GOVT. COLLEGE OF ENGINEERING, AMRAVATI

B. TECH. (Civil Engineering)

CURRICULUM

Final year

Department of Civil Engineering

2013-14

CURRICULUM STRUCTURE OF B. TECH. CIVIL ENGINEERING - 2013

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI.

Department of Civil Engineering.

B. Tech. (Civil Engineering)

SEM III

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE	Total	Credits
SHU301	Engineering Mathematics-III	3	--	---	3	10	15	15	60	---	---	100	3
CEU301	Engineering Geology & Hydrology	3	---	---	3	10	15	15	60	---	---	100	3
CEU302	Fluid Mechanics	3	1	---	4	10	15	15	60	---	---	100	4
CEU303	Strength of Materials	3	1	---	4	10	15	15	60	---	---	100	4
CEU304	Building Construction & Materials	3	---	---	3	10	15	15	60	---	---	100	3
SHU305	General Proficiency II	1	---	2	3	---	---	---	---	25	25	50	2
CEU305	Engineering Geology & Hydrology Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU306	Fluid Mechanics Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU307	Strength of Materials Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU308	Building Construction & Materials Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		**16**	**2**	**10**	**28**	**50**	**75**	**75**	**300**	**125**	**125**	**750**	**23**

TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Contineous Accessment

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

SEM IV

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE	Total	Credits
CEU401	Engineering Economics & Humanities	3	--	---	3	10	15	15	60	---	---	100	3
CEU402	Transportation Engineering	3	1	---	4	10	15	15	60	---	---	100	4
CEU403	Surveying	3	1	---	4	10	15	15	60	---	---	100	4
CEU404	Concrete Technology	3	---	---	3	10	15	15	60	---	---	100	3
CEU405	Open Channel Flow & Hydraulic Machines	3	1	---	4	10	15	15	60	---	---	100	4
CEU406	Transportation Engineering Lab	---	---	2	2					25	25	50	1
CEU407	Surveying Lab	---	---	4	4	---	---	---	---	50	50	100	2
CEU408	Concrete Technology Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU409	Open Channel Flow & Hydraulic Machines Lab	---	---	2	2	---	---	---	---	25	25	50	1
Total		**15**	**3**	**10**	**28**	**50**	**75**	**75**	**300**	**125**	**125**	**750**	**23**

TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Contineous Accessment

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

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI.

Department of Civil Engineering.

Revised curriculum B. Tech. (Civil Engineering) - 2013

SEM V

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE	Total	Credits
CEU501	Theory of Structures	3	1	---	4	10	15	15	60	---	---	100	4
CEU502	Design of Steel Structures	3	1	---	4	10	15	15	60	---	---	100	4
CEU503	Building Design & Drawing	2	---	---	2	10	15	15	60	---	---	100	2
CEU504	Advanced Surveying	3	---	---	3	10	15	15	60	---	---	100	3
CEU505	Water Treatment Process & Technology	3	---	---	3	10	15	15	60	---	---	100	3
CEU506	Design of Steel Structures Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU507	Building Design & Drawing Lab	---	---	4	4	---	---	---	---	50	25	75	2
CEU508	Advanced Surveying Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU509	Water Treatment Process & Technology Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU510	Self Study-I	---	---	----	--	25	---	---	---	---	---	25	2
	Total	**14**	**2**	**10**	**26**	**75**	**75**	**75**	**300**	**125**	**100**	**750**	**23**

Note: The ESE duration for all theory cources shall be 2 hrs. 30 min. except course CEU502 and CEU503 for which the ESE duration will be 3 hrs.

Self study-I is based on one class test each, on the basis of 20% curriculum of the courses CEU501, CEU503, CEU504 and CEU505 to be declared by respective course coordinator at the beginng of the semester.

One faculty member shall be appointed as course coordinator for Self Study I and his/ her teaching work load shall be considered as one hr/week.

SEM VI

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							
						Theory				Practical			
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE	Total	Credits
CEU601	Design of Reinforced Concrete Structures	3	--	---	3	10	15	15	60	---	---	100	3
CEU602	Geotechnical Engineering	3	---	---	3	10	15	15	60	---	---	100	3
CEU603	Water Resources Engineering	3	---	---	3	10	15	15	60	---	---	100	3
CEU604	Construction Management	3	---	---	3	10	15	15	60	---	---	100	3
CEU605	Estimating & Costing	3	---	---	3	10	15	15	60	---	---	100	3
CEU606	Design of Reinforced Concrete Structures Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU607	Geotechnical Engineering Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU608	Water Resource Engineering Lab	---	---	2	2	---	---	---	---	25	-	25	1
CEU609	Estimating & Costing Lab	---	---	2	2	---	---	---	---	25	-	25	1
CEU610	Minor Project	----	----	2	2	---	----	---	----	25	25	50	2
CEU611	Self Study-II	---	---	----	--	25	---	---	---		---	25	2
CEU612	Industrial Lecture-I*	1	---	----	1	---	---	---	---	---	---	---	---
	Total	**16**	**0**	**10**	**26**	**75**	**75**	**75**	**300**	**125**	**75**	**725**	**23**

TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Contineous Accessment

Note: The ESE duration for all theory cources shall be 2 hrs. 30 min. except course CEU601 and CEU605 for which the ESE duration will be 3 hrs.

*** Credits shall be awarded on the basis of combined assesment of CEU612 and CEU710.**

Self study-II is based on one class test each, on the basis of 20% curriculum of the courses CEU601, and CEU602, CEU603, CEU604 to be declared by respective course coordinator at the beginng of the semester.

One faculty member shall be appointed as course coordinator for Self Study II and his/ her teaching work load shall be considered as one hr/week.

B. Tech. (Civil Engineering)

SEM VII

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical		Total	
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE		
CEU701	Advanced Theory of Structures	3	---	---	3	10	15	15	60	---	---	100	3
CEU702	Foundation Engineering	3	---	---	3	10	15	15	60	---	---	100	3
CEU703	Elective-I	3	---	---	3	10	15	15	60	---	---	100	3
CEU704	Interdisciplinary Elective	3	---	---	3	10	15	15	60	---	---	100	3
CEU705	Advanced Theory of Structures Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU706	Foundation Engineering Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU707	Application Software Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU708	Project-Phase-I	---	---	4	4	---	---	---	---	100	--	100	2
CEU709	Industrial Visit / Training	---	---	---	--	---	---	---	---	50	---	50	2
CEU710	Industrial Lecture-II*	1	---		1	---	---	---	---	25	---	25	1
CEU711	Self Study-III	---	---	---	--	25	---	---	---	---	---	25	2
CEU712	Seminar	---	---	---	---	---	---	---	---	25	---	25	1
Total		**13**	**0**	**10**	**23**	**40**	**60**	**60**	**240**	**275**	**75**	**750**	**23**

Note: The ESE duration for all theory courses shall be 2 hrs. 30 min. except course CE U701 for which the ESE duration will be 3 hrs.

Students of this department shall select any one Interdisciplinary Elective offered by other departments. Interdisciplinary Elective shown below will be offered to students of other department.

*** Credits shall be awarded on the basis of combined assessment of CEU612 and CEU710.**

Self study-III is based on one class test each, on the basis of 20% curriculum of the courses CEU701, CEU702 and CEU703 to be declared by respective course coordinator at the beginning of the semester.

One faculty member shall be appointed as course coordinator for Self Study III and his/ her teaching work load shall be considered as one hr/week.

SEM VIII													
		Teaching Scheme				Evaluation Scheme							
						Theory				Practical			
Course Code	Name of the Course	Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	ICA	ESE	Total	Credits
CEU801	Advanced Structural Design	2			2	10	15	15	60			100	2
CEU802	Environmental Engineering	3	---	---	3	10	15	15	60	---	---	100	3
CEU803	Elective -II	3	---	---	3	10	15	15	60	---	---	100	3
CEU804	Elective -III	3	---	---	3	10	15	15	60	---	---	100	3
CEU805	Advanced Structural Design Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU806	Environmental Engineering Lab	---	---	2	2	---	---	---	---	25	25	50	1
CEU807	Elective -II Lab	---	---	2	2	---	---	---	---	25	---	25	1
CEU808	Elective -III Lab	---	---	2	2	---	---	---	---	25	---	25	1
CEU809	Project Phase II	---	---	6	6	---	---	---	---	75	100	175	6
CEU810	Self Study-IV	---	---	---	--	25	---	---	---	---	----	25	2
Total		**11**	**0**	**14**	**25**	**65**	**60**	**60**	**240**	**175**	**150**	**750**	**23**

TA :Teacher Assessment CT: Class Tests ESE: End Semester Examination ICA : Internal Continuous Assessment

Note: The ESE duration for all theory courses shall be 2 hrs. 30 min. except course CE U801 for which the ESE duration will be 3 hrs.

Self study-IV is based on one class test each, on the basis of 20% curriculum of the courses CEU801, CEU802 CEU803 and CEU804 to be declared by respective course coordinator at the beginning of the semester.

