

West Bengal University of Technology
BF – 142, Salt Lake City, Kolkata – 700 064
Civil Engineering Revised Course Structure upto 8th Semester, 2007
 Remaining syllabus will be published soon
 (To be applicable for the students who admitted in the session July 2005-2006)

STRUCTURE

Semester III

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credits
		L	T	P		
CE 301	Mathematics	3	1	0	4	4
CE 302	Fluid Mechanics	3	1	0	4	4
CE 303	Surveying-I	3	1	0	4	4
CE 304	Structural Mechanics	3	1	0	4	4
CE 305	Engineering Geology	3	1	0	4	4
CE 306	Building Materials and Construction	3	1	0	4	4
TOTAL OF THEORY					24	24

B. PRACTICAL:

CODE	PRACTICAL	Contacts periods Per week			Total	Credits
		L	T	P		
CE 395	Geology Lab	0	0	3	3	2
CE 394	Structural Mechanics Lab	0	0	3	3	2
TOTAL OF PRACTICAL					6	4

TOTAL OF SEMESTER					30	28
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Semester IV

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credit
		L	T	P		
CE 401	Mathematics II	3	1	0	4	4
CE 402	Quantity Surveying, Specification and Valuation	3	1	0	4	4
CE 403	Surveying – II	3	1	0	4	4
CE 404	Structural Analysis-I	3	1	0	4	4
CE 405	Structural Design-I	3	1	0	4	4
TOTAL OF THEORY					20	20

B. PRACTICAL:

CODE	PRACTICAL	Contacts periods Per week			Total	Credit
		L	T	P		
CE 491	Surveying Practice-I	0	0	3	3	2
CE 492	Fluid Mechanics Lab	0	0	3	3	2
TOTAL OF PRACTICAL					6	4

C. SESSIONAL:

CODE	SESSIONAL	Contacts periods Per week			Total	Credits
		L	T	P		
CE 493	Building Design and Drawing	0	0	3	3	2
CE 494	Numerical Analysis & Computer Programming – I	1	0	2	3	2
CE 495	Technical Report Writing & / Language Practice Lab	0	0	3	3	2
TOTAL OF SESSIONAL					9	6
TOTAL OF SEMESTER					35	30

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Semester V

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credits
		L	T	P		
CE-501	Soil Mechanics-I	3	1	0	4	4
CE-502	Concrete Technology	3	1	0	4	4
CE-503	Environmental Engineering	3	1	0	4	4
CE-504	Structural Analysis-II	3	1	0	4	4
CE-505	Structural Design-II	3	1	0	4	4
	TOTAL OF THEORY				20	20

B. PRACTICAL:

C.

CODE	PRACTICAL	Contacts periods Per week			Total	Credits
		L	T	P		
CE 591	Civil Engineering Lab I	0	0	3	3	2
CE 592	Surveying Practice-II	0	0	3	3	2
CE 593	Soil Mechanics Lab I	0	0	3	3	2
	TOTAL OF PRACTICAL				9	6

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C.SESSIONAL:

CODE	SESSIONAL	Contacts periods Per week			Total	Credits
		L	T	P		
CE 594	Structural Design & Drawing – I	0	0	3	3	2
	TOTAL OF SESSIONAL				3	2
	TOTAL OF SEMESTER				32	28

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Semester VI

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credit
		L	T	P		
CE 601	Soil Mechanics II	3	1	0	4	4
CE 602	Transportation Engineering -I	3	1	0	4	4
CE 603	Environmental Engineering -II	3	1	0	4	4
CE 604	Structural Analysis-III	3	1	0	4	4
CE 605	Water Resources Engineering-I	3	1	0	4	4
	TOTAL OF THEORY				20	20

B. PRACTICAL:

CODE	PRACTICAL	Contacts periods Per week			Total	Credit
		L	T	P		
CE 691	Soil Mechanics Lab II	0	0	3	3	2
CE 692	Civil Engineering Lab-II	0	0	3	3	2
	TOTAL OF PRACTICAL				6	4

