cartesian co-ordinates), state of stress at a point, stress equilibrium equations, strain-components, stress strain relations, generalized Hooke's law, plane stress and plane strain conditions, stress and strain compatibility for 2D

Analysis of beams circular in plan.

Text Books:

1. Basic Structural Analysis, Reddy C. S., 2nd edition, Tata – McGraw Hill, New Delhi, 2004.
2. Intermediate Structural Analysis, Wang, C. K., International Edition, McGraw Hill Inc, 1983

Reference Books:

1. Structural Analysis, R. C. Hibbler, 4th Edition, Prentice Hall of India Pvt., Ltd. Publications, 1999
2. Theory of Elasticity, Timoshenko, S. P. and Goodid, J. N., 3rd Edition, Tata McGraw-Hill Publishing Co. Ltd., 1988
3. IS 1893:2002, Criteria for Earthquake Resistant Design of Structures, Part I, Bureau of Indian Standards, New Delhi, 2002.
4. Elementary Structural Analysis, Utku, Norris and Wilbur, 4th Edition, McGraw Hill Inc, 1991

CE801 ELECTIVE-II

C) PAVEMENT DESIGN AND CONSTRUCTION

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

General: Structural action of flexible and rigid pavements. Characteristics of highway and airfield pavements.

Design Parameters: Standard Axle load and wheel assemblies for road vehicles Under carriage system for aircraft, Tire and contact pressure, contact area imprints, Computations of ESWL for flexible and rigid pavements. Load repetitions and distributions of traffic for highway and airfield pavement, airport traffic areas.

Material characteristics: AASHO sub grade soil classification. Group index, CBR, North Dakota cone bearing value, plate load test for “K”, Marshal’s method of Bituminous mix design. Modulus of rupture and elasticity, poisson’s ratio and coefficient of thermal expansion of concrete. Layer equivalency concepts.

Analysis of Flexible and Rigid Pavements: Stress, Strain deformation analysis for single, two three and multilayered flexible pavement systems. Stress and deflections for rigid pavements due to load and temperature, influence Charts, ultimate load analysis, joints in C.C. pavements.

Highway Pavement Design: Flexible: North Dakota Cone, Group index, CBR, IRC-37, Brumister, Triaxial (Kansas), AASHO method of design.
RIGID IRC-58, PA. C.A. AASHO method of design, Design of joints and reinforcement.

Airfield Pavement Design: Flexible :U.S.Corps of Engineering, CBR, FAA, Mcload (Canadian)

Rigid: PCA, FAA & LCN, ultimate load Analysis yield lines patterns, methods.

Pavement Testing and Evaluation: Pavement evaluation techniques including Bump integrators, Benkelman Beam, Falling weight deflectometer methods. Straightening of pavement: Design of flexible, composite and rigid overlays for flexible and rigid pavements, Repairs, Maintenance and rehabilitation of pavements. Specifications and Cost Estimates: Review of IRC / MORTH / CAO / NAAI Specification and standards for highway and airfield construction. Cost evaluation and comparative study. Pavement Management systems.

Text Books:

1. Principles of Pavement Design; Yoder & Witzace; 2nd edition, John Wiley & Sons, 1975.
2. Airport Planning & Design; Goyal & Praveen Kr.; Galgotia Publication, 2002. ‘

Reference Books:

1. Design of Functional Pavement; N.C Yang.; McGraw Hill, 1990
2. Highway Engineering; S.C. Sharma Dhanpat Rai, 2000
3. Design and Performance of Road Pavement Croney & Croney; McGraw Hill, 2002.
4. Highway Engineering; K. Khanna, and Justo, C.E.G., Khanna Publication, Roorkee, 2001

CE801 ELECTIVE-II

D) ADV. WASTE WATER TREATMENT

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Introduction to Waste Water Treatment: Classification of wastewater treatment methods, Application of treatment methods, Selection of treatment - process flow diagrams, Principles types of reactors.

Industrial Wastewater Treatment, variation in quality and quantity of industrial wastewater. Indian standards for discharge of treated wastewater on land, into public sewer and inland surface water.