One faculty member shall be appointed as course coordinator for Self Study IV and his/ her teaching work load shall be considered as one hr/week.

Electives

CEU703 Elective-I	CEU704 Interdisciplinary Elective	CEU803 Elective-II	CEU804 Elective-III
A) Advanced Structural Analysis		A) Structural Dynamics	A) Hydraulic Structures
B) Advanced Soil Mechanics	A) Industrial Building Planning & Design	B) Earthquake Resistant Design	B) Advanced Design of Steel Structure
C) Matrix Analysis of Structures	B) Interior Designs AND Drawing	C) Pavement Design & Construction	C) Finite Element Method
D) Environmental Pollution Control	C) Project Management	D) Advanced Wastewater Treatment	D) Ground Improvement Technology

E) Railways, Tunnels & Airport Engineering	D) Systems Engineering	E) Advanced Foundation Engineering	E) Remote Sensing & GIS
F) Advanced Fluid Mechanics		F) Advanced Construction Management	F) Advanced Water Treatment Process & Technology

CEU701 ADVANCED THEORY OF STRUCTURES

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 : 3 hrs.

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.

Energy Methods: Castigliano's theorems, minimum potential energy theorem, Betti-Maxwell's reciprocal theorem, principle of least work. Analysis of redundant trusses (up to second degree of redundancy).

Matrix Methods: Flexibility method and stiffness matrix method, static and kinematic redundancy, application to continuous beams and frames (maximum two degree of redundancy)

Introduction Finite Element Method: Basic concept, comparison between FEM and stiffness method, application of FEM for analysis of bars and 2D trusses (Maximum 3 unknowns).

Text Books:

1. Basic Structural Analysis, Reddy C. S., 3nd Edition Tata – McGraw Hill, New Delhi, 2012.
2. Intermediate Structural Analysis, Wang, C. K., 1st Edition, International Edition, McGraw Hill Inc, 2010.

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.
4. Finite Element Analysis, P. Seshu, PHI Learning Pvt. Ltd, 2006.
5. Finite Element Analysis, Bhavikatti S.S., second edition, New Age International Publishers, 2010.

CEU702 FOUNDATION ENGINEERING

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 : 2 hrs. 30 min.

Soil Exploration: Planning, objectives and methods of exploration, soil boring, spacing and depth of boring, boring log, hand augers, wash boring, percussion drilling, rotary drilling, Type of samples and samplers, area ratio, inside and outside clearance, Field Tests and geophysical methods, Soil investigation report.

Bearing Capacity: Bearing capacity, its type, its criteria and factors, Different methods: Terzaghi's, Skemptons, Meyorhoff, BIS method, and methods based on plate load test results, SPT value, SCPT test results, Pressuremeter test, Effect of water table on bearing capacity, bearing capacity of different soils, contact pressure distribution diagram below the base of footing.

Settlement: immediate, primary and secondary settlement, concept of differential settlement, factors and causes for differential settlement, codal provision for total as well as differential settlement, Settlement calculations for single footing, combined footing, raft foundation etc, proportioning of footing for uniform settlement.

Pile Fundation: Classification, Criteria for spacing and depth of piles. static analysis, determination of pile capacity for driven and bored pile in sand and in clay, dynamic pile formula, Negative skin friction, factor affecting it, piles in groups and their capacity, group efficiency, factors affecting group efficiency, behaviour of group of pile in sandy and in clayey solids, pile load test, Pile subjected to lateral loads, IS design criterion for under-reamed pile in clay and sands, Total and differential settlement related to single pile and group of piles in sandy and in clays soils.

Slope Stability: Stability analysis of infinite and finite slope of soil; Taylor's stability number, Swedish circle method, Friction circle method, Bishop Method, Concept of effective stress analysis.

Earth Pressure: Earth Pressure, its type, Stages of plastic equilibrium, Rankin's and Coulombs theory of active and passive earth pressure on retaining wall, influence of surcharge, water table, wall friction, Rebhann and Culmanns simple graphical methods

Retaining Structures: Different types of retaining structures, stability analysis of rigid walls, bracing system for underground construction

Ground Improvement: Introduction to techniques for Ground Improvement such as soil stabilization, reinforced soil, deep compaction, stone column, and preloading.

Text Books:

1. Geotechnical Engineering, Venkatramaiah C., 3rd Edition New Age International (P) Ltd., Publishers, New Delhi, 2006.
2. Textbook of Soil Mechanics and Foundation Engineering, Murthy V. N. S., CBS Publishers & Distributors Pvt. Ltd. India, 2008 .

Reference Books:

1. Soil Mechanics and Foundations, Muniram Budhu, 2nd Edition, John Wiley & Sons Publishers, 2007.
2. Geotechnical Engineering, Gulhati S. K. and Datta M., 1st Edition, Tata McGraw Hill Publishing Company, New Delhi, 2005.
3. Foundation Analysis and Design, Bowles J.E., 5th Edition, McGraw Hill International, 1996.
4. Foundation Design & Construction, Tomlinson, M. J., 7th Edition, Addison-Wesley Longman Ltd, 2001.
5. Design Aids in Soil Mechanics and Foundation Engineering, Kaniraj, R, 1st edition, Tata McGraw Hill, New Delhi, 2004.
6. SP: 36 (Part 2), Compendium of Indian Standards on Soil Engineering, Part 2, BIS New Delhi, 2001.
7. http://www.nptel.iitm.ac.in

CEU703 ELECTIVE-I
(A) ADVANCED STRUCTURAL ANALYSIS

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 : 2 hrs. 30 min.

Approximate analysis for gravity loads of multi-bay multi-storey frames bases on assumption for point of contraflexure, Approximate analysis for lateral loads of multi-bay multi-storey Frames by- Cantilever method, Portal method & Factor method.

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

Minimum potential principal, Rayleigh & Rayligh-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 problems.

Bending of asymmetrical section, shear centre for thin walled beam section symmetrical about one axis.
Analysis of beams curved 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.
5. Structural Analysis, Jangid R.S. and Negi, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.
6. Structural Analysis, Aslam Kassimali, Amit Prashant publisher, 2000.

CEU703 ELECTIVE – I
(B) ADVANCED SOIL MECHANICS

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 : 2 hrs. 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. Textbook of Soil Mechanics and Foundation Engineering, Murthy V. N. S., CBS Publishers & Distributors Pvt. Ltd. India, 2008 .
2. Principles of Foundation Engineering, B.M. Das, 5th Edition, Thomson Asia Pvt. Ltd, 2004.

Reference Books:

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

3. Soil Mechanics and Foundations, Muniram Budhu, 2nd Edition, John Wiley & Sons Publishers, 2007

CEU703 ELECTIVE-I
(C) MATRIX ANALYSIS OF STRUCTURES

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 : 2 hrs. 30 min.

Introduction: Introduction to matrix methods and its comparison with other methods.

Flexibility Method: Static redundancy, flexibility coefficients, basic determinate, released structure, geometric compatibility conditions, matrix formulation, application to beams, 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 beams, 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

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. Analysis of framed structures: James M. Gere and William Weaver Jr., D Van Nostrand Company Inc., Affiliated East West Press Pvt. Ltd., 1965

Reference Books:

1. Matrix, Finite Element, Computer and Structural Analysis: M. Mukhopadhyay, Third Edition, Oxford & IBH publishing Co. Pvt. Ltd. 1993
2. Structural Analysis- A Matrix Approach: G. S. Pandit and S. P. Gupta, Tata McGrow Hill Publishing Company Limited, New Delhi, 1986

CEU703 ELECTIVE I
(D) ENVIRONMENTAL POLLUTION CONTROL

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 : 2 hrs. 30 min.

Introduction: General components of environment, Nature and scope of environmental pollution, Population growth, Degradation due to human activities, Episodes of environmental pollution.

Water Pollution: Sources, Effects on water bodies, Dissolved oxygen sag curve, Problems on DO sag curve, Pollution control measures.

Air Pollution: Sources, Effect on man, animal, material, and plants; Control measures, Air quality standards, Air pollution indices, Problems on indices

Land Pollution: Sources and effect on the environment, Control measures, Effect of Industrial waste, Leachate generation and control.

Noise Pollution: Sources, Measurement, Problems on computation of noise, Effects, Control measures, human tolerance limits

Solid Waste: 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; E-waste: Sources, effects and control measures; Biomedical wastes: Collection, Transport, Treatment and Disposal methods.

Hazardous and Toxic wastes: Collection of solid waste, Onsite handling and processing, Transfer and transport, Treatment and Disposal methods.

Legislation: Legislations for environmental pollution, Environmental impact assessment.

