

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

Department of Civil Engineering

Proposed Curriculum Structure and Scheme of Evaluation for B.E. (Civil) programme

Sr. No	Course Code	Name of the Subjects	Scheme of Teaching (Hrs/week)				Scheme of Evaluation (Marks)					
			L	P	Total Hrs	Total Credits	Theory			Term Work	Pract. / Viva-voce	Total Marks
							Test	Assign.	ESE			
SEMESTER - I												
1	CE 401	Environmental Engineering-II	3	0	3	3	20	20	60	--	--	100
2	CE 402	Water Resources Engg.-II	4	0	4	4	20	20	60	--	--	100
3	AM 403	Design of RCC Struct.-II	4	0	4	4	20	20	60	--	--	100
4	CE 404	Foundation Engineering	3	0	3	3	20	20	60	--	--	100
5	CE 405	Professional Practice	4	0	4	4	20	20	60	--	--	100
6	CE 406	Lab- Environmental Engg.-II	0	2	2	1	---	----	----	25	25	50
7	CE 407	Lab- Water Resources Engg.-II	0	2	2	1	---	----	----	25	25	50
8	AM 408	Lab-Struct. Design & Drg-II (RCC)	0	4	4	2	---	----	----	25	50	75
9	CE 409	Lab- Professional Practice	0	4	4	2	---	----	----	25	50	75
A) Total of Semester - I			18	12	30	24	100	100	300	100	150	750
SEMESTER - II												
10	AM 410	Structural Mechanics	4	0	4	4	20	20	60	---	--	100
11	CE 411	Transportation Engg.-II	4	0	4	4	20	20	60	--	--	100
12	CE 412	Construction Management	4	0	4	4	20	20	60	---	--	100
13	Elective		3	0	3	3	20	20	60	--	--	100
	AM 413	Advanced RCC Structures										
	AM 414	Prestressed Concrete										
	CE 415	Industrial Waste Treatments										
	CE 416	Water Resources Systems and Management										
CE 417	Advanced Soil Engineering											
14	CE 418	Lab-Transportation Engg-II	0	2	2	1	---	----	----	25	25	50
15	CE 419	Lab-Construction Management	0	2	2	1	---	----	----	25	25	50
16	CE 420	Seminar	0	2	2	1	---	----	----	25	25	50
17	CE 421	Project	0	6	6	6	---	----	----	100	100	200
B) Total of Semester- II			15	12	27	24	80	80	240	175	175	750
Grand Total = A+ B			33	24	57	48	180	180	540	275	325	1500

(Note: **L:** Lecture, **P:** Practical, **ESE:** End Semester Examination)

Chairman,
Departmental Subject Board
Civil Engineering Programme

CE-401 Environmental Engineering-II

Teaching Scheme:

Lectures: 3 Hrs / Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Types of Sewage and Types of Sewerage systems, Estimation of Sewage Discharge, Variation in sewage flow, The Run off Process and Computing the Peak Drainage Discharge, Maximum and Minimum velocities to be generated in sewers, Hydraulic Characteristics of Circular Sewer sections and use of Nomograms

UNIT II:

Forces acting on Sewer Pipes, Sewer materials and Jointing, Laying of sewer pipes, Sewer Appurtenances, Decomposition of Sewage by aerobic and anaerobic processes, Characteristics of sewage and comparison of the same with other types of industrial wastewaters, effects of different parameters on environment

UNIT III:

Kinetics of BOD, Oxygen Sag Curve and self purification of streams, BIS standards for Discharge of sewage and Industrial wastewaters, Classification of Treatment Processes, Design concepts of Primary treatment units

UNIT IV:

Secondary treatment units-Activated Sludge Process, Trickling Filters, Stabilization Ponds, Septic Tanks, UASB Reactors, Anaerobic Filters, Tertiary Treatment Units, Flow Diagrams of Treatment units,

UNIT V:

Definition, Classification, Quantity and Composition of Refuse; Disposal of Refuse by various methods- Sanitary land filling, Burning or Incineration, Pulverization and Composting, Excreta Disposal in Non sewerred and Rural Areas; Functions and Types of Traps used in Sanitary Plumbing Systems, Systems of Plumbing

Reference Books:

- 1) Metcalf & Eddy, Wastewater Engineering Treatment and Reuse, Tata McGraw-Hill Publishing Company Limited, New Delhi
- 2) S.K.Garg, Sewage Disposal and Air Pollution Engineering, Khanna Publishers, New Delhi
- 3) G.S.Birdie & J.S.Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Company, New Delhi

CE 402: Water Resources Engineering – II

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Reservoir Planning and Gravity Dam

Reservoir types, classification of dam, investigation of site and selection, storage capacity estimation, fixing various control levels, Gravity Dam: forces acting, modes of failure, stability analysis, design of low and high gravity dams, galleries, joints, keys and water seals.