Physical and Chemical Treatment: Screening, Grit removal, mixing, flocculation, sedimentation, Equalization and neutralization, floatation, gas transfer. Design principles and design of screens, grit chamber, sedimentation tank and equalization basin.

Biological Treatment: Fundamental of biological treatment. Introduction of suspended and fixed film reactors. Concept and design of activated sludge process and trickling filter. Design of secondary settling tank

Anaerobic Treatment: Theory and Design of anaerobic treatment process.

Tertiary Treatment: Principles of tertiary treatment, theory of adsorption and factors affecting the adsorption, concepts and different methods of dissolved solids removal.

Text Books:

1. Wastewater Treatment, Disposal and Reuse; Metcalf and Eddy, 3rd edn, McGraw Hill Pub. Co. Pvt. Ltd., New Delhi, 1991.
2. Waste Water Treatment; M.N. Rao and A.K. Datta, Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi, 2003.

Reference Books:

1. Wastewater Treatment and Disposal; S.J. Arceivalla, Marcel Dekkar, 1981.
2. Environmental Engineering, H.S.,Peave, D.R. Rowe and T. George, McGraw Hill Pub. Co. Pvt. Ltd., New Delhi, 1985.

CE801 ELECTIVE-II

E) ADV. FOUNDATION ENGINEERING

Teaching scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Bearing capacity– Bearing capacity for footing on or adjacent to slopes, footing on non-homogeneous soil conditions, bearing capacity of rock.

Pile foundations – Uplift resistance of pile, Vertical piles subjected to lateral loads, Solution with soil modulus assumed constant, short and long piles, Hansen’s method, Broom’s method, Use of p-y curves, Deflection of vertical piles, Batter pile groups

under inclined load, Culman's method, Analytical method, Hrehnikoffi's method, Brill's approach,

Raft foundations – Types, Bearing capacity of rafts on sands and clay, Analysis of rigid rafts, Modulus of subgrade reaction and its determination, Effect of depth on subgrade reaction, criteria for rigid / Flexible raft, Raft analysis using modulus of subgrade reaction,

Well foundations – Depth of well foundation, Bearing capacity of well foundation, Loading on well foundation, Lateral stability of well foundation, Different methods of analysis – Terzaghi's analysis, Banergee and Gngopadhyay's method, IRC method, Design of components of well foundation.

Foundations in difficult soils: expansive soils, chemically aggressive environment, soft soils, fills, collapsible soils.

Anchored bulk heads - Free earth support and fixed earth support methods - Types of anchors, Design of anchors

Text Books:

1. Foundation Analysis and Design, J. E. Bowles, 5th Edition, McGraw Hill International, 1996.
2. Foundation Design & Construction, M. J Tomlinson, 7th Edition, Addison-Wesley Longman Ltd, 2001.

Reference Books:

1. Geotechnical Engineering, V. N. S.Murthy, Marcel Dekker Inc., New York, 2003.
2. Principal of Foundation Engineering, Das B. M., 5th Edition, Thomson Brooks/Cole, 2004
3. Design Aids in Soil Mechanics and Foundation Engineering, R. Kaniraj, 1st edition, Tata McGraw Hill, New Delhi, 2004.

CE801 ELECTIVE-II

F) ADV. CONSTRUCTION MANAGEMENT TECHNIQUES

Teaching scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Computerized Project Management: The Role Project Managers-Trends in Modern Management-Strategic planning and project programming- Leadership and Motivation for the Project team-Interpersonal behavior in project organization, Role and responsibility of PMC.

Construction Accounting and Finance: Project budgeting, Quality control and Quality Production-Audit in economic law of returns governing production Construction development in housing, Transport and other infrastructures

Resource Planning and Scheduling: Repetitive Project Modeling techniques. LOB technique, Mass haul diagrams. PERT/CPM, Precedence Network Analysis, Resources smoothing and Resources Leveling.

Human Resource Development and Management: Recruitment, Training of Construction Managers and team, Incentive Schemes – Necessity, Merit rating, job evaluation, installation, modification and maintaining and incentive scheme based on implementation experience, Theories of motivation and Organizational Behavior. Safety and Health-Discipline and Discharge-Special human resource problems, Performance appraisal

Project management software: Detailed study of the software used in Construction scheduling, budgeting, monitoring, updating, resource leveling in latest software's in construction project monitoring and control. Web based project management.