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. Environmental Impact assessment, Canter, Tata McGraw Hill Publishing Company Limited, New Delhi, 1989
2. Solid Waste Engineering: Principles and Management Issues, G. Techbanoglous, Elliasen, Mc-Graw Hill Book Co., 1972
3. Solid Waste Management, D. Joseph Hagerty, Joseph L. Pavoni and John E. Heer Jr., Van Norstrand Reinhold Environmental Engineering Science, 1973

4. Handbook of Solid Waste Management, Frank Kreith, 2nd Edition, Mc-Graw Hill Inc., 2002
5. Management of Solid Waste in Developing Countries, Frank Flintoff, 2nd Edition, WHO Publication, 1984
6. Air Pollution, Rao, M. N., and Rao, H. V. N., Tata McGraw Hill Publishing Company Limited, New Delhi, 2005
7. Environmental Engineering, Volume II, S. K. Garg, Khanna Publishers, New Delhi, 2001

CEU703 ELECTIVE I
(E) RAILWAY, TUNNELS AND AIRPORT ENGINEERING

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 : 2 hrs. 30 min.

Railway: Characteristics of Railway Transport, Classification of Railway, Track standard terminology, track sections in embankment and cutting, engineering survey
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 and sleeper density, Rail fixtures and fastenings.
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

Tunnels: Necessity, types, tunnel alignment, Size and shape of tunnels, Tunnel lining, drainage, ventilation & lighting of tunnels, Tunneling methods for soft ground and hard ground, method of mucking, drilling, blasting

Airport: Agencies controlling national and international aviation, various surveys to be conducted, airport site selection
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, drainage, introduction to pavement design
Airport layout, Terminal area, unit terminal concept, Apron, Apron layout, Aircraft parking, Hangers
Environmental guidelines for Airport projects

Text Books:

1. A Text Book of Railway Engineering, S. C. Saxena & S. P. Arora, Dhanpat Rai Publications(P) Ltd., New Delhi, 2003.
2. Airport Planning & Design, Khanna S. K., Arora M. G. , Jain S. S. , 6th edition, Nemchand & Bros., Roorkee,1999
3. Tunnel Engineering, S. C. Saxena, Dhanpat Rai Publications(P) Ltd., New Delhi

Reference Books:

1. Principles of Transportation Engineering, Chakroborty P. and Das A., 1st edition, Prentice Hall of India, 2009
2. Transportation Engineering Vol. I & II, V.N. Vazirani & S.P. Chandola, 7th edition , Khanna Publishers, New Delhi, 2003.
3. A Text Book of Transportation Engineering, S. P. Chandola, S. Chand & Co. New Delhi, Reprint 2008

CEU703 ELECTIVE I
(F) ADVANCED FLUID MECHANICS

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 : 2 hrs. 30 min.

Gradually Varied Flow in Channels
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.

Unsteady Flow in Pipes
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.

Water Hammer Analysis
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.
Introduction to water hammer pressure in branched pipe system, Various devices used for protection from water hammer pressures.

Surge Tanks
Open & closed surge tanks, 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
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 StudentEdition,1996
3. Fluid Mechanics; Narasimhan S.; Engineering Vol. II, Orient Longman Publication,1981.

CEU704 INTERDISCIPLINARY ELECTIVE
(A) INDUSTRIAL BUILDING PLANNING AND DESIGN

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 : 2 hrs. 30 min.

Building Components

Types of structures- Framed structure and load bearing structure
Walls-Load bearing and partition, Common thickness
Door- Types of door frames and shutters and their suitability for industry, common sizes of doors. Criteria for location of doors
Windows- Types of window frames and shutters and their suitability for industry, common sizes of windows. Criteria for location of windows
Beams & Columns & slabs -Common sizes and function
Staircase-Different technical terms, types, their suitability, commonly adopted dimensions, Design of staircase from given data
Flooring – IPS flooring, tile flooring, wooden flooring, special types flooring for industrial building
Trusses- Types of steel roof trusses and their suitability, types of bracing system
Roof coverings- Type and suitability, fixing details
Building materials – conventional and modern building materials used for construction

Building Services

Plumbing and sanitation - Layout of plumbing, symbols
Electrification & Lighting- Types of electric fitting and their suitability, Lighting, study of types of lighting, Direct & Indirect lighting, special types of lighting used for Industry Fire fighting services – Various appurtenances, criteria for location and installation
Thermal & acoustic insulation – Types, suitability

Planning & Design of Industrial Building

Working Drawings of building: Selection of scales, dimensioning in architectural drawing, Abbreviations & graphical symbols used in Civil Engineering Drawing as per IS:962, Layout of sheet for Civil Engineering drawing, Concept of line plan & working drawings of the building, Developing working drawings of the building from the given line plan. Details to be incorporated in the working drawings, Necessity and use of working drawing, Site plan, Block plan, Layout plan, Reading of given drawing

Elements of Industrial Building Planning & Design

Introduction, general principles of planning viz. aspect, prospect, roominess, grouping, circulation, ventilation, Climate and design consideration, Orientation of buildings, requirement of the owner, Common utilities such as parking, security, Influence of environment on design of industrial building in tune with community & site location, Eco friendly designing, Space - Organization of space in design, Character of good design, Planning for specific functions, Psychological space planning, Industrial safety, provision of emergency exit and its location, Planning for

industrial waste disposal and recycling, Solar Passive architecture, Concept of green building applicable to industry, Built environment.

Machine Foundation- Types, criteria for location, sizes

Building Rules And Bye-Laws: for industrial buildings, conversion of land to nonagricultural lands, layout for a industrial building project, Plot area, Built-up area, Floor space Index, Building line, Set back, side margins, height of building, Provisions as per NCB

Plan Sanctioning Authorities and Their Requirements-

Study of Typical Plans for Various Industries

TEXT BOOKS:

1. Building Construction, Sushil Kumar, 19th edition, Standard Publishers Distributors, New Delhi, 2008
2. Building Drawing, Shah M.G., Kale & Patki, Tata McGraw Hills Publishing Co., New Delhi

REFERENCE BOOKS:

1. IS: 962-1989, Code of practice for architectural and building drawings, BIS New Delhi

CEU704 INTERDISCIPLINARY ELECTIVE
(B) INTERIOR DESIGNS AND DRAWING

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 : 2 hrs. 30 min.

Building Components
Walls-Load bearing and partition, Common thickness
Door- Types of door frames, components of frame, types of shutters and their suitability, common sizes of doors. Criteria for location of doors
Windows- Types of frames, components of frame, types of shutters, types of indows, suitability, common sizes, Criteria for location of windows.
Beams-Common sizes and function
Columns- Common sizes and functions
Roof-Slabs, Common thickness
Staircase-Different technical terms, types, their suitability, commonly adopted dimensions, Design of staircase from given data
Lintels & Arches-Types

Building Services
Plumbing and sanitation - Layout of plumbing, symbols
Electrification & Lighting- Types of electric fitting and their suitability.
Thermal & acoustic insulation- Types and their suitability

Building Materials
Wood-commercial wood, types- veneers, plywood, batten board, particle board, block board, laminates, their purpose and suitability, commonly used sizes
Bricks- Commonly used sizes
Decorative building Stone- Marble, Granite, Kadappa, types and their suitability, cladding
Metals –Aluminum sections, RS sections, commonly adopted sizes
Fixtures and fastenings of doors and windows - handles, bolts, Hinges-Types and suitability
Sanitary fittings-Wash basin, W.C. pan, bath tubs, taps
Flooring tiles- cement tiles, mosaic tiles, ceramic tiles, verified tiles, glazed tiles, chequrred tiles, paving blocks
Roofing sheets - A. C. sheets, G.I. sheets, Fiber sheets
Pipes – Types – P.V.C. G.I. S.W., commonly adopted sizes, pipe appurtenances

Interior Designs: Character of good design - Values of design, Influence of environment on design in tune with community & site location, Eco friendly designing, Creative problem solving, styles & taste
Functional Planning of Interior Spaces - Planning for specific functions, Planning for coordination & circulation, Psychological space planning

Elements of Interior Design:

Form, texture, hard, medium, soft & importance of texture in design
Light- Importance of light as an art element & effect of light color & texture.
Space - Organization of space in design.
Color- Importance of color as an art element
Color theory- Lightness & Darkness, intensity, Brightness &, dullness warm & cool color, paint & their properties- how to apply, textures & patterns

Principles of Design:

Balance its definition, types, formal & informal balance.
Harmony definition, aspect of harmony, line, shape size, texture, color, idea
Rhythm - definition, methods of obtaining rhythm repetition of shapes, progression of size, continuous line movements
Emphasis – definition, how to emphasis grouping of objects, using contrasting color, using decoration, having sufficient plain background, using unusual lines, shapes & size

Anthropometric data- Standard dimensions of human body in different postures
Standard dimension of furniture

Interior Construction, Elements & Materials:

Interior Materials:

Floor covering carpets, types & fixing of carpets
Finishes- Walls & Furniture finishing likes paint, wallpaper paneling & cladding
Furnishing materials - cloth, Rexene, leather, etc. curtains,
Plastics - Study of types of plastics, casting, molding process, use in interiors

Elements:

Furniture - Movable furniture like chairs, tables, fixed furniture like wall units, wardrobe, kitchen platform, partitions, Upholstered furniture like sofa sets, chairs etc.
Lighting, study of types of lighting, Direct & Indirect lighting, study of different wiring systems & their suitability

Construction:

Partition – wooden partition, aluminum partitions, sound proofing partitions
False ceiling, different types of false ceiling systems in different materials

TEXT BOOKS:

1. Civil Engineering Materials, Duggal A. K., TMH Publication.
2. Building Drawing, Shah M.G., Kale & Patki, Tata McGraw Hills Publishing Co., New Delhi

REFERENCE BOOKS:

1. Building Materials , P.C. Verghese, Prentice-Hall of India, New Delhi
2. Building Construction, Sushil Kumar, 19th edition, Standard Publishers Distributors, New Delhi, 2008
3. IS: 962-1989, Code of practice for architectural and building drawings, BIS New Delhi
4. AutoCAD Workbook for Architects, Shannon Kyles, Wiley-Blackwell, July 2008
5. Architectural Graphic Standards for Residential Construction: The Architect's and Builder's Guide to Design, Planning, and Construction Details, The American Institute of Architects, John Wiley & Sons, 2003.