C. SESSIONAL:

CODE	SESSIONAL	Contacts periods Per week			Total	Credits
		L	T	P		
CE 693	Structural Design & Drawing –II	0	0	3	3	2
CE 694	Computer Programming in Civil Engineering	1	0	2	3	2
	TOTAL OF SESSIONAL				6	4
	TOTAL OF SEMESTER;				32	28

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Semester VII

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credit
		L	T	P		
CE 701	Water Resources Engineering II	3	1	0	4	4
CE 702	Transportation Engineering II	3	1	0	4	4
CE 703	Foundation Engineering	3	1	0	4	4
CE 704	Structural Design III	3	1	0	4	4
CE705	Hydraulic Structures	3	1	0	4	4
TOTAL OF THEORY					20	20

B. PRACTICAL:

CODE	PRACTICAL	Contacts periods Per week			Total	Credit
		L	T	P		
CE 791	Environmental Engineering Lab	0	0	3	3	2
CE 792	Highway Engineering Lab	0	0	3	3	2
CE 793	Computer Application in Civil Engineering – I Lab	0	0	3	3	2
TOTAL OF PRACTICAL					9	6

C. SESSIONALS:

CODE	SESSIONALS	Contacts periods Per week			Total	Credit
		L	T	P		
CE 784	Project Work-Part I	0	0	3	3	2
CE 785	Seminar	0	0	3	3	2
CE 786	Evaluation of Practical Training	0	0	0	0	2
TOTAL OF PRACTICAL					6	6
TOTAL OF SEMESTER:					35	32

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Semester VIII

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credit
		L	T	P		
CE 801/1-	Elective I	3	1	0	4	4
CE 802/1-	Elective II	3	1	0	4	4
CE 803	Construction Management, Technology & Departmental Procedure	3	1	0	4	4
CE 804	Accountancy & Economics	3	1	0	4	4
TOTAL OF THEORY					16	16

B. PRACTICAL:

CODE	PRACTICAL	Contacts periodsPer week			Total	Credit
		L	T	P		
CE 891	Computer Application in Civil Engineering - II	0	0	3	3	2

C. SESSIONALS						
CE 882	Project Work Part II	0	0	12	12	8
CE 883	Seminar	0	0	3	3	2
CE 884	Comprehensive Viva-Voce	0	0	0	0	3
TOTAL OF SESSIONALS					15	13
TOTAL OF SEMESTER					34	31

ELECTIVE – I

Advanced Transportation Engineering	CE 801/1
Environmental Pollution and Control	CE-801/2
Advanced Structural Analysis	CE-801/3
Advanced Foundation Engineering	CE 801/4
Remote Sensing and GIS	CE-801/5

ELECTIVE – II

Soil Stabilisation & Ground Improvement Technique	CE-802/1
Bridge Engineering	CE-802/2
Water Resources Management & Planning	CE 802/3
Prestressed Concrete	CE-802/4
Structural Dynamics & Earthquake Engineering	CE-802/5

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SYLLABUS

Semester III

Code: CE-301

Contact: 3L + 1T

Credits: 4

Fourier Series: Periodic functions, Euler's formulae. Fourier series of odd and even functions and functions with arbitrary period. Half range expansions. Fourier sine and cosine transforms. Fourier integrals. Application of Fourier series to forced vibration problems.

(8)

Partial differential equations: Basic concepts, solutions of equations involving derivatives with respect to one variable only. Solutions by indicated transformations and separation of variables. Derivation of one-dimensional wave equation (vibrating string) and its solution by using the method of separation of variables. Simple problems. D'Alembert's solution of wave equation. Derivation of one dimensional heat equation using Gauss divergence theorem and its solution by separation of variables. Solutions of 2-D Laplace equations.

(12)

Introduction to probability: Finite sample space, conditional probability and independence. Bayes' theorem, one-dimensional random variables. Two and higher dimensional random variables: mean, variance, correlation coefficient and regression. Chebyshev inequality.