Project economics: Construction economics, Comparison of project costs and trade off analysis, Economy of scale and size. Choosing between alternatives including levels of investments. Project profitability.

Text Books:

1. Applied Project Engineering and Management , Ernest E. Ludwig, , Gulf Publishing Co., Houston, Texas,1988.
2. Computer Integrated Construction Project Scheduling, John Butterworth, Prentice Hall, ISBN: 0131114654, 2004
3. Practical Construction Management, R.H.B. Rans, Taylor & Francis Group 2nd edn., ISBN: 0415362571, 2005

Reference Books:

1. Cases in Construction Management, Slater W.J., Taylor & Francis Group, ISBN: 1850320322, 1988
2. Professional Construction Management, Barrie-Paulson-McGraw Hill Institute Edition. Construction Project Management: A Practical Guide to Field Construction Management; Publisher: John Wiley & Sons; 2nd edn., ISBN: 0070038473, 1984
3. Handbook of Heavy Construction, O'Brien, Havers & Stubb,, McGraw Hill, 1996

CE802 ELECTIVE-III

A) ADV. HYDRAULIC STRUCTURES

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Embankments : Earth and Rockfill Embankments, Forces acting on Embankments, General principles of design, Stability analysis, Foundation requirements, Embankment construction and Slope protection..

Gravity dams : Forces on gravity dams, Elementary profile, Design, Stability requirements, Foundation treatment, Mass concrete for dams, Structural joints and galleries.

Buttress dams: Types, Economic spacing of buttresses, Design of deck slab buttress dam, Advantages and limitations.

Arch dams: Types, Methods of design, Thickness of arch and central angle for minimum concrete.

Spillways: Types, Comparison, Components, Profile of Ogee spillway, Hydraulic design, Design of crest.

Energy dissipaters: Types, Components, Design of hydraulic jump type, Basins, Ski – bucket type roller bucket.

Intake structures for water supply and hydropower projects, Location and design of simple, differential and orifice type surge tank,

Text Books:

1. Earth and Rockfill Dam, J. L. Sherard, John Wiley, New York, 1963
2. Concrete Dam, R.S. Varshney, Oxford IBH, 1988

Reference Books:

1. Engineering for Dams Volume I,II and III, W. P. Creager and Justin J. D., John Wiley and Sons, 1964
2. Design of Small Dams, USBR, Oxford IBH, 1970.
3. Design of Large Dams, USBR, Oxford IBH, 1970.
4. Design of Gravity Dams, USBR, Oxford IBH, 1970.
5. Concrete Dams, H.D. Sharma., Metropolitan Book Co, New Delhi, 1981.

CE802 ELECTIVE-III

B) ADV. DESIGN OF STEEL STRUCTURE

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100

Duration of ESE: 2hrs.30 min.

Design of industrial building including gantry girder, gantry column, Design of knee braces.

Analysis and design for transmission towers

Design of self supporting steel chimney and its foundation.

Design of through type truss bridge members for dead load and equivalent live load including top, bottom and portal bracings.

Design of North light trusses and latic girder

Introduction to plastic analysis of steel structure, shape factor, plastic section modulus, upper and lower bound theorems, Mechanism method to find collapse loads / plastic moment for beams, single bay single storey portals.

Text Books

1. Design of Steel Structures, by N.Subramanian, 1st edition, Oxford University Press, New Delhi, 2008
2. Design of Steel Structures, by Duggal .S.K., 3rd Edition, Tata McGraw Hill Publishing Company Limited, 2008

Reference Books:

1. Design of steel Structures, by Arya AS, Ajmani JL, Nem Chand & Brothers, Roorkee, 2007
2. Designs of Steel Structures, Raghupati, 1st Edition, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2001
3. BIS 800-2007, Code of practice for general construction in steel, BIS New Delhi
4. BIS 875-1987 (Part I to V), Code of Practice for Design Loads (other than Earthquake) for Buildings and Structures, BIS, New Delhi

CE802 ELECTIVE-III

C) FINITE ELEMENT METHODS

Teaching Scheme : 03 L + 01 T Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 2hrs.30 min.