CEU704 INTERDISCIPLINARY ELECTIVE
(C) PROJECT MANAGEMENT

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 : 2 hrs. 30 min.

Project Management: concepts' & key terms, evolution of integrated project management system, aligning projects with organization strategy, effective project portfolio management system, project life cycle, different forms of project contracting

Project Scope Management: defining project scope, creating work breakdown structure (WBS), project roll up, process break down structure, responsibility matrix.

Project Risk Management: contingency planning, risk identification, risk analysis, risk mitigation in a project.

Project Team Management: building high-performance project teams, managing virtual project teams, project control process, performance measurement and evaluation, project quality, planning, quality assurance, quality audit, project closure, and post completion audit.

Business Planning: From idea generation to preparation of detailed business plans, exercises in preparation of business plans with a case study of multidisciplinary project.

International Trade Policy: Overview of International Trade: introduction, development, operating factors, factors leading to growth in international trade and evaluation with a case study.

Text books:

1. Meredith J.R. and Mantel S.J. (2005) Project Management – a managerial approach, 6th edition, New Delhi, Wiley.
2. Chandra, Prasanna. (2009) Project Management- Planning, analysis, selection, implementation and Review, 7th edition, New Delhi, Tata McGraw Hill.

Reference books:

1. Slack, Nigel, Chambers, Stuart, Harland and Johnston, A.J. (2007) Operations Management, 2nd edition, USA, PITMAN
2. Stucken, L.C. (2005). The Implementation of Project Management: The Professional's Handbook, USA, Addison-Wesley.
3. Burke, R. (2004) Project Management – Planning & Control Techniques, 7th edition,New Delhi, Wiley.

CEU704 INTERDISCIPLINARY ELECTIVE
(D) INTRODUCTION TO SYSTEM ENGINEERING

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 : 2 hrs. 30 min.

System fundamentals: Systems Engineering Definitions and Terminology, Fundamental Tenets of Systems Engineering, Importance of Systems Engineering, Examples of systems requiring system engineering, the power of systems engineering, system engineering fields and approaches.

System elements: System engineering building blocks, interfaces, interactions, environment and hierarchy; system engineering through system life cycle, system engineering method. Life cycle stages: A case study

System needs analysis: Originating a new system, operation analysis, functional analysis, feasibility definition, trade-off analysis, review of probability, evaluation methods.

System life cycle: Total Life Cycle Considerations, Reliability, Maintainability, Usability/Human Factors, Safety, Producibility, Disposability.

System modeling : Systems modeling and simulation, System analysis, design evaluations using model and simulation, systems model development, systems simulation, and prototyping. Introduction to System Development Models. Development of mathematical model for a legacy engineering system.

System management: Project planning, proposal management, project metrics and reporting, risk management, quality management, security, and program reviews. Computer simulation of project

Text Books:

1. Systems Engineering and Analysis by Benjamin S. Blanchard & Wolter J. Fabrycky, 5th Edition, Wiley publication.
2. Systems Engineering Principles and Practice, by Alexander Korsikoff, 1st Ed, John Wiley & Sons (2008)

Reference Books:

1. System Engineering Management by Benjamin S. Blanchard.
2. Engineering Systems: Meeting Human Needs in a Complex Technological World, Daniel Roos, Christopher L. Magee , Olivier L. de de Weck.
3. The Engineering Design of Systems: Models and Methods by Dennis M. Buede

CEU705 ADVANCED THEORY OF STRUCTURES LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 + ESE 25 **Total Marks: 50**
Duration of ESE : 3 hrs.

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

Minimum five experiments from the following list should be performed.

1. To measure static strains using electrical resistance linear strain gauge.
2. To draw Influence line diagram for reactions of continuous beams
3. To draw Influence line diagram for moment at fixed support for propped cantilever beams.
4. Experimental verification of Forces and displacements in redundant trusses.
5. Experimental study of beam end rotations.
6. Verification of Maxwell Reciprocal Theorem.
7. Experimental study of beam deflections under different support conditions.
8. Experimental study of rectangular portal frame.
9. To find horizontal reaction for two hinged arch.
10. Analysis of following structure by any structural analysis software and compare results with different analytical method
    a) Continuous beams
    b) Portal frame
    c) Multistory Multibay frame
    d) Redundant truss
    e) Beams with overhangs A

Lab report for the laboratory experiments / problems should be submitted by each student.

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

ESE: The End Semester Practical examination shall consist of oral examination based on Report.

CEU706 FOUNDATION ENGINEERING LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 + ESE 25 **Total Marks: 50**
Duration of ESE : 3 hrs.

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

PART I-
Lab. Experiments: Any **SIX** laboratory / field experiments from the following:

1. Subsoil strata identification by conducting soil resistivity / seismic refraction method.
2. Soil characteristic by conducting standard penetration test / dynamic penetration test
3. Soil characteristic by conducting static cone penetration test.
4. Bearing capacity of soil from field tests
5. Determining allowable bearing capacity for shallow foundation.
6. Design of a pile group foundation.
7. Determination of earth pressure by graphical method.
8. Slope stability analysis by graphical method.
9. Stability analysis of retaining wall

PART II:
Field visit to any **one** of the following site
1. Foundation work site
2. Retaining wall / abutment construction
3. Ground improvement site and conduction of field test

PART III:
Solution to any **TWO** of the following problems using Geo5 / Plaxis 2D software
1. Determination of earth pressure.
2. Slope stability analysis.
3. Stability analysis of retaining wall
4. Determination of settlement of foundation
5. Design of pile foundation

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

ESE: The End Semester Practical examination shall consist of oral examination based on Report.

CEU707 APPLICATION SOFTWARE LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 + ESE 25 **Total Marks: 50**
Duration of ESE : 3 hrs.

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

The course focuses on the personal computer and software as an analysis/design tool used to solve routine engineering problems. Emphasis is on computer-assisted solutions to practical civil and structural engineering problems.

Group A:

Structural Engineering – Analysis and design of any structure using one the software listed below or otherwise

i) STAAD Pro
ii) STRUDS,
iii) SAP-2000
iv) ETABS
v) ANSYS

Group B:

Civil Engineering – Solution of problems in any TWO **different areas using software** listed below or otherwise

i) Geotechnical Engineering : GEO5, PLAXIS 2D, OYASYS Slope - 2D slope stability analysis, OYASYS - Pdisp-3D settlements and stresses, OYASYS - Xdisp- 3D Tunnel settlements and building damage assessment, MIDAS GTS
ii) Estimating and Surveying- QE-Pro,
iii) AutoCivil
iv) Project Management Software: Mircosoft Project 2010, PRIMA VERA, Contractor 6.1. PRISM, SURETRACK
v) Transportation Engineering: Road Master
vi) Remote Sensing & GIS: ArcGIS, GEOMATICA, ERDAS
vii) Environmental Engineering: Neuro Solution
viii) Hydraulic Engineering: LOOP, BRANCH, SEWER, WATER GEM, SEWER GEM & PIPE2012

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

ESE: The End Semester Practical examination shall consist of oral examination based on Report.

CEU708 PROJECT PHASE I

Teaching Scheme : 04 P Total = 04 **Credits: 02**
Evaluation Scheme : ICA 100 **Total Marks: 100**

1 In general, a group of 3-6 students should be allowed to complete the project on Approved topic.
2 Preferably more than 25 % projects shall be Industry / Research based / oriented.
3 Exhaustive survey of literature based on a clear definition of the scope and focus of the topic should be carried out by the students.
4 Students should finalize the topic for the project after literature survey in consultation with the Guide.
5 The **Synopsis/Abstract** on the selected topic should be submitted to the H.O.D. for approval.
6 On approval of the topic, students should initiate the topic based work.
7 Approximately more than 30% work (of the total quantum) should be completed by the end of VII semester.
8 At the end of semester, each batch should submit the progress report in following format:
Title
Introduction
Concept
Work completed
Work to be completed
References
9 For uniform and continuous evaluation, the Evaluation Committee comprising of the Guide, Project Course Coordinator and Expert appointed by the Program Head will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Oral examination shall be conducted by the panel of examiners.