(8)

Distribution: Binomial, Poisson, Uniform, Normal, Gamma, Chi-square and Exponential. Simple problems.

(8)

Text Books :

1. Murray R. Spiegel: Vector Analysis. Edn. 1959, Schaum Publishing Co.
2. Erwin Kreyszig: Advanced Engineering Mathematics-Fifth edn. 1985, Wiley Eastern.
3. P.L. Meyer: Introduction to probability and Statistical Applications, second Edn. 1979, Amerind Publishing Co.

Reference Books :

1. Bengamine A.R. and Cornell C.A : Probability and Statistics second edn. 1970, McGraw Hill.
2. Ang. A.H.,S. and Tang V.H. : probability concepts in Engineering, Planning and design, Vols. I and II, John Wiley.
3. Hogg and Craig: Introduction of Mathematical Statistics, fourth edn. 195 Mac Millan International.
4. B.S.Grewal: Higher Engineering Mathematics edn. 1989, Khanna publishers.

Fluid Mechanics

Code: CE-302

Contact: 3L + 1T

Credits: 4

Fluid Statics: Forces on plane and curved surfaces. Center of pressure, buoyancy and stability of floating bodies.

(3)

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Discharge measuring devices: Application of Bernoulli's equation- orifices and mouthpieces, Rectangular, triangular, Cippoletti notch, sharp crested and broad crested weirs, submerged weirs.

(4)

Flow in pipes: Turbulent flow through pipes, fluid friction in pipes, head loss due to friction. Darcy-Weisbach equation, Friction factors for commercial pipes, use of Mody's diagram, minor losses in pipes.

(4)

Fundamentals of open channel flow: Scope and importance, characteristics of openchannel flow, distinction between pipe flow and open channel flow, Types of flow: Steady, Unsteady; Uniform, Non uniform, Gradually varied flow, Rapidly varied flow.

(5)

Steady uniform flow: Characteristics, Chezy's and Manning's formulae, Hydraulically efficient Rectangular and trapezoidal sections. Design features of rigid boundary channels.

(4)

Specific Energy: Definition, Diagram. Critical, Sub-critical and Super-critical flows. Channel transitions - construction and raised bed. Establishment of critical flow, Venturi flume and Parshall flume. Specific force: Definition and diagram.

(6)

Dimensional Analysis and Model studies: Dimensions and dimensional homogeneity, Importance and use of dimensional analysis.

(4)

Buckingham Pi Theorem: Statement and application.

Geometric, Kinematic and Dynamic similarity.

(4)

Introduction to Hydraulic Turbines (Pelton & Francis turbine) and Pumps (centrifugal & reciprocating)

(2)

Reference Books:

1. Fluid Mechanics by Modi & Seth Standard Book House, New Delhi
2. Fluid Mechanics by A.K.Jain, Khanna Publishers, Nath Market, Nai Sarak, New Delhi.
3. Fluid Mechanics & Machinery by H. M. Raghunath – CBS Publishers. New Delhi

Surveying-I

Code: CE- 303

Contact: 3L + 1T

Credits: 4

Introduction: Definition, classification of surveying, objectives, history of surveying, modern trends in surveying, principles of surveying.

(1)

Chain surveying: Chain and its types, optical square, cross staff. Reconnaissance and site location, locating ground features by offsets – field book. Chaining for obtaining the outline of structures, methods for overcoming obstacles, conventional symbols, plotting chain survey and computation of areas, errors in chain surveying and their elimination – problems.

(8)

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Compass surveying: Types of compasses, use and adjustments, bearings, local attraction and its adjustments. Chain and compass surveying of an area, booking and plotting. Adjustments of traverse, errors in compass surveying and precautions - problems.