Continuum structures, discretization, finite elements, nodes, variational principle, minimum potential theorem, relation to Rayleigh-Ritz method.

Interpolation, Lagrangian, Hermitian shape functions, natural coordinates, area and volume coordinates, coordinate and derivative transformations.

2D plane stress and plane strain analysis, constant triangle, rectangular element, 3D analysis, tetrahedron and parallelepiped elements.

Introduction to Isoparametric elements, plane stress, plane strain and solid, numerical integration.

Programming aspect, geometry, connectivity, code numbers, alternative data types, half band data preparation, flow charts, typical subroutine for assembly, shape functions, solution of equations, stiffness matrix.

Text Books:

1. Concepts and Applications of Finite Element Analysis: R. D. Cook, Third Edition, Wiley India Text books, Wiley India Pvt Limited, 1989.
2. Introduction to Finite Elements in Engineering, Chandragupta T. R. and Belegundu A. D., 3rd edn., Prentice Hall, 2002.

Reference Books:

1. Finite Element Analysis: Theory and Programming: C. S. Krishnamurthi, Second Edition, Tata McGraw Hill Publishing Company Limited, 1994, Reprint 2005.
2. The Finite Element Method for Engineers: K. H. Huebner, D. L. Dewhurst, D. E. Smith and T.G. Byrom, Fourth Edition, John Wiley and Sons, Inc., , 2001.
3. Matrix and Finite Element Analysis of Structures: Madhujit Mukhopadhyay and Abdul Hamid Sheikh, First Edition, Ane books Publication, 2004.
4. The Finite Element Method (Volume -I): O. C. Zienkiewicz and R. L. Taylor, First Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 1989

CE802 ELECTIVE-III

D) GROUND IMPROVEMENT TECHNOLOGY

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

Principle & methodology of soil stabilization, Different methods of soil stabilization such as granular stabilization, Chemical stabilization, Cement stabilization, Lime stabilization, Fly ash stabilization, Bituminous stabilization, Thermal stabilization.

Bearing capacity improvement using Geosynthetics, Soilmass reinforcement geometry, mechanisms & modes of failure (Binquet & Lee theory), foundation on soil with Geotextile reinforcement, design procedures.

Pavement construction using Geotextile- Mode of action, design & construction methods,

Reinforced retaining walls- Geotextile reinforced walls, Construction procedure, analysis, design, design of gabion walls, Geogrid soil walls construction & design

Deep compaction of granular soil, Vibroflotation, Vibrocompaction, Blasting methods.

Design of stone columns, Compaction piles, Dynamic consolidation, Preloading method, Stabilization of soft soil, Lime columns, Bearing capacity of lime group, Design of lime column foundation.

Sand drains, Granular trench stabilization,

Grouting techniques, Hydrofracture grouting, compaction grouting, Jet grouting, Types of grouts, Design of soil grouting program, Grouting equipment, Quality control & testing.

Text Books:

1. Ground Improvement Techniques, Dr. P. Purushottam Raj, 1st edn., Laxmi Publication, Delhi, 1999.
2. Reinforced Soil and its Engineering Applications, Swami Saran, 1st edn, I. K. International Pvt. Ltd., 2006.

Reference Books:

1. Practical Foundation Engineering Handbook, R. W. Brown, MC GrawHill, ISBN 0070081948, 1995
2. Geosynthetics – An Introduction, G. V. Rao, Sai Masters Geo environmental Services Pvt. Ltd., Hyderabad, 2006.
3. Principles of Foundation Engineering, B.M. Das, 5th edn, Thomson Asia Pte Ltd, 2004.

CE802 ELECTIVE-III

E) GIS & REMOTE SENSING

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

GIS

Geographical information Systems; Definition & Importance of GIS, Functions of GIS, The four M's of GIS, Components of GIS system, Data input & output: GIS Data Models- Raster & vector Data models, Data structures, Concepts & Basic characteristics of Vectorization, Topology Generation, attribute data attachment, editing and analysis

Data presentation, Database design & structure, Data analysis & cartographic modeling, Digital Elevation model

Hardware & Software image processing System. Characteristics of arc info,

GIS software packages

Linkage of GIS to remote sensing

REMOTE SENSING

Definition of Remote Sensing & applications of Remote Sensing: Idealized remote sensing system, Electromagnetic energy & spectrum, Physics of Remote Sensing, photogrammetry, types of photograph and geometry of photograph, Sensors & Scanners, Resolution of Sensors, Multispectral, thermal & Radar, Spectral Signatures

Remote sensing observation platforms- Terrestrial Airborne & Space borne platforms, sunsynchronous & Geostationary satellite Indian Remote Sensing Programs.