UNIT II:

Earth, Arch and Buttress Dam

Types of earth dam, components and their functions, causes of failure, design criteria, stability analysis, seepage and its control through earth dam and its foundation, drainage of earth dam, Arch and Buttress Dam: types and suitability, forces acting and design methods of arch dams, buttress dam and types of buttress dam

UNIT III:

Spillways and Canal

Types of spillways, construction features, design criteria, energy dissipation, spillway gates, canal: classification, factors influencing alignment, design of canal in non alluvial soils, Kennedy's and Lacey's silt theories

UNIT IV:

Canal Masonry Works

Types of cross drainage works, components and hydraulic design, design of transition. Canal falls: necessity, location, types, and design, energy dissipation, Head and cross regulators, construction features and hydraulic design, Modules: function, requirements, types and hydraulic design

UNIT V:

Diversion Weir Head Works, Dam outlets and intakes

Components of diversion weir head works, design criteria, Design of weir by Bligh and Khoslas theory, Dam outlets and intakes: types, construction features, and design principles

Reference Books:

1. Garg, S.K. "Irrigation engineering and hydraulic structures", Khanna Publishers, Delhi
2. Punmia, B.C. and Pande, B.B.L. "Irrigation and water power engineering", Laxmi Publications Pvt. Ltd, New Delhi
3. Modi, P.N. "Irrigation water resources and water power engineering", Standard Book House, Delhi
4. Wurbs, R.A. and James, W.P. "Water Resources Engineering", Prentice Hall of India Pvt. Ltd, New Delhi

AM 403: Design of RCC Structures-II

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Multistory Buildings

Structure: Structural systems, Stiffening elements, Regularity, Member stiffness; Loads: Dead, Live, Wind, Earthquake; Analysis & Design: Frames- Vertical loads, Lateral loads; Torsion in buildings; Monolithic joints; Foundations- Combined footings, Raft, Piles;

UNIT II:

Torsion in RCC Members

Typical failure modes; Torsional stiffness of homogeneous, RCC sections: Equivalent bending moment, shearing force; Provision of reinforcement;

UNIT III:

Circular slabs

Types: Simply supported slabs, Fully restraint slabs, Simply supported slabs with a concentric hole; Loads: Uniformly distributed loads, concentric loads, uniformly distributed loads inside a concentric circle, linearly varying distributed load; Analysis & Design: Examples

UNIT IV:

Retaining Walls

Types: Cantilever, Counter fort; Preliminary sizes; Loads: Forces acting on retaining walls; Stability requirements; Analysis & Design: Examples

UNIT V:

Prestressed Concrete

Basic concepts, properties of materials, classification and types of prestressing, prestressing systems, end anchorages, losses of prestress, analysis of beams for flexure, pressure line, kern distances, efficiency of section, Magnel's method, shear and diagonal tension, stresses at anchorage, IS: 1343-1980 recommendations, Limit state design procedure for flexure.

Reference Books:

1. Ashok K. Jain, Reinforced Concrete (Limit State Design), Nem Chand & Brothers, Roorkee, Latest Edition
2. P. C. Varghese, Advanced Reinforced Concrete Design, Prentice Hall, New Delhi,
3. S. Unnikrishna Pillai & Devdas Menon, Reinforced Concrete Design, Tata McGraw-Hill Publishing Company, New Delhi, Latest Edition
4. N. Krishna Raju, Advanced Reinforced Concrete Design, CBS Publishers New Delhi, B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Comprehensive Designs, Laxmi Publications (P) Ltd, New Delhi, Latest Edition
5. N. Krishna Raju, Prestressed Concrete, Tata McGraw Hill Publishing Company Ltd.,
6. Lin T.Y. and Burns N.H., Design of Prestressed Concrete Structures, John Wiley and Sons Inc., New York.
7. IS:456-2000, Plain and Reinforced Concrete-Code of Practice (Fourth Revision), Bureau of Indian Standards, New Delhi.
8. IS: 875-1987(Parts 1-5), Code of Practice for Design Loads (other than earthquake) for Buildings and Structures (Second Revision)
9. IS: 1343- 1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi.

CE 404: Foundation Engineering

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Site investigation and sub soil exploration, bearing capacity:

Open excavation, boring, subsurface sounding, and geophysical methods Theories of Terzaghi, Prandtl's, Meyer off for bearing capacity, Ultimate, net and safe bearing capacity, Local and general shear failure, Plate load test and its limitations, Standard penetration test Effect of water table and eccentricity of loading on bearing capacity

UNIT II:

Settlement analysis and Design of footing:

Causes and control of settlement, Immediate, consolidation and differential settlement, Design considerations and construction of different types of footings. Proportioning of footings.