(8)

Plane table surveying: Equipment, leveling, orientation, different methods of survey, two and three point problems, errors and precautions. (4)

Leveling: Introduction, basic definitions, leveling instruments and their features, temporary adjustment of levels, sensitiveness of bubble tube. Methods of leveling – differential, profile & fly leveling, cross sectional and reciprocal leveling. Effect of curvature and refraction, Reducing errors and eliminating mistakes in leveling. Permanent adjustments of dumpy level. Modern levels – Tilting level, Automatic levels, precise levels. Plotting longitudinal sections and cross sections. Measurement of area and volume

(8)

Contouring: Topographic map, characteristics of contour, contour interval. Methods of locating contours, Interpolation of contours. Measurement of area and volume from contour maps. (4)

Minor Instruments: Clinometers, Planimeter (mechanical and digital) (3)

Books recommended

1. Surveying – Vol I & II B.C. Punmia
2. Surveying levelling – Vol I & II – T.P. Kanetkar & Kulkarni
3. Fundamentals of surveying – S.K. Roy (Prentice Hall India)
4. Surveying By A. Dey [PHI]
5. Plane and Geodetic surveying Vol I & II – David Clark
6. Advanced surveying – Norman Thomas
7. Advanced surveying – Som & Ghosh

Structural Mechanics

Code: CE- 304

Contact: 3L + 1T

Credits: 4

Fundamental of Stresses : Simple stresses and strain, modulus of elasticity, modulus of rigidity, bulk modulus, their relationship, strain energy due to direct stresses, impact loads, shearing stresses, factor of safety, permissible stress, proof stress.

(5)

Beam Statics: Support reactions, concepts of redundancy, definitions, axial force, shear force and bending moment diagrams for concentrated, uniformly distributed, linearly varying load, concentrated moments in simply supported beams, cantilever and overhanging beams, (7)

Symmetric Beam Bending: Basic kinematic assumption, moment of inertia, elastic flexure formulae and its application, moment carrying capacity, Shear stress Distribution in beams section.

(6)

Deflection of beams by Double Integration: Elastic curve, moment Curvature relationship, governing differential equation, boundary conditions, direct integration solution for simple beams.

(4)

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Torsion: Pure torsion, torsion of circular solid shaft and hollow elastic bars, torsional equation, torsional rigidity, closed coil helical spring. (4)

Two Dimensional Stress Problems: Principal stresses, maximum shear stresses, Mohr's circle of stresses, construction of Mohr's circle (5)

Introduction to thin cylindrical shells: Hoop stress and meridional stress and volumetric changes . (2)

Columns: Fundamentals, criteria for stability in equilibrium, column buckling theory, Euler's load for columns with different end conditions, limitations of Euler's theory – problems, eccentric load and secant formulae, Rankine & IS code formulae (5)

Books recommended

Engineering Mechanics of Solids By E. P. Popov [PHI]
Strength of Materials By S S Bhavikatti [Vikas Publishing House Pvt. Ltd]
Strength of Materials By R. Subramanian [OXFORD University Press]
Elements of Strength of Material By S. P. Timoshenko & D. H. Young [EWP Pvt. Ltd]
Strength of Material By A. Pytel & F. L. Singer [AWL Inc]
Strength of Material By Ramamrutham
Engineering Mechanics I by J. L. Mariam [John Willey]
Engineering Mechanics I by I. H. Shames [PHI]

Engineering Geology

Code: CE- 305

Contact: 4L

Credits: 4

Geology and its importance in Civil Engineering. (2)

Mineralogy: Definition, internal and external structure of minerals, study of crystals, Classification and physical properties of minerals. (3)

Classification of rocks. (4)

- a) Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance.
- b) Sedimentary rocks: Process of sedimentation, classification and engineering importance.
- c) Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.