Remote Sensing Data Products & their Types: Analogue & Digital data Formats, errors. Geometric & radiometric Corrections.

Interpretation Techniques: Elements & methods Relief displacement and vertical exaggeration, determination & Calculation of elevation from Remote Sensing Data.

Digital Satellite data products and their characteristics, different methods of digital satellite data interpretation,

Digital Image Processing: Image Rectification & restoration, image enhancements, image classification.

Global & Indian Remote Sensing Satellite, Remote Sensing Techniques in Geosciences, Visual Interpretation of satellite images

Text Books:

1. Remote Sensing- Principles and applications, Sabbins,F.F., 2nd edn., Freeman Publication 1985.
2. Remote Sensing & GIS, Chandra, A.M. & Ghosh S.K, Narosa Pub. House, New Delhi, 2006

Reference Books:

1. Image Interpretation in Geology, S.A. Drury, Allen & Unwin Publication 1987.
2. Remote Sensing & Image Interpretation, T.M. Lillesand, & R.W.Kieffer, John Wiley Publication, 1987.
3. Concepts And Techniques of geographic Information Systems, C. P. Lo, Albert K.W. Yeung, Prentice Hall of India, 2002.
4. Remote Sensing Geology, Gupta, R.P., 5th edn., Springer Verlag Publication, 1990.

CE802 ELECTIVE-III
F) ENVIRONMENTAL POLLUTION AND SOLID WASTE
MANAGEMENT

Teaching Scheme : 03 L + 01 T Total = 04 Credits: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

General components of environment. Nature and scope of Environmental pollution, population growth, Degradation due to human activity, Episodes of environmental pollution

Water pollution : Sources , effects on water bodies, dissolved oxygen sag curve, pollution control measures.

Air pollution: Sources, effect on human body, control measures.

Land pollution :sources and effect on the environment, control measures.

Noise pollution. Their sources, effects, control measures, human tolerance limits

Legislation for Environmental pollution, Environmental Impact Assessment.

Problems and impacts of solid waste in developing countries, Sources, types and composition of Municipal solid waste, quantity estimation and forecast.

Characteristics of solid waste, Sampling, analysis, Composition of industrial solid waste. Hazardous and toxic waste, treatment and disposal methods

Collection of solid waste, onsite handling and processing, Transfer and transport

Text Books:

1. Introduction to Environmental Engineering and Science, Masters M. Gillbert, Prentice Hall of India Pvt. Ltd., New Delhi, 2005.
2. Solid Waste Management in Developing Countries, Bhide A.D and Sundaresan B.B; INSDOC, New Delhi, 1983.

Reference Books:

1. Solid Waste Engineering: Principles and Management Issues, G. Techbanoglous, Elliasen, Mc-Graw Hill Book Co., 1972.
2. Solid Waste Management, D. Joseph Hagerty, Joseph L. Pavoni & John E. Heer Jr., Van Norstrand Reinhold Environmental Engineering Science, 1973.
3. Handbook of Solid Waste Management, Frank Kreith, 2nd edn. Mc-Graw Hill Inc., 2002.
4. Management of solid waste in developing countries, Frank Flintoff, 2nd edn., WHO Publication, 1984.

CE 803 – ADVANCE STRUCTURAL DESIGN

Teaching Scheme : 03 L + 01 T

Total = 04

Credits: 04

Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE

Total Marks: 100

Duration of ESE: 3hrs.

Portal frames: Design of portal frames (symmetrical frame for symmetrical loading) up to two bays, two storied

Combined footing: Analysis & design of combined footing (rectangular & trapezoidal)

Slabs: Design of interior panel of flat slab by direct design method,

Retaining walls: Design of cantilever & counter fort retaining walls

Water tanks: Design of circular & rectangular water tanks resting on firm ground by working stress method.