UNIT III:

Pile foundation, Raft foundation:

Types of pile foundation, their use and function, negative skin friction Group action, number and spacing of piles, under rimmed pile foundation Design considerations and construction of different types of raft foundation

UNIT IV:

Cofferdam, Well and Caissons:

Types of sheet piles, Cofferdam uses and features. Types of well, component part, choice of particular type, sinking, tilting Types of caissons, safety problems, caisson disease

UNIT V:

Foundation on black cotton soil

Characteristics of black cotton soil, problems, foundation techniques, dewatering of foundation, foundation for towers and tanks

Reference books:

1. V.N.S.Murthy, "Soil mechanics and foundation engineering" Vol.1, Saikrupa Technical Consultants, Bangalore, Latest edition.
2. Punmia B. C. "Soil mechanics and foundation engineering "Laxmi Publications Pvt. Ltd., New Delhi, Latest edition.
3. J.E.Bowles, Foundation analysis and design, McGraw Hill International ed. New York
4. Wayne C. Teng, "Foundation Design" Prentice Hall of India, New Delhi
5. K.R. Arora, "Soil Mechanics and Foundation Engineering" Standard Publishers Distributors
6. Kasmalkar B. J. "Geotechnical Engineering", Pune Vidyarthi Griha Prakashana, Sadashiv Peth Pune-30, Latest edition.
7. Shashi K. Gulhati and Manoj Datta, "Geotechnical Engineering" Tata McGraw Hill Publication, Latest edition.
8. T.W. Lambe, Soil Testing for Engineers, John Wiley Publication

CE 405: Professional Practice

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Introduction of IS: 1200 for modes of measurement. Estimating: Definition, importance of quantity surveying for civil engineer, purpose, types of estimates, data required for estimates. Item of work, description of an item work, units of measurement and principles deciding the units, I.S. & PWD mode of measurements of building. Definition and purpose of approximate estimate, methods of approximate estimating of building and other projects e.g. roads, irrigation & water supply and sewerage schemes.

UNIT II:

Taking out Quantities Principles, methods of taking out quantities for different assignments mentioned in term work, Abstracting bill of quantities, provisional and prime cost items, contingencies, establishment charges.

UNIT III:

Analysis of Rates : Factors affecting cost an item of work materials, labour, tools, and plant, overheads and profit. Task work-definition and factors affecting task work Transportation of material and cost Schedule of materials and labour, schedule of rates (D.S.R). Analysis of rates of different items mentioned in T.W. Specifications : Definition and purpose, types, drafting specifications, legal aspect, specifications of stone masonry, wood work, earth work, reinforcing brick work of R.C.C. work.

UNIT IV:

Valuation of Property: Purpose, nature of value, price, factors affecting value of a property. Free hold and leasehold property. Depreciation and methods of working out depreciation, sinking fund, years purchase, out goings. Methods of valuation
Land and building basis, Rental basis, Reproduction and replacement cost basis, Profit basis, fixation of rent.

UNIT V:

Contracts and Tenders: Types of contracts, Law of contract, essentials of contract conditions. Liquidated damages defect liability period, retention money, termination of contract, payment, secure advance.

Tenders and tender Notice: Prequalification, Technical Bid/Price Bid, Opening of the tender. Tender, Types of tenders, tender notice, documents, methods of preparation and submission of tenders, scrutiny of tenders, acceptance of tenders, BOT Tender, general idea of global tenders. Administrative approval, technical sanction,

Text Books

1. Chakraborti M., .Estimating ,Costing and Specification in Civil Engineering,
2. Dutta B.N., Estimating and costing ,
3. Patil B.S., Civil Engineering Contracts and Estimates,

Reference Books

1. PWD Hand Book and Red Book
2. PWD District Schedule of Rates (DSR)

CE 406: Lab Environmental Engineering-II

Teaching scheme:

Practicals : 2 Hrs /Week

Examination scheme:

Term Work: 25 marks

Pract/Viva: 25 marks

Practical examination based on practical conducted

The practical examination shall consist of viva-vice based on following experiments and their applications.

The term work shall consist of a record of laboratory experiments as mentioned below and detail Design report of Sewage Treatment Plant for a medium sized township (above 1 lakh population)

List of Experiments:

1. Determination of BOD
2. Determination of COD
3. Determination of Suspended Solids
4. Determination of SVI
5. Determination of Trace Metal(s)

The term work shall also include following sketches

1. Flow Diagram of Sewage Treatment Plant
2. Screen Chamber, Grit Chamber, Proportionate Weir
3. Skimming Tank
4. Secondary Sedimentation Tank
5. Sludge Drying Bed
6. Septic Tank
7. UASB Reactor
8. One Pipe and Two Pipe System of Plumbing

CE 407: Lab-Water Resources Engineering – II

Teaching scheme:

Practicals : 2 Hrs /Week

Examination scheme:

Term Work: 25 marks

Pract/Viva: 25 marks

Term work shall be based on syllabus and following assignments (any six)

1. Channel routing: estimation of time of travel and peak flood for flood forecasting purpose in a channel for a given data
2. Single step / Multiple step method of design of dam
3. Slip circle analysis for earth dam
4. Analytical / Graphical method of locating phreatic line and trial sketching of flow nets for homogeneous sections
5. Design of spillway crest and ogee shape profile
6. Design of energy dissipater (any one)
7. Design of canal by using silt theories
8. Design of cross drainage work
9. Design of diversion weir head works
10. A report based on visit to any irrigation project during the academic term