CEU709 INDUSTRIAL VISIT / TRAINING

Teaching Scheme : 00 P Total = 00 **Credits: 02**
Evaluation Scheme : ICA 50 **Total Marks: 50**

Industrial Training shall have an option of Industrial Visit.

Industrial Training: List of renowned industries shall be prepared by the Departmental Coordinator of T & P Cell for the course. After approval from the Principal and with the consultation of Industry personnel, 02 weeks trainings shall be arranged during the vacations (after the VI semester). The students may be permitted to undergo the trainings of 02 weeks as per their choices for which all the official formalities will be completed by the students under the guidance of course coordinator. The students shall submit the report based on the Industrial training to the course coordinator which will be evaluated during the VII semester

Industrial Visit: An Industry Visits to minimum three industries shall be arranged for the students unable to complete the Industrial Training. The visit shall be arranged preferably during the vacation period. However in non-availability of permission for the visit during vacation period, same may be arranged during the regular VII semester. The students will be required to submit the report based on the Industrial Visit which will be evaluated by the course coordinator

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training/visits and knowledge / skill acquired. The technical report submitted by the students shall be assessed, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by the Program Head.

CEU710 – INDUSTRIAL LECTURE-II*

Teaching Scheme : 01 L + 00 T Total = 01 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

List of renowned persons from industry shall be prepared by the Departmental Coordinator of T & P Cell for the course. After approval from the Principal, Minimum twelve Industrial lectures shall be arranged, preferably once a week, which shall be delivered by the experts/Officials from Industries/Govt. organizations/ Private Sectors/Public Sectors covering the various aspects.

The assignments based on the Industry Lecture-I and Industry Lecture-II will be evaluated during VII semester

Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.

Students shall submit the report based on lectures.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the lectures and knowledge acquired. The technical report submitted by the students shall be assessed, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by the Program Head.

CEU711 – SELF STUDY - III

Teaching Scheme : 00 L + 00 T Total = 00 **Credits: 02**
Evaluation Scheme : TA 25 **Total Marks: 25**

Self study-III is based on one class test each, on the basis of 20% curriculum of the courses **CEU701, CEU702 and CEU703** to be declared by respective course coordinator at the beginning of the semester. These class tests should be conducted separately for each course and after CT2. The marks of all such class tests then shall be converted to out of 25. One faculty member shall be appointed as course coordinator for Self Study I and his/ her teaching work load shall be considered as one hr/week.

CEU712 – SEMINAR

Teaching Scheme : 00 L + 00 T Total = 00 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

1. Student shall select a topic for seminar which is **not covered in curriculum**.
2. Topics shall be registered within a month after beginning of VII Semester and shall be approved by the concerned guide and Program Head.
3. Students should know the functional and technical details of selected topic after carrying out the conceptual study.
4. Before the end of semester, student shall deliver a seminar and submit the seminar report in following format:
   Introduction
   Literature Survey
   Concept
   Functional and Technical Details
   Future scope
   Applications
   Comparison with similar topics / methods
   References
5. Student shall deliver a seminar based on submitted report. The presentation and oral examination on selected seminar topic shall be assessed by panel of examiners

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Seminar Topic and the knowledge acquired. The seminar shall be assessed by the examiner panel consisting of Project Guide, Course Coordinator Seminar and Expert appointed by Program Head.

CEU801 ADVANCED STRUCTURAL DESIGN

Teaching Scheme : 02 L + 0 T Total = 02 **Credits: 02**
Evaluation Scheme : 15 CT1 + 15 CT2 + 10 TA + 60 ESE **Total Marks: 100**
Duration of ESE : 3 hrs.

Part (I) RCC Design

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

Combined Footing: Analysis & design of combined rectangular footing.

Retaining Walls: Design of cantilever & counterfort retaining walls

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

Introduction to Flat Slabs

Part (II) Prestressed Concrete Design

Introduction to Prestressed Concrete: Basic concepts, Materials for prestressed concrete and their characteristics, Prestressing systems. Losses of prestress

Analysis and Design of Beams: Beams of rectangular section for limit state of flexural strength, Shear resistance of prestressed concrete members, recommendations of IS code, design for shear reinforcement.

Analysis and Design of End Blocks: End blocks in post tensional members - primary and secondary distribution zones, bursting tensions and splitting cracks.

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

CEU802 ENVIRONMENTAL ENGINEERING

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: 2 Hrs. 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, Population equivalent; Waste water characteristics, First order BOD equation, COD, Solids, Pollution due to domestic and industrial wastes, Effluent standards for disposal of wastewater on land, into streams, in sewers; Stream pollution, Self purification, DO sag curve, Streeter Phelps formulation, Fair's factor, Stream classification, 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, Sewer inlets, Inverted siphon, Over flow weirs, Sewer ventilation, Flushing tanks; Laying out of sewers: Boning rod and sight rail method, Maintenance of sewers; Layout generation; Sewage pumping: Necessity, Location, Sewage pumping station, Design of wet well

Design of Sewers: Hydraulic formulae: Manning's equation, Hazen-Williams equation, Darcy-Weisbach equation, Range of validity; 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, Design; Grit chamber: Function, Velocity control, Design; Oil and Grease tank; Primary settling tank: Surface over flow rate, Weir loading, Design problems; Secondary treatment, Trickling filters: Standard rate, High rate, Recirculation, Efficiency, Design of trickling filters; Activated sludge process: Process description, Loading rates, Modifications, MLSS, MLVSS, SVI, F/M, Mean cell residence time, Design of conventional ASP; Secondary clarifier; Sludge treatments: Anaerobic digestion, Effect of pH and temperature, Sludge disposal, Sludge drying beds

Low Cost Waste Treatments: Oxidation ponds, Facultative pond, Oxidation ditch, Aerated lagoon, Septic tank, Soak pits, Dispersion trenches, Problems on design of oxidation pond, oxidation ditch and septic tank

Air and Noise Pollution: Sources of air pollution: Primary, secondary and tertiary, Stationary and mobile sources, Effect of air pollution on man, material, and plants; Bhopal gas tragedy, Lapse rate, Dispersion, Control of air pollution: Settling chambers, Electrostatic precipitators, Cyclone separators, Scrubbers, Air quality standards, Problems on computation of air pollution index; Sources, Measurement, Decibel scale, Computation of noise, Effect, Control measures, tolerance levels

Solid Waste: Types, Sources, Composition, Collection systems, Frequency of collection, Setting up of dust bins, Biogas generation, Sanitary land fill, Composting, Incineration

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

Text Books:

1. Environmental Engineering, Volume II, S. K. Garg, Khanna Publishers, New Delhi, 2001
2. Wastewater Engineering, Metcalf and Eddy, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2003

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. Environmental Engineering, H. S. Peavy, D. R. Rowe and T. George, McGraw-Hill Book Company, New Delhi, 1985
4. Water and waste water technology, Hammer M. J., and Hammer M. J., Prentice-Hall of India Pvt. Ltd., New Delhi, 2000
5. Air Pollution, Rao, M. N., and Rao, H. V. N., Tata McGraw Hill Publishing Company Limited, New Delhi, 1989
6. Solid Waste Management in Developing Countries, Bhide A. D. and Sundaresan B. B., INSDOC, New Delhi, 1983
7. Environmental Impact assessment, Canter, Tata McGraw Hill Publishing Company Limited, New Delhi, 1989
8. Environmental Engineering, Gerard Kiely, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007
9. Environmental Engineering, A. P. Sincero and G. A. Sincero, Prentice-Hall of India Private Limited, New Delhi, 2004
10. Wastewater Engineering, B. C. Punmia, and A. K. Jain, Laxmi Publications (P) Ltd, New Delhi, 2005

CEU803 ELECTIVE-II
(A) STRUCTURAL DYNAMICS

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	**: 2 hrs. 30 min**	

Single Degree Freedom System, free vibrations, damped free vibrations, critical damping, and response, dynamic load factor
Single degree freedom systems' 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.

Introduction to Distributed Systems, GDE for beams subjected to free transverse vibrations, application to free vibration of simply supported beams

Introduction to Earthquake Engineering, Design philosophy, concept of earthquake resistant structures, measurement of earthquake, magnitude, intensity of earthquake, earthquake resistant architectural features

Textbooks:

1. Structural Dynamics Vibrations & Systems, Madhujit Mukhopadyay, Ane Books India, 2006
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 Ltd, 1990,
2. Structural Dynamics: Theory and Computation, Mario Paz, 2nd Edition, CBS Publishers, 1987
3. Dynamics of Structures, R.W. Clough and J. Penzian, 2nd edition, McGraw-Hill Inc, 1993
4. Dynamics of Structures, Anil K, Chopra, 2nd Edition, Pearson Education Asia, 2001

CEU803 ELECTIVE – II
(B) EARTHQUAKE RESISTANT DESIGN

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 : 2 hrs. 30 min

Causes of Earthquake: The Earth and its interior, Circulations, plate tectonics, faults, seismic waves, Strong ground motions, characteristics of strong ground motions.