Prestressed concrete: Introduction to prestressed concrete, Materials and their characteristic, type of prestressing, methods and various prestressing systems. Losses of prestress

Analysis and design of slab & beams: single span slab & beams of rectangular & flanged section for limit state of flexural strength, Design for diagonal tension, Shear strength of prestressed concrete beams, recommendations of I.S. code, Design of shear reinforcement.

Analysis and design of end blocks in post tensional members- primary and secondary distribution zones, Bursting and spalling tensions.

Text Books

1. Limit State Design of Reinforced Concrete, P.C. Varghese, 1st edition, Prentice – Hall of India Pvt. Ltd New Delhi, 2001
2. Prestressed Concrete, Krishan Raju, 4th edition, Tata McGraw Hill, New Delhi, 2006.

Reference Books

1. Illustrated Reinforced Concrete design, Dr. V. L. Shah & Dr. S. R. Karve, 2nd edition., Structures Publishers, Pune, 2004
2. Reinforced Concrete Design, S Unnikrishna Pillai & Devdas Menon, 2nd edition, Tata McGraw Hill, New Delhi, 2003.
3. BIS 456-2000, Plain & Reinforced Concrete, Code of Practice, BIS, New Delhi
4. BIS 875-1987(Part I-V), Code of Practice for Design loads for Buildings and Structures, BIS, New Delhi
5. Prestressed concrete structures, P. Dayaratnam., Oxford and IBH Publishing Company Private Ltd., New Delhi, 1991.

6. Design of Prestressed Concrete Structures, T.Y. Lin. and N.H. Burns, John Wiley and Sons, 1982.
7. BIS 1343-1980, Code of Practice for Prestressed Concrete (*First Revision*) BIS, New Delhi

CE 804 – TRANSPORTATION ENGG. – II

Teaching Scheme : 03 L + 00 T Total = 03 Credits: 03
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE: 2hrs.30 min.

RAILWAY: Different modes of Transportation, Railway transportation, Importance of Railway Transportation in Nation Development, Characteristics of Railway Transport, Classification of Railway, Surveying, Track standard terminology, track sections in embankment and cutting.

Permanent Way : Requirement, components of permanent way, gauges, coning of wheels, Rail types and functions, defects in rails, Rail failures, Creep of rails, Rail joints, welding of rails, Sleeper density, Rail fixtures and fastenings.

Traction and tractive resistance, Different types of traction, hauling capacity and tractive effort of locomotive.

Geometric Design of railway track: Importance of Geometric Design, Gradients, speed, Super-elevation, cant deficiency, Negative super elevation, Grade compensation, Curves,

Points and crossings: Left and right hand turnouts, Design calculations for turnouts, & crossovers, types of track junctions.

Stations and yards: Types, functions, facilities and equipment.

Railway signaling: Objects classification and types of signals.

AIRPORT : Development of air transportation in India Agencies controlling national and international aviation, various surveys to be conducted, airport site selection, drainage.

Airport obstructions: Zoning laws, imaginary surfaces, approach and turning zone.

Runway and Taxiway design: Orientation of runway, wind rose diagram, basic runway length and corrections, runway geometric design standards.

Airport layout, Terminal area, unit terminal concept, Apron, Apron layout, Aircraft parking, Hangers.

Environmental guidelines for Airport projects.

TUNNELS: Tunnel necessity, types, tunnel economics, tunnel alignment tunneling methods in soft soils and hard rock, size and shape of tunnels, tunnel lining, drainage, ventilation and lighting of tunnel.

BRIDGES: Components, classification and identification, data collection, site selection. Economic span, different structural forms – culverts, causeways, major and minor bridges, types of foundations, abutments piers and wing walls, bearing types and choices, Erection of bridge superstructure.

Repairs, maintenance, strengthening of bridge superstructure.