AM 408: Lab - Structural Design and Drawing-II (RCC)

Teaching scheme:

Practicals : 4 Hrs /Week

Examination scheme:

Term Work: 25 marks

Pract/Viva: 50 marks

Term Work

The term work shall consist of the following,

A) Complete design and drawings of any one of the following,

- a) Independent Bungalow
- b) Multi Storey Building
- c) Industrial Building
- d) Sports Complex

The design report shall include detail calculations as per relevant standards. The drawings shall be submitted on at least two full imperial size sheets along with design report.

B) Computer Aided Design of any two of the following structural components,

- a) Two way slab with various edge conditions
- b) Two span continuous beam
- c) Column with bi-axial bending

Pract / Viva-Voce Examination:

The viva voce examination shall be conducted in the presence of External Examiner appointed by the Controller of Examination. The term work shall be assessed by the Course Coordinator / Subject Teacher.

CE 409: Lab-Professional Practice

Teaching scheme:

Practicals 04 Hrs /Week

Examination scheme:

Term Work:25 marks

Pract/Viva : 50 marks

- A) Working out Detailed Quantities for
- i) A two storied R.C.C. framed building based on prevailing DSR rates for Aurangabad District
 - ii) Estimation of quantities of steel reinforcement for an R.C.C. frame structure in (i) above
 - iii) Detailed Estimate of Residential Drainage and Water Supply Project
- B) Preparation of Estimate using Computer Software Detailed estimate of any two of the following
- a. One column, column footing, beam and slab panel.
 - b. Quantities of form work.
 - c. Pipe culvert and slab culvert.
 - d. Earthwork (for a road, Railway, Canal or a small dam)
 - e. One estimate of new construction materials
- C) Writing Detail specifications of any two items Work Form the items of works in (A) above
- D) Analysis of Rates For the two Items of Works in (A) above based on the prevailing market Rates of various items and labor involved.
- E) Valuation reports of a residential buildings using the format given in the O-1 form
- F) Preparation of draft of tender notice for the Work for which Detailed Estimate is Prepared.

Note :

A Laboratory Record based on the laboratory work would be submitted for the term-work. Oral Examination would be based on the term work and theory covered in the class under the subject CE (408) – Quantity Surveying and Valuation. Course Teacher for the Laboratory would decide the breakup of Oral Examination. An Objective Multiple Choice Test may be conducted as a part of the Oral.

AM 410: Structural Mechanics

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

UNIT I:

Theory of Elasticity and Plasticity:

Elasticity: Strain displacement relation, strain compatibility equations, Generalised Hooke's law, Plane stress and Plane strain conditions, stress compatibility and strain compatibility equations. Principal planes and principal stress in 3-D.

Plasticity: Introduction, Assumptions, Shape factor, plastic section modular, collapse mechanism, fundamentals theorems of plastic analysis, plastic analysis methods, plastic analysis of steel beams, steel frames, plastic design of steel beams and frames

UNIT II:

Matrix Methods of Analysis

Introduction to Flexibility and Stiffness Matrix methods, Applications to beams and portal frames up to 3 degree of indeterminacy.

UNIT III:

Plates and Shells:

Laterally loaded plates with small deflection theory, Cylindrical bending of thin rectangular plates, Kirchhoff's thin plate theory, Governing differential equation, Membrane Theory of thin cylindrical shells

UNIT IV:

Introduction to Rayleigh-Ritz and Finite Element Method

Rayleigh-Ritz Method: Potential energy theorem, application to axially loaded members and beam bending problems,

FEM: General Principles, Principle of virtual work, displacement function, discretisation of continuum, Pascal's triangle, selection of displacement function, convergence requirement, shape functions, basic elements, one dimensional line elements, beam element and truss element.

UNIT V:

Introduction to Structural Dynamics

Single degree freedom system, undamped systems, damped system, dynamic load factor, sinusoidal dynamic loading, typical impulsive support motion, earthquake response of linear systems.