Measurement of Earthquake: Magnitude, Intensity, Richter scale measurement of earthquake, other modern methods of earthquake measurement. Numerical Problems.

Earthquake Resistant Structures: Concept, Seismic zones in India, Seismic design philosophy for buildings. Earthquake Resistant Planning of structures: Guidelines for achieving efficient earthquake resistant building, I.S. selection of sites, importance of architectural features in earthquake resistant building, twisting of building, geotechnical design considerations.

Introduction to Indian Seismic Codes:
Introduction to IS 1893-2002, Structural response to earthquake, Seismic analysis of multistoried frames by equivalent static analysis method.
Introduction to IS 13920, design strategy, strength, ductility of reinforced concrete members

Reinforced Concrete Buildings: Seismic effects, resistance and ductile detailing in RC building elements: Beams, Columns, Beam-Column joints, footing, shear walls. (No mathematical treatment), seismic design considerations for open ground storey, short column effect. (No mathematical treatment)

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

CEU803 ELECTIVE – II
(C) PAVEMENT DESIGN AND CONSTRUCTION

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 : 2 hrs. 30 min

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

Design Parameters: Standard Axle load and wheel assemblies for road vehicles, Tire and contact pressure, contact area imprints, Computations of ESWL for flexible and rigid pavements. Load repetitions and distributions of traffic for highway

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, poison'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.

Flexible Pavement Design: North Dakota Cone, Group index, CBR, IRC-37, Brumister, Triaxial (Kansas), AASHO method of design.

Rigid Pavement Design: IRC-58, PA. C.A., AASHO method of design, Design of joints and reinforcement.

Pavement Construction: Equipments for excavation, grading and compaction of soil, equipment for bituminous and cement concrete pavement, construction methods and field control checks for various type of flexible pavement layers, methods of cement concrete pavement construction with construction of joints and quality control test.

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.

Text Books:

1 Traffic Engineering and Transportation Planning, Kadiyali L.R, 8th edition, Khanna Publication New Delhi, 2011.

2 Highway Engineering, Khanna S.K., and Justo C.E.G., Nem Chand Bros., Roorkee, 2004.

Reference Books:

1 Design and Performance of Road Pavement Croney & Croney; McGHraw Hill, 2002.
2. Principles of Pavement Design, Yoder & Witzace; Prentice Hall,2000
3. Pavement Analysis and Design, Y. H. Huang, 2nd edition, Pearson Prentice Hall, 2003.
4. Pavement Engineering - Principles and Practice, Mallick, R.B. and T. El-Korchi, CRC Press, Taylor and Francis Group, Florida, USA, 2009.
5. Pavement Design and Materials, Papagiannakis, A.T. and E.A. Masad, John Wiley and Sons, New Jersey, USA, 2008.

CEU803 ELECTIVE-II
(D) ADVANCED WASTE WATER TREATMENT

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 : 2 hrs. 30 min.

Introduction: Classification of wastewater treatment methods, Application of treatment methods, Advance waste water treatment methods, Selection of treatment - process flow diagrams, suitability of treatment system for typical waste, Principal types of reactors

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. Suspended and attached growth system, Introduction to suspended and fixed film reactors, Concept and design of activated sludge process and trickling filter. Design of secondary settling tank , Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors; Design of activated sludge process reactors, Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal

Anaerobic Treatment: Theory and Design of anaerobic treatment process. **Sludge Treatment** Thickening; Digestion; Dewatering; Sludge drying; Composting

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

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, flow diagram of treatment system to be adopted for typical industries

Text Books:

1. Wastewater Treatment, Disposal and Reuse; Metcalf and Eddy, 3rd Edition, 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

CEU803 ELECTIVE – II
(E) ADVANCED FOUNDATION ENGINEERING

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 : 2 hrs. 30 min.

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

Footings: Footings with eccentric loading & moments, combined footing

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 subgarde reaction and its determination, Effect of depth on subgarde reaction, criteria for rigid / Flexible raft, Raft analysis using modulus of subgarde 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, Geru & Manjara rock

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. Theory and Practice of Foundation Design, N. N. Som and S. C. Das, PHI Learning Pvt. Ltd., 2009.

Reference Books:

1. Soil Mechanics and Foundation Engineering, V.N.S. Murthy, CBS Publishers & Distributors, 1st edition, 2007.
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.
4. Foundation Design & Construction, M. J Tomlinson, 7th Edition, Addison-Wesley Longman Ltd, 2001.
5. Design of foundation System: Principles and Practices, N. P. Kurian, 3rd edition, Narosa Publishing House, 2005.
6. Foundation Engineering Handbook, R. W. Day, McGraw Hill, 2005.
7. Pile Foundation Analysis and Design, H. G. Poulus and E. H. Davis, John Wiley & Sons, 1980.

CEU803 ELECTIVE-II
(F) ADVANCED CONSTRUCTION MANAGEMENT TECHNIQUES

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 : 2 hrs. 30 min.

Project Management Trends: The Role of 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: Fundamentals of project financing and financing for infrastructure project, Project budgeting, Quality control and Quality Production-Economic law of returns governing construction development in housing, transport and infrastructure projects.

Project Economics: Technical / Financial / Economic / Ecological Analysis - flow diagram for feasibility study of a project, Construction economics, Comparison of project costs and trade off analysis, Economy of scale and size, Choosing between alternatives including levels of investments, Project profitability.

Construction Labour and Legislation: Need for legislation - Payment of wages Act - Factories Act – Contract labour (Regulation and abolition Act – Employees Provident Fund (EPF) Act, Construction accidents, safety and health.

Contract Management: Types of contract - contract documents - possible contractual obligations - meaning of specification - tender notice – types - tender documents - earnest money deposit (EMD) and security deposits (SD) - scrutiny and acceptance of a tender - contract agreement – contractual changes and termination of contract – subcontract - rights and duties of sub contractor.

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

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, PrenticeHall, ISBN: 0131114654, 2004
3 Practical Construction Management, R.H.B. Rans, Taylor & Francis Group 2nd Edition, ISBN: 0415362571, 2005
4 Boyd.C. & Paulson Jr, "Computer Applications in Construction ", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1995

Reference Books:

1 Cases in Construction Management, Slater W.J., Taylor & Francis Group, ISBN: 1850320322, 1988
2 Handbook of Heavy Construction, O'Brien, Havers & Stubb, McGraw Hill, 1996
3 Sengupta.B, & H.Guha. “Construction Management and Planning”, Tata McGraw Hill Publishing Company Ltd., New Delhi.

CEU804 ELECTIVE-III
(A) HYDRULIC STRUCTURES

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 : 2 hrs. 30 min.

Gravity Dams: Design, Analysis by various methods, Foundation treatment

Buttress Dams: Types, Economic spacing of buttresses, Design considerations

Arch Dams: Types, Methods of design, Thickness of arch and central angle by thin cylinder theory

Spillways: Flood routing through spillways, Design of ogee spillway and chute spillway

Energy Dissipaters: Types, Components, Influence of tail water rating curve on choice of energy Dissipater, Design of hydraulic jump type Basins

Canal Head Regulator: Design of canal head regulator

Canal Structures: Hydraulic design of aqueduct, siphon aqueduct, super passage and other canal structures

Principal Components of Hydropower Station: Intakes and Trash racks, Water conductor system, Tunnels, Surge tanks, Penstocks

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.

CEU804 ELECTIVE-III
(B) ADVANCED DESIGN OF STEEL STRUCTURE

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 : 2 hrs. 30 min.

Designs Using Limit State Method:

Design of plate girder (welded)

Design of Beam Column, concept, general behavior, nominal strength, interaction equations, beam columns subjected to tension & bending

Design of Industrial building: Design of trusses, rafters, purlin, eaves girder, bracings Gantry girder, gantry column

Analysis & Design of transmission towers

Introduction to earthquake resistant design of steel structures, design philosophy & methodology, seismic analysis methods, seismic behavior of steel structures, capacity design

Plastic & local buckling behavior of steel , plastic theory, shape factors , plastic section modulus, Plastic collapse load, condition of plastic analysis, methods of plastic analysis, plastic theorems ,plastic analysis of 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

CEU804 ELECTIVE-III
(C) FINITE ELEMENT METHOD

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 : 2 hrs. 30 min.

Introduction: Introduction to Finite Element Method, its application, and procedure. Continuum structures, reduction of infinite elements to finite elements, nodes, variational principle, minimum potential theorem, relation of FEM with Rayleigh-Ritz method and stiffness method.
Discretization, Convergence, Numerical integration

Coordinate Systems: Cartesian, polar, natural, area and volume coordinates, derivative transformations.