Text books:

1. A Text Book of Railway Engineering, S. C. Saxena & S. P. Arora, Dhanpat Rai Publications(P) Ltd., New Delhi, 2003.
2. A Text Book of Transportation Engineering, S. P. Chandola, S. Chand & Co. New Delhi, Reprint 2008.
3. Airport Planning & Design, Khanna S. K., Arora M. G. , Jain S. S. , 6th edition, Nemchand & Bros., Roorkee,1999
4. Tunnel Engineering, S. C. Saxena, Dhanpat Rai Publications(P) Ltd., New Delhi
5. Principles and Practices of Bridge Engineering, S. P. Bindra, Dhanpat Rai Publications(P) Ltd., New Delhi, 2001.

Reference books:

1. Railway Engineering, Satish Chandra and M.M. Agrawal, Oxford University Press, New Delhi, 2007.
2. Transportation Engineering and Planning, Costas P. and Prevedouros, 3rd edition, Prentice Hall, 2001.

CE 805 PROJECT AND SEMINAR

Teaching Scheme: 04 P Total = 04
Evaluation Scheme: Internal = 100; External = 100

Credit : 9
Total Marks: 200

1. Project work decided in previous semester will be continued.
2. Students should complete implementation of ideas given in synopsis, so that project work should be completed before end of semester.
3. Students shall submit the final project report in proper format which shall include the work of both semesters.

4. For uniform and continuous evaluation, evaluation committee for each group shall be formed by HOD in which guide must be a member. Internal marks should be awarded by committee at end of semester based on continuous evaluation.
5. Final examination of project shall include demonstration of working model, presentation of complete work and oral examination based on total project work. Project work shall be assessed by guide and one external examination.

CE806 ELECTIVE-II LAB

A) EARTHQUAKE RESISTANT DESIGN - LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

A report should consist of earthquake resistant design and detailing of different structural elements of G+1 reinforced concrete building.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report.

CE806 ELECTIVE-II LAB

B) ADV. STRUCTURAL ANALYSIS- LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

Study of any one structural analysis software SAP / STRUDS / STRAP etc. Modeling, Analysis and interpretation of results of following structural components using software (Minimum three)

1. Continuous beam for different support conditions
2. Single bay single storey portal frames for different loading conditions
3. Analysis of multistory frame for earthquake forces
4. Analysis of determinate plane trusses
5. Analysis of indeterminate plane trusses
6. Analysis of space truss
7. Analysis of space frame

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE806 ELECTIVE-II LAB

C) PAVEMENT DESIGN AND CONSTRUCTION- LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Design and drawing of highway/airfield pavement project
2. Design & drawing of rigid highway/airfield pavement project
3. Report of field visit to any highway/airfield pavement project under construction

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE806 ELECTIVE-II LAB

D) ADV. WASTEWATER TREATMENT-LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Design and drawing of municipal wastewater treatment plant
2. Design and drawing of effluent treatment plant of any one industry
3. Report of field visit to any municipal wastewater treatment/effluent treatment plant.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE806 ELECTIVE-II LAB

E) ADV. FOUNDATION ENGINEERING- LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum five experiments should be performed.

1. To determine the bearing capacity of footing on sloped ground.
2. To determine the bearing capacity of footing on multilayered soil
3. Design of piles subjected to lateral load.
4. Design of battered pile group under inclined load.
5. Design of raft foundation for a given data.
6. Design of Well foundation for a given data.
7. Field visit to foundation site

Lab Report:

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE806 ELECTIVE-II LAB

F) ADV. CONSTRUCTION MANAGEMENT TECHNIQUE- LAB

Teaching Scheme: 02 P	Total = 02	Credit : 1
Evaluation Scheme: Internal = 25; External = 25		Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Use of project management software's for
 - a. Project scheduling
 - b. Resource allocations
 - c. Project Budgeting
 - d. Resource leveling

2. Visit to mega construction project to study practical construction management aspects given below through interaction with construction industry leaders,
 - a. Site layout,
 - b. Materials management,
 - c. Cost control
 - d. Project uncertainties and risks identification

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE807 ELECTIVE-III LAB
A) ADV. HYDRAULIC STRUCTURES - LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum four experiments should be performed.