Reference Books:

1. Sadhu Singh, "Theory of Elasticity", Khanna Publication, Delhi
2. J.M. Gere & W. Weaver Jr. "Analysis of Framed Structures", CBS Publication, Delhi
3. N.C. Sinha and P.K. Gayen "Advance Theory of Structure"
4. Timoshenko S.P. and Krieger S.W., "Theory of Plates and Shells", McGraw Hill, USA
5. G.S. Ramaswamy "Design and construction of Concrete shell Roofs", Tata McGraw Hill, Delhi
6. B.K. Chatterji "Theory of Design of Concrete Shells"
7. V.K. Manicka Selvam "Rudiments of finite Element" Dhanpat Rai & Sons, New Delhi
8. Mario Paz, "Structural Dynamics: Theory and Computation, CBS publication, New Delhi
9. H. M. Somayya, "Theory of Structures-II" Nirali Prakashan, Pune

CE 411: Transportation Engineering –II

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination Scheme:

Class Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Rural Road Technology, PMGSY Programs, Alignment ,construction ,Geometric design of Rural Roads, SP 20-2002 and SP 72- 2007 Guidelines, Design of C/D works

Highway Planning &Financing: Historical developments, classification of Roads, preparation of master plan, highway user benefit, private sector participation, Indian Road Congress

Unit II:

Highway Alignment and Geometric Design: Highway Alignment, cross section, formation width, Land width, design of vertical and horizontal alignment including curves, super elevation, sight distance, gradients, alignment and geometrics of hill Roads

Traffic Characteristics, Operations, Design of Intersections, Design of Parking Facility, Highway Lighting, Traffic Planning and Administration

Unit III:

Highway Material Soil and its characteristics, CBR Test, Plate Bearing Test, Aggregates and its tests, bituminous material and its test mix design of bituminous material, concrete mix and its properties,

Unit IV:

Design of flexible and rigid pavement, design factors, different methods, IRC 37-2001, IRC58-2002, Slab thickness for pavement, Longitudinal and Transverse joints, Causes of pavement failures, flexible and rigid pavement failures, special repairs in flexible pavements

Unit V:

Pavement construction and construction machinery: Construction of earth Roads, Stabilized soil roads, water bound macadam roads, wet mix macadam roads, Bituminous macadam, semi dense bituminous concrete, Asphalt concrete, seal coat, mix seal surfacing, liquid spray grout, construction of cement concrete roads.

Earth moving equipments, spreaders, rollers, Paver finishers, binder sprayers, Hot mix plant. Tippers

Reference Books:

- 1) Highway Engineering by S. K. Khanna & Justo, 8th ed. Nem Chand & Bros. Roorkee (UP)
- 2) Principals of Transportation engineering by Partha Chakroborty & Animesh Das
- 3) Specification of road and bridges by Ministry of Road Transportation &Highways -2001 Govt. of India, New Delhi
- 4) Principal of Transportation &Highway Engineering by G. Venkatappa Rao
- 5) Guidance of Design of Flexible pavement, Second Revision- IRC-37-2001
- 6) Guidance of Design of Rigid pavement, - IRC-58-2002

CE 412: Construction Management

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Introduction and Overview

Construction Management: -Overview of construction – Construction sequence and discrete construction activities – Specifications of typical construction items, Construction Industry – Nature, Characteristics, Size and Structures. Role of economic development of nation, employment generation, infrastructure development related to other industries. Construction, management: Necessity, application of management functions viz. Planning, Organizing, Staffing, Leading and controlling to the construction. View points of clients, contractors, consultants. Construction manager: Role, Qualities, Ethics, Duties, Responsibilities, Authorities. General principles of BOT system

Unit II:

Construction Scheduling and Network Analysis

Construction scheduling: Network analysis, bar charts, Programme Evaluation and Review Techniques (PERT) and Critical Path method (CPM). Basics of construction industry and organizational structure; Engineering economy in construction projects-personnel, monitoring and control work study in constructions - contracting. Bidding and law for engineers-value engineering, safety engineering etc.

Earth Moving Equipments

Power Shovels, Back-Hoe, Drag-line, Excavator, Dozers, Scrapers, Use of Trucks and Dumpers, Work Cycle, Suitability of Use, Factors affecting Selection, Calculation of Out Put estimation and economics of equipment, Group Behaviour involving Labour, Different Equipment associated in a chain. Useful life estimation of equipments

Unit III:

Resource and Financial Management

Introduction to resource leveling and allocation, 4-M's in Construction – Men, Money, Machine and Material. Material Management: definition by international federation of purchasing and material management, Objectives, Role Functions, Qualities, of material manager Material forecasting. Inventory Control- Necessity, Techniques, ABC analysis, Lead-time, safety stocks, Material Evaluation using differential indices.

Objectives, managing working capita, Law of flow of funds, managing debts, Preparation of cash flow schedule based on funds available and project planning. Financial Accounting Systems, Accounting methods- cash basis, Actual Basis. Percentage completion basis and completed contract basis.

Unit IV:

Project Appraisal and Development and Safety Engineering

Project feasibility analysis based on Technical, Financial and social benefits. Ecological and Environment Assessments Studies.

Accident cost, injury sources and causes, Effective safety programmes occupational health, hazards, Personal protective equipment, Preparation of safety programmes for construction works.

Unit V:

Site Layout and Management Information System (MIS)

Factors affecting, typical layout few major construction projects, Legal Aspect and Laws Applicable to

Construction Industry: Works contract act, Child labour act, Workman's compensation Act, Employees provided fund Act 1952, Minimum wages Act, Payment of bonus Act 1965; and Maternity leave Act.