Interpolation: Lagrangian, Hermitian and Serendipity family shape functions.

Skeletal Structures: bar, beam elements (with multiple nodes), solutions of problems with FEM procedure.

2D Continuum Structures: Plane stress and plane strain analysis by constant strain triangle, rectangular element, development of element stiffness matrices, load vectors and solution.

3D Continuum Structures: Analysis by tetrahedron and parallelepiped elements, development of element stiffness matrices and load vectors.

Isoparametric Elements, CST, LST and QST, analysis of plane stress, plane strain and solid, development of element stiffness matrices, load vectors and solution.

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

Text Books:

1. Concepts and Applications of Finite Element Analysis: R. D. Cook, Forth Edition, John Wiley India &Sons, Inc, 2002.
2. Introduction to Finite Elements in Engineering, Chandragupta T. R. and Belegundu A. D., 3rd Edition, 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. Dewhirst, 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.

CEU804 ELECTIVE-III
(D) GROUND IMPROVEMENT TECHNOLOGY

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 : 2 hrs. 30 min.

Introduction - Different types of problematic soils, Ground Conditions – Hazardous, poor and favourable, Need and purpose of Ground Improvement, mechanisms used for insitu ground improvement

Soil Stabilization: Principle, purpose and applications, classification of methods Mechanical stabilization, Cement stabilization, Lime stabilization, Bituminous stabilization - Principle, factors affecting, proportioning the materials, Stabilization using industrial wastes, Construction techniques and applications, Construction methods, Field control,

Stabilization of Expansive Soils: Lime treatment for expansive soils, lime-columns, chemical analysis, construction, applications of lime column method, bearing capacity of lime column group

Insitu Densification of Sands- response of sands to externally applied stress, need and methods of Deep Compaction, Displacement piles, Sand compaction piles, Dynamic Compaction, Vibratory compaction by Vibroflotation, Blasting, vibratory probe and vibratory compactors.

Accelerated Pre-consolidation of Clays – Principle, Methodology, Types of Preloading, Types of vertical drains and their installation, design of vertical drains, pre-fabricated drains

Ground Improvement by drainage, Dewatering methods, vacuum consolidation, Electro-kinetic dewatering,

Stone Columns- Formation of stone column by vibro replacement process, rammed stone Columns, load carrying capacity, design of stone columns

Grouting Techniques - Grouting and its Applications, Types of grouts, desirable characteristics of grouts, commonly used grouts and their suitability

Permeation grouting- Applications, single stage grouting, descending and ascending stage grouting, sleeved pipe grouting, circuit grouting, Grouting plant and equipments, grout hole spacing.

Compaction grouting and its applications

Soil - fracture grouting and its applications.

In Situ Soil Treatment Methods: Soil nailing, rock anchoring, Pre-stressed anchors, micro-piles, design methods, construction techniques.

Bearing Capacity Improvement Using Geotextile Reinforcement- mechanisms, modes of failure of reinforced soil bed (BinQuet & Lee theory), model test results

Text Books:

1. Ground Improvement Techniques, Dr. P. Purushothama Raj, 1st edition, University Science Press
2. Geotechnical Engineering, S.K. Gulhati and M. Datta, 1st edition, Tata McGraw Publishing Company Limited, New Delhi.

Reference Books:

1. Reinforced Soil and its Engineering Applications, Swami Saran, 1st Edition, I. K. International Pvt. Ltd., 2006
2. Foundation Engineering Handbook, 2nd edition, Robert W. Day, McGraw Hill
3. Geosynthetics – An Introduction, G. V. Rao, Sai Masters Geoenvironmental Services Pvt. Ltd.
4. Engineering Treatment of Soils, Bell, F.G., Taylor and Francis, New York, 1993. Engineering Principles of Ground Modification, Manfred R. Haussmann, McGraw Hill Pub. Co., New York, 1990

CEU804 ELECTIVE-III
(E) REMOTE SENSING AND GIS

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 : 2 hrs. 30 min.

Remote Sensing

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

Elements of Remote Sensing System: Terrestrial Airborne & Space borne platforms, sunsynchronous & Geostationary satellites.

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

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

Applications: Integrated approach of RS & GIS application; Geotechnical investigations (soil studies, dam site studies), water resources management, environmental studies (EIA and Land Use Land cover studies), transportation planning, Urban Planning

Linkage of GIS to remote sensing

Text Books:

1. Remote Sensing- Principles and applications, Sabbins,F.F., 2nd Edition, 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 Edition, Springer Verlag Publication, 1990.

CEU 804 ELECTIVE III
(F) ADVANCED WATER TREATMENT PROCESS AND TECHNOLOGY

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 : 2 hrs. 30 min.

Water Treatment: Water quality standards, Variation in quantity of water, Design period, Requirement of water treatment facilities, Various unit operations and unit processes, Coordination of unit operations, Flow diagram of conventional WTP, Limitations of conventional treatment, Hydraulic considerations, Common attributes of water affected by conventional unit operation and processes,

Aeration: Objectives, Types, Factors governing design of aerator, Gas transfer, Rate of gas absorption and desorption, Problems on aeration and design of aerators

Rapid Mixing: Function, Types, Power requirement, Design of flash mixer

Slow Mixing: Flocculation, Objectives, Chemical coagulation, Concept of surface charge, Coagulating effects of electrolytes, Zeta potential, Coagulants and coagulant aids, Quantity of coagulants, Factors influencing coagulation, Perikinetic and orthokinetic flocculation, Mixing and stirring devices, Operation of flocculators, Design of flocuulators, Pebble bed flocculators

Sedimentation: Principle, General equation for settling of discrete particles, Hindred settling, Effect of Temperature, Efficiency of an ideal basin, Short-circuiting, Design and operation of settling tank, Design of Clariflocculator, Inlet and outlet arrangements, Sludge removal, Tube settler and plate settler, High rate solid contact clarifier, Floatation: Principle and working

Filtration: Objective, Theories, Rapid and slow sand filters, Operation, Backwashing, Negative head, Filter media, Grain size distribution, Preparation of filter sand, Hydraulics of filtration, hydraulics of fluidized beds, Type of filter, High rate, Constant rate, Decline rate, Up flow, Dual media, Pressure filters, Diatomaceous earth filter, Under drainage system, Design of slow and rapid sand filters, Design of under drainage system

Disinfection: Objectives, Requirements of disinfectant, Methods of disinfection, Chemical disinfection, Theory, Kinetics, Factors affecting disinfection, Chlorination: Free and combined chlorine, Residual chlorine, Effect of pH, Contact time, Types of compounds, Types of chlorination, Disinfection in rural water supply

Tertiary Treatments: Water softening: Lime soda process, Quantity of lime and soda, Split process, Zeolite process, Ion exchange; Effect of fluoride, Fluoridation and De-fluoridation, Methods of Iron and Manganese removal, Removal of taste and odour, Removal of dissolved solids, Desalination, Demineralization, Membrane

processes, Adsorption: Theory, Applications, Mass transfer zone, Adsorption capacities, Adsorption isotherms, Problems on adsorption

Text Books:

1. Environmental Engineering, H. S. Peavy, D. R. Rowe and T. George, McGraw-Hill Book Company, New Delhi, 1985
2. Water Supply and Waste Water Disposal, Fair G. M. and Geyer J. C., John Wiley and Sons, Inc., New York, 1968

Reference Books:

1. Manual on Water Supply and Treatment, Central Public Health and Environmental Engineering Organization, Government of India Publication, New Delhi, 1999
2. Water Treatment Processes, S. Vigneswaran and C. Visvanathan, CRC Press, Boca Raton, Florida, USA, 1995
3. Environmental Engineering, Gerard Kiely, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007
4. Environmental Engineering, A. P. Sincer and G. A. Sincero, Prentice-Hall of India Private Limited, New Delhi, 2004
5. Water and Waste Water Technology, Mark J. Hammer, 6^{th} edition, John Willy and Sons, 2007
6. Water Supply and Sewerage, E. W. Steel and McGhee, 6^{th} edition, McGraw Hill Company, 1991
7. Physico-Chemical Processes for Water Quality Control, Weber, John Wiley and Sons, 1972

CEU 805 ADVANCED STRUCTURAL DESIGN LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 + ESE 25 **Total Marks: 50**
Duration of ESE : 3 hrs.

It is a representative list of practical. 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 along with Site visit report of Part C.

PART (A) RCC Design

1. Design of portal frames (symmetrical frame for symmetrical loading) up to two bays, two storied
2. Design of combined rectangular footing
3. Design of rectangular water tanks resting on firm ground by WSM
4. Design of cantilever & counter fort retaining walls

PART (B) Prestressed Concrete Design

1. Design of Rectangular Beams for Flexure and Shear
2. Design of Pre tensioned rectangular Prestressed concrete beam.
3. Design of Post Tensioned rectangular Prestressed concrete Beam
4. Design of end blocks in post tensional members

PART (C) Field Visit

Field visits to any RCC structures / pre-stressed concrete structure for studying various aspects of Theory and Lab & submission of report.