1. Design and drawing of Earth(or Rockfill) embankment from given data
2. Design and drawing of Gravity dam from given data.
3. Layout of various types of Buttress dam (or Arch dam) and section at middle.
4. Design and drawing of spillway and stilling basin.
5. Design and drawing of surge tank (any two types)
6. Design and drawing of head regulator for earth dams

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE807 ELECTIVE-III LAB
B) ADV. DESIGN OF STEEL STRUCTURE -LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. A Lab report & Structural drawings (using AutoCAD / manually) on at least two designs from following

1. Design of industrial building components like gantry girder, gantry column, & knee braces.
2. Design for transmission towers
3. Design of self supporting steel chimney and its foundation.
4. Design of through type truss bridge members including top, bottom and portal bracings.
5. Design of North light trusses and lattice girder

Field visits on Steel Structures / Industrial buildings/ Railway Station / Bridges & report of the visits.

Practical Examination:

Practical examination shall consist of oral examination based on Report & Structural drawings.

CE807 ELECTIVE-III LAB
C) FINITE ELEMENT METHODS-LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum four experiments should be performed.

1. Give suitable discretisation for finite element analysis of given examples
2. Develop shape functions for nine noded plane stress element.
3. Develop finite element formulation for an 8 noded plane stress element.
4. Develop flow chart for a computer program for analysing any continuum structure by FEM.
5. Generate input data for software for analysis of any continuum structure by stiffness method. Use both the type of code numbering.
6. Mathematical modeling using any one FEM based software.
7. Study element library available in different software.
8. Develop assembly subroutine of program for analysis of any continuum structure.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE807 ELECTIVE-III LAB
D) GROUND IMPROVEMENT TECHNOLOGY-LAB

Teaching Scheme: 02 P Total = 02 Credit : 1
Evaluation Scheme: Internal = 25; External = 25 Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum five experiments should be performed.

1. Evaluation of improvement in shear strength parameters of soil after stabilization
2. Design of foundation with geotextile reinforcement.
3. Design of pavement reinforced by geotextile.
4. Design of stone columns.
5. Design of Soil grouting program.
6. Design of Geotextile reinforced retaining wall.
7. Design of sand drains

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

**CE807 ELECTIVE-III LAB
E) GIS & REMOTE SENSING -LAB**

Teaching Scheme: 02 P	Total = 02	Credit : 1
Evaluation Scheme: Internal = 25; External = 25		Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise.

1. Interpretation of Imageries
 - a. Interpretation of structural features such as Faults, Folds, Joints, Fractures, etc.
 - b. Interpretation of Lithology such as Tone, Texture, Vegetation, etc.
 - c. Interpretation of suitable site for construction

2. Study of GIS software
 - a. Vector & Raster Methods
 - b. Interrelating the Toposheet & Imagery of the given region

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

**CE807 ELECTIVE-III LAB
F) ENVIRONMENTAL POLLUTION AND SOLID WASTE
MANAGEMENT -LAB**

Teaching Scheme: 02 P	Total = 02	Credit : 1
Evaluation Scheme: Internal = 25; External = 25		Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Minimum two designs should be performed.

1. Design problem on transportation of Solid waste.
2. Design problem on compost plant for treatment of municipal solid waste.
3. Design of incinerator.

A Field visit along with report on Pollution assessment of an operating industry.

A Report based on above shall be submitted by each student.

Practical Examination:

Practical examination shall consist of oral examination based on Report

CE 808 ADV. STRUCTURAL DESIGN -LAB

Teaching Scheme: 02 P Total = 02

Credit : 1

Evaluation Scheme: Internal = 25; External = 25

Total Marks: 50

It is a representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. A Lab report & Structural drawings (using AutoCAD / manually) on at least any two designs from Part A and any two designs from part B

PART A

1. Design of portal frames (symmetrical frame for symmetrical loading) up to two bays, two storied
2. Design of combined footing
3. Design of interior panel of flat slab by direct design method
4. Design of cantilever & counter fort retaining walls

PART B

1. Design of single span slab
2. Design of rectangular & flanged beam.
3. Design of end blocks in post tensional members
4. Design of rectangular water tanks resting on firm ground by WSM

Field visits on RCC structures / pre-stressed concrete structure for studying various aspects & submission of report

Practical Examination:

Practical examination shall consist of oral examination based on Lab Report & Structural drawings.