Risk Management: Introduction –Principal-Types, Origin, Costs of Risks. Risk Control –Role of Risk Manager, Risk, financing methods –Insurance, Funds cash borrowing, external borrowing.

Application of MIS: System Development, Data processing, Flow charting, DBM , Data communication System, Developments, Data processing , Application in Civil Engineering Industry, Training:

Necessity –Method, Training Programmes

Text Books

1. Senagupta, Construction Management and Planning , Tata McGraw-Hill Publication (Latest Edition)
2. Barrie- Paulsion, Professional Construction Management, McGraw-Hill Institution Edition(Latest Edition)
3. Mahesh Varma, Construction Equipment Planning and Applications, Tata McGraw-Hill (Latest Edition)
4. Peurify, Construction Planning, Equipment and Methods, Tata McGraw-Hill Publication (Latest Edition)
5. Frank Harris and Ronald Caffer, Management of Construction Equipments, McMillan Publication (Latest Edition)

Reference Books

1. Manuals on Machinery, Construction Engineering Construction Reviews
2. International Construction, Journal
3. Brochures Published by Various Agencies Associated with Construction
4. Handbook of Estimating and Costing for Quantity Surveyors, P. T. Joglekar
5. Earth Moving Equipments, Brinton Crison
6. Moving the Earth, Nicolas• Construction Management By S. Seetharaman, Umesh Publications S.B. Nath Market, N. Delhi.
7. Purchasing and Inventory Control by K.S. Menon, Wheelar Publication.
8. An Integrated Materials Management by Gopalkrishnan and Sunderasan.

Elective
AM 413: Advanced RCC Structures

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Flat Slabs

Structural components, Indian Code recommendations, direct design method, equivalent frame method, shear in the slabs, reinforcement details

Unit II:

Seismic Analysis of RCC Buildings

Equivalent static lateral force method: fundamental natural period, distribution of base shear; Response spectrum method: eigen values, eigen vectors, modal participation factors, modal mass, lateral force at various floor levels, modal storey shear forces, storey shears by modal combinations; Time history method: modal matrix, effective force vector, displacement response in normal & physical coordinates, storey shears

UNIT III:

Earthquake Resistant Design of RCC Buildings

Preliminary data, Analysis for dead load, live load, earthquake load, load combinations, design of frames: beams, columns, foundations, detailing of reinforcement; Shear walls: design and detailing

UNIT IV:

Highway Bridges

RCC bridges: types, design loads, standard specifications, general design requirements, design examples: deck slab, longitudinal and cross girders, piers, abutments, bearings and expansion joints, foundations; PC bridges: types, pre tensioning, post tensioning, bonding of tendons, precautions, design examples; Composite bridges

UNIT V:

Water Tanks

Types, Indian Code requirements, Underground water tanks: earth pressure on tank walls, uplift pressure on floor of the tank, design example; Elevated circular/ rectangular/ Intze type water tanks: design of container and supporting tower

Reference Books

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Comprehensive RCC Designs, Laxmi Publications (P) Ltd, New Delhi, Latest Edition
2. Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of Structures, Prentice-Hall of India Pvt. Ltd., New Delhi, Latest Edition
3. IS: 456-2000, Plain and Reinforced Concrete-Code of Practice, Bureau of Indian Standards, New Delhi
4. IS: 1893-2002, Criteria for Earthquake Resistant Design of Structures-Part 1, General Provisions and Buildings (Fifth Revision), Bureau of Indian Standards, New Delhi
5. IS: 13920-1993, Ductile Detailing of reinforced Concrete Structures subjected to Seismic Forces, Bureau of Indian Standards, New Delhi
6. SP 16-1980, Design Aids for Reinforced Concrete to IS:456-1978, Bureau of Indian Standards, New Delhi
7. D. Johnson Victor, Essentials of Bridge Engineering, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, Latest Edition
8. T. R. Jagadeesh and M. A. Jayaram, Design of Bridge Structures, Prentice-Hall of India Pvt. Ltd., New Delhi, Latest Edition

AM 414: Prestressed Concrete

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Limit State Method of Design

Application of limit state method of design of prestressed concrete elements. Design of section for tension, compression, flexure, shear and bond by limit state method.

Unit II:

Linear transformation and concordant cables, Analysis of composite section

Analysis of statically indeterminate structures, pressure line, line of prestress, tendon, profile, continuous beams, Analysis of propped and unpropped composite sections (precast PSC and cast in situ concrete slab) Kern point (top and bottom)

Unit III:

Design of End Blocks:

Introduction, stress distribution in end block, methods of analysis such as Magnel's , Guyons's, Zielinski and Rowe's method, I.S. Code method, detailing of reinforcement in end block.

Unit IV:

Design of one way, two way prestressed concrete slabs:

Minimum section modules, Min. prestressing force, spacing of cables, eccentricity of the cable, serviceability requirements.