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B

ESE: The End Semester Examination for Practical shall consists of oral examinations based on Theory and Lab Report, Structural Drawings, as above.

CEU 806 ENVIRONMENTAL ENGINEERING LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 + ESE 25 **Total Marks: 50**
Duration of ESE : 3 hrs.

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

Minimum five experiments should be performed from Part A, three design problems from Part B, and Part C is compulsory

Part A:

Analysis of waste water samples:

1. Determination of pH of wastewater sample
2. Determination of chloride content of wastewater sample
3. Determination of sulphate content of wastewater sample
4. Determination of DO content of water and wastewater sample
5. Determination of BOD of wastewater sample
6. Determination of COD of wastewater sample
7. Determination of total dissolved solids and suspended solids content of wastewater sample
8. Determination of volatile solids and fixed solids content of wastewater sample
9. Determination of oil and grease content of wastewater sample
10. Determination of SVI of wastewater sample from aeration tank
11. Determination of SPM of air sample

Part B:

Design problems:

1. Design of screen chamber
2. Design of grit chamber
3. Design of primary settling tank
4. Design of conventional ASP
5. Design of trickling filters
6. Design of sludge digestion tank
7. Design of sludge drying beds
8. Design of septic tank with soak pits

Part C:

Visit to STP/WWTP/CETP: Visit report shall be in brief consisting of layout of plant, necessity of units, design details such as: flow, size etc. along with cross-section of each unit

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B

ESE: The End Semester Examination for Practical shall consists of oral examinations based on the lab report

CE807 ELECTIVE-I LAB
(A) STUCTURAL DYNAMICS LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

Minimum five experiments from the following list should be performed.

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

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU807 ELECTIVE-II LAB
(B) EARTHQUAKE RESISTANT DESIGN - LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

The lab report shall consist of Part I and Part II as follows:

Part I

Earthquake resistant design and detailing of different structural elements of multistory reinforced concrete building

Part II

A visit to Earthquake measurement stations / Earthquake resistant construction sites

A Report based on Part I and Part II shall be submitted by each student.

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU807 ELECTIVE – II LAB
(C) PAVEMENT DESIGN AND CONSTRUCTION LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

PART I: Any **SEVEN** laboratory / field experiments from the following:

1. Determining CBR value for sub grade, sub-base and base material and designing the flexible pavement
2. Determining North Dakota cone bearing value and designing the flexible pavement
3. Determining modulus of sub grade by conducting plate load test
4. Bituminous mix design by Marshal method
5. Designing flexible pavement by IRC - 37.
6. Designing rigid pavement along with joints by IRC -58
7. Pavement evaluation by Bump integrators,
8. Pavement evaluation by Benkelman Beam,
9. Pavement evaluation by Falling weight deflectometer methods

PART II: Field visit to flexible pavement / rigid pavement construction site.

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU807 ELECTIVE-II LAB
(D) ADVANCED WASTEWATER TREATMENT-LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

PART I

1. Detailed design and drawing of municipal wastewater treatment plant for given data
2. Detailed design and drawing of effluent treatment plant of any one industry for given data

PART II

Field Visit to any municipal wastewater treatment/effluent treatment plant and writing Report of field visit.

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU807 ELECTIVE – II LAB
(E) ADVANCED FOUNDATION ENGINEERING LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

PART I: Any **SEVEN** laboratory / field experiments from the following:

1. Determination of the bearing capacity of footing on sloped ground.
2. Determination of 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 site.
6. Design of Well foundation for a given site.
7. Design of foundation on expansive soil
8. Design of foundation on collapsible soil
9. Design of anchors

PART II: Field visit to foundation construction site.

A Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU807 ELECTIVE – II LAB
(F) ADVANCED CONSTRUCTION MANAGEMENT LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content 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 Lab Report based on above experiments shall be submitted by each student

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808 ELECTIVE-III LAB
(A) HYDRAULIC STRUCTURES LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

Minimum four experiments from the following list shall be performed.

1. Design, analysis and drawings of Gravity dam from given data.
2. Design and drawing of spillway and stilling basin.
3. Design and drawing of surge tank (any two types)
4. Design and drawing of head regulator for earth dams
5. Drawings of siphon aqueduct

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808 ELECTIVE-III LAB
(B) ADVANCED DESIGN OF STEEL STRUCTURE LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

The lab report shall consist of Part I and Part II as follows:

Part I

A Lab report & Structural drawings (using AutoCAD / manually) oF at least two designs from following list of practicals.

1. Design of industrial building components like truss, rafters, purlin, eaves girder, bracings gantry girder, gantry column
2. Design plate girder
3. Design of Beam Column
4. Design of transmission towers
5. Earthquake resistant design of steel building

Part II

Field visits on Steel Structures / Industrial buildings/ / Bridges/ transmission towers & report of the visits.

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808 ELECTIVE-III LAB
(C) FINITE ELEMENT METHOD LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

Minimum eight experiments from the following list should be performed.

1. Discretise civil engineering structures for finite element analysis
2. Validate solution of numerical integration of any mathematical expression using one, two and three Gauss points with classical integration
3. Develop shape functions for nine noded plane stress element
4. Develop finite element formulation for an 8 noded plane stress element
5. Develop flow chart for a computer program for analysing any continuum structure by FEM.
6. Generate input data for software for analysis of any continuum structure by FEM.
7. Introduction of FEM software and solution of simple problems
8. Calculate [B] matrix at and Gauss point in an actual element
9. For any isoparametric element, find geometry of any point within actual element

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808 ELECTIVE-III LAB
(D) GROUND IMPROVEMENT TECHNOLOGY LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

List of practicals to be performed

1. Evaluation of improvement in strength of soil after cement stabilization
2. Evaluation of changes in plasticity characteristics of soil after lime stabilization
3. Design of sand drains / prefabricated drains
4. Design of stone columns
5. Design of soil nails
6. Design of anchors
7. Designing a grouting system to reduce seepage
8. Model plate load test on reinforced soil bed to determine BCR

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808 ELECTIVE-III LAB
(E) REMOTE SENSING AND GIS LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

1. Interpretation of Imageries

i) Interpretation of structural features such as Faults, Folds, Joints, Fractures, etc.
ii) Interpretation of Lithology such as Tone, Texture, Vegetation, etc.
iii) Interpretation of suitable site for construction

2. Study of GIS software

i) Vector & Raster Methods
ii) Interrelating the Toposheet & Imagery of the given region

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU808: ELECTIVE III LAB
(F) ADVANCED WATER TREATMENT PROCESS AND TECHNOLOGY LAB

Teaching Scheme : 02 P Total = 02 **Credits: 01**
Evaluation Scheme : ICA 25 **Total Marks: 25**

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

Minimum Five design problems from Part A, and Part B is compulsory.

Part A:

Problems on design of various individual treatment units:

1. Design of aeration
2. Design of flocculator
3. Design of sedimentation tank
4. Design of rapid sand filter
5. Design of under drainage system for filter
6. Computation of head loss through filter bed
7. Design of tube settler
8. Design of water softener
9. Calculation of quantity of lime and soda requirement for water softening

Part B:

Design of conventional water treatment plant for a given population along with hydraulic computations, layout plan, sectional elevation etc.

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

Note:

ICA: The Internal Continuous Assessment shall be based on practical record and knowledge / skill acquired. The performance shall be assessed experiment wise using continuous assessment formats A and B.

CEU809 PROJECT PHASE II

Teaching Scheme : 06 P Total = 06 **Credits: 06**
Evaluation Scheme : ICA 75 + ESE 100 **Total Marks: 175**
Duration of ESE : 3 hrs.

1. Project work decided in VII semester shall 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 as per guidelines given on the college website which shall include the work of both semesters.
4. For uniform and continuous evaluation, evaluation committee for each group shall be formed by Program Head in which guide must be a member. Internal marks should be awarded by committee at the end of semester based on continuous evaluation.
5. Final examination of project shall include demonstration, presentation of complete work and oral examination based on the project work.

Note:

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Oral examination shall be conducted on the Project report, by the panel of examiners consisting of Project Guide, Course Coordinator and Expert appointed by Program Head.

ESE: The End Semester Examination for Project shall consist of Demonstration if any, presentation and oral examinations based on the project report.

CEU810 – SELF STUDY IV

Teaching Scheme : 00 L + 00 T Total = 00 **Credits: 02**
Evaluation Scheme : 25 TA **Total Marks: 25**

Self study-IV is based on one class test each, on the basis of 20% curriculum of the courses **CEU801, CEU802, CEU803 and CEU804** to be declared by respective course coordinator at the beginning of the semester. These class tests should be conducted separately for each course and after CT2. The marks of all such class tests then shall be converted to out of 25. One faculty member shall be appointed as course coordinator for Self Study I and his/ her teaching work load shall be considered as one hr/week.