Unit V:

Circular prestressing: Design of prestressed concrete poles and railway sleepers. Design of prestressed concrete pipes: Non cylinder pipes and cylinder pipes, factor safety against cracking. Design consideration of poles and sleepers, various checks for limit states of serviceability

(IS: 1343 will be allowed to be used in theory examination)

Assignments:

- i) The solutions of at least six examples based on topics from the syllabus.
- ii) Design and detailing of simple prestressed concrete structure.

Reference Books

1. Krishna Raju "Prestressed concrete" 3rd ed., Tata McGrawHill, New Delhi
2. T.Y. Lin "Design of prestressed structures" John Wiley and Sons, New Delhi
3. R.I. Gilbert and N.C. Mickleborough, "Design of Prestressed Concrete" Unwin Hyman, London

ELECTIVE
CE 415: Industrial Waste Treatment

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Sources and types of wastes: solid, liquid, and gaseous wastes; Control and Removal of specific pollutants in Industrial wastewaters: eg. Oil and Grease, Cyanide, Fluoride, Toxic organics, Heavy metals, Radioactivity etc.

Unit II

Solid and Hazardous wastes: definitions, concepts and management aspects; Control of gaseous emissions: Identification of chimney and fugitive sources, their quantification, fuel quality, combustion processes. Particulate and gaseous pollutant control;

Unit III

Recent trends in Industrial waste management: Cradle to Grave concept, life cycle analysis and clean technologies; Case studies of various industries: Dairy, Fertilizer, Distillery, Sugar, Pulp and paper, Iron and Steel, Metal plating, Thermal power plants, etc.;

Unit IV

Environmental audit: Definitions and concepts, environmental audit vs. accounts audit, compliance audit relevant methodologies, regulations; Introduction to ISO and ISO 14000, Preparation and implementation of environmental Management Plans.

Unit V

In-plant waste control and water reuse, methods of treatment, floatation and coagulation, activated carbon, combined biological, physical and chemical process.

Reference Books

1. Dr. Patwardhan A.D., Industrial waste Treatment, Prentice Hall of India, New Delhi
2. Numerow, Industrial Waste Treatment, Mc-Graw Hill.

ELECTIVE
CE 416 : Water Resources Systems and Management

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Introduction and economic analysis of water resources system

General principles of system analysis, objectives of water resources system, economic analysis of water resources system, principles of engineering economy, depreciation, benefit cost evaluation, direct and indirect benefits, discounting techniques - present worth method, rate of return method, benefit cost ratio method, annual cost method

Unit II:

Methods of system analysis

Linear programming models, simplex method, graphical method, introductory concepts of dynamic programming, non-linear programming, stochastic programming, simulation

Unit III:

Management of canal irrigation

Need for canal irrigation management, inadequacies of canal irrigation management, objective and criteria of good canal irrigation management, methods of improving canal irrigation management, participatory irrigation management

Unit IV:

Water shed management

Conservation and land and water, necessity of water shed development and management, funding sources, structures involved in watershed management, Area treatment, drainage line treatment, impact assessment

Unit V:

Micro-irrigation

Sprinkler irrigation, types of sprinklers, layout of sprinkler irrigation system, design aspects of sprinkler irrigation system, Drip irrigation: types of drips, layout of drip irrigation system, design aspects of drip irrigation system

Reference Books:

1. Loucks, D.P., Stedinger, J.R. and Haith, D.A. (1982) "Water Resources Systems Planning and Analysis", Prentice Hall Inc. N York
2. Chaturvedi, M.C. (1987), "Water Resources Systems Planning and Management", Tata McGraw Hill Pub. Co., N Delhi
3. Taha, H.A. (1996) "Operations Research", Prentice Hall of India, N Delhi.
4. Gupta, B.L. and Gupta Amit. "Water Resources Systems and Management", Standard Publishers Distributors, Delhi
5. Asawa, G.L. (1996) "Irrigation Engineering", New Age International Pub. Co. N Delhi.
6. Michael, B.A.M. (1990) "Irrigation", Vikas Publishing House Pvt. Ltd. N Delhi.

ELECTIVE
CE 417: Advanced Soil Engineering

Teaching Scheme:

Lectures: 3 Hrs/Week

Examination Scheme:

Test: 20 marks

Assignment: 20 marks

ESE :60 marks

Unit I:

Introduction:

Introduction to soil Mechanics, Factors influencing nature and formation of soils, typical soil deposits With special reference to Indian soils, Soil problems in civil engineering, Soil as a multiphase material, Particle size and shape, Soil minerals.

Unit II:

Soil Structure and classifications:

Soil structures, relationship and it's significance, .I.S. classification of soil, Field identification of soils. Type of bonds, Structural and engineering properties of compacted soils.

Unit III:

Shear strength:

Mohr's envelopes for different types of soils, Pore pressure coefficient, total and effective stress, Mohr-Coulomb law, Sensitivity and thixotropy of cohesive soils, Geostatic stresses, Elastic solutions for vertical stresses and displacements in soils, Pressure bulb and contact pressure.

Unit IV:

Consolidation and Settlement:

Settlement, Immediate settlement and consolidation settlement, Classification of settlement computation procedures, computation of settlement in sand, Three dimensional Consolidation, Secondary consolidation

Unit V:

Stability analysis and earth pressure:

Stability analysis of slope, Earth pressure theories, Geoenvironmental hazards, Geotechnical reuse of waste material.

Assignments should be based on above syllabus having practical utility (minimum 10 assignments to individual students)

Reference Books:

1. S.R. Kaniraj "Design aids in soil mechanics and foundation engineering" Tata McGraw Hill Publication
2. V.N.S.Murthy, "Soil mechanics and foundation engineering"Vol.1, Saikrupa Technical Consultants, Bangalore
3. Shashi K. Gulhati and Manoj Datta, "Geotechnical Engineering" Tata McGraw Hill Publication
4. J.E.Bowles, Physical and Geotechnical Properties of soils, McGraw Hill International Editions
5. T.W. Lambe, Soil Testing for Engineers, John Wiley Publication
6. Wayne C. Teng, "Foundation Design" Prentice Hall of India, New Delhi

CE 418: Lab-Transportation Engineering –II

Teaching Scheme:

Practicals: 2 Hrs/ Week

Examination Scheme:

Term Work :25 marks

Pract/Viva :25 marks

Practicals to be carried out in the laboratory.

I) Laboratory Tests

- 1) Tests on Aggregates
 - i) Aggregate Impact Value ii) Aggregate Crushing Value iii) Aggregate Abrasion value iv) Water absorption of Aggregates v) Gradation test
- 2) Tests on bitumen
 - i) Ductility test ii) softening Point Test iii) Fire and Flash point Test iv) Penetration Test v) Bitumen content vi) Bituminous Mix Design vii) Viscosity of Bitumen viii) Viscosity of Emulsion ix) Storage Stability test of Emulsion
- 3) California Bearing Ratio Test

II) Any one of the following:

1. Marshal Test
2. Plate Bearing Test
3. Benkelman Beam Test

III) Design of Pavements (Any two)

- 1) Design of Flexible pavements
- 2) Design of Rigid pavement
- 3) Design of overlay
- 4) Design of drainage layer

IV) Site Visit

- 1) Visit to Road construction site and Hot Mix Plant and preparation of detailed Report on the same

Reference Books:

1. Highway Engineering by S. K. Khanna and Justo Eighth Edition, Nem chand & Bros. Roorkee (U.P.)
2. Principles of Transportation Engineering by Partha Chakroborty and Animesh Das
3. Specification of road and bridges by Ministry of Road Transportation &Highways -2001 Govt. of India, New Delhi
4. Principles of Transportation and Highway Engineering by G. Venkatappa Rao
5. Guidance of Design of Flexible pavement, Second Revision- IRC-37-2001
6. Guidance of Design of Rigid pavement, - IRC-58-2002

CE 419: Lab-Construction Management

Teaching Scheme:

Practicals: 2 Hrs/ Week

Examination Scheme

Term Work :25 marks

Pract/Viva :25 marks

Term work should consist of assignments based on above syllabus.

Any six of the following.

1. Assignment on bar chart for construction project.
2. Assignment on mile stone chart.
3. Network representation, assigning durations to various activities by considering available resources, computation of duration of project, cost optimization resources scheduling, Uses of computer programming
4. Inventory control related with construction project
5. Problem on ABC analysis
6. Cost analysis of construction equipments
7. Use of at least one soft computing technique in construction management, such as Primavera, MS Project, etc.

CE 420: Seminar

Teaching Scheme:

Practicals: 2 Hrs/ Week

Examination Scheme:

Term Work :25 marks

Pract/Viva :25 marks

The seminar shall consist of submission of technical report, in the prescribed format, and presentation, on the recent developments in various fields of Civil Engineering. The students shall carry out literature review from standard sources and shall compile the information in the prescribed format. The evaluation of term work shall be done by the Guide. The candidate shall be asked to present his work in front of the audience and two internal examiners, one of whom will be the Guide and the other appointed by the Head of the Department. The performance of the candidate in viva voce shall be assessed based on the presentation and the responses of the candidate to the questions asked by the examiner and the audience.

CE 421 : Project

Teaching Scheme:

Practicals: 6 Hrs/ Week

Examination Scheme:

Term Work :100 marks

Pract/Viva :100 marks

The project work shall consist of comprehensive review of recent development or detailed project report consisting of an experimentation / design related to Civil Engineering. The work shall be carried out by an individual or a group of students, but in no case the number of students in a group shall exceed 9. The Project Guide may decide the number of students in a group. The students shall submit two copies of the project, in the prescribed format, in addition to the individual copies. The viva voce examination shall be conducted in the presence of External Examiner appointed by the Controller of Examination.

The term work shall be assessed by the Project Guide.