Weathering of rocks: Agents and kinds of weathering, soil formation & classification based on origin. . (2)

Geological work of rivers: Origin and stages in the system, erosion, transportation and deposition. (1)

Structural geology: Introduction to structural elements of rocks, dip & strike, definition, description, classification of folds, faults and joints, importance of geological structures in Civil Engineering. (4)

Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercalli's intensity scale and Richter's scale of magnitude. (3)

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Engineering properties of rocks: Porosity, permeability, compressive strength, tensile strength and abrasive resistance. (3)

Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing. (3)

Geophysical exploration: Methods of Geophysical Exploration, electrical resistivity method field procedure – sounding and profiling, electrode configuration, interpretation of resistivity data. Geophysical surveys in ground water and other Civil Engg. Projects. (4)

Applied Geology: Surface and subsurface geological and geophysical investigations in major Civil Engg. Projects. Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations. (4)

Landslides: Types of landslides, causes, effects and prevention of landslides. (3)

Reference Books:

1. Engineering and General Geology by Parbin Singh, Fourth edition. Katson publishing house Delhi 1987.
2. Engineering Geology for Civil Engineers – D. Venkat Reddy, Oxford, IBH, 1995.
3. Tyrell: Principles of petrology, 1972, Asia, Bombay.
4. Marland P. Billings: Structural Geology, fourth edition, 1975, Wiley eastern Prentice-Hall, U.S.A. 1972.
5. Todd D.K. Ground Water hydrology. Jonh Wiley & Sons, Second edition, 1980.

Building Material and Construction

Code: CE- 306

Contact: 4L Credits: 4

Materials of Construction

Bricks – classification – characteristics –Testing of bricks as per BIS . (2)

Aggregates: Types, Classification and Characteristics (3)

Lime: Types, composition, Manufacturing, Properties – Hydration (2)

Mortars: Classification and characteristics –Types and uses (2)

Cement: OPC – Composition (3)

Concrete: Types – Ingredients – uses (2)

Wood and wood products: – Structure, characteristics of good timber, defects, seasoning, decay & its prevention. Suitability of timber for specific uses. Wood products: Veneers plywood, Fibre boards, chip boards, black boards, batten boards and laminated boards – characteristics and uses. (4)

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Paints, Enamels and Varnishes: Properties and uses. Tar, Bitumen and Asphalt: Properties and uses. Miscellaneous materials: Heat insulating, Sound insulating, Adhesives. Geo-synthetics & Geo-textiles: - properties and uses. (3)

Building Construction

Foundations: Types of foundations [definitions and uses]: Spread foundations, Piles and Well foundation (3)

Brick Masonry: Rules for bonding; stretcher bond, header bond; English and Flemish bonds for one, one and a half brick thick walls. (2)

Walls, Doors and Windows: Load bearing and partition walls reinforced brick walls; common types of doors and windows of timber and metal. (2)

Stairs: Types; R.C. Stair cases with sketches; Elevation and Cross section, Design principles and design of a dog-legged stair case. (3)

Roofs: Types of pitched roofs and their sketches; Lean – to, coupled and collared roofs; king-post truss, queen-post truss and simple steel trusses; Roof covering materials: -Tiles, AC sheets, and G.I. sheets (2)

Plastering and Painting: Plastering with cement and lime mortar; White-washing, colour washing and distempering; Painting: New and existing wood and metal work. (2)

Flooring: Cement concrete, terrazzo, Mosaic, marble and tiled flooring (2).

Precast Element : Types and uses . (1)

Recommended Books

1. Building materials – S.K.Duggal
2. Building materials – P. C. Varghese [Prentice Hall of India]
3. Engineering Materials – S.C. Rangwala
4. Concrete Technology – M.S. Shetty
5. Concrete Technology – A. M. Neville & J. J. Brooks [Pearson Education]
6. Building Construction by B.C.Punmia
7. Building Construction and Foundation Engineering by Jha and Sinha

References:

National Building Code

Geology Lab

Code: CE- 395

Credits -2

Study of crystals with the help of crystal models

Identification of Rocks and Minerals [Hand Specimens]

Microscopic study of Rocks and minerals

Study of Geological maps, interpretation of geological structures Thickness problems, Bore-hole Problems

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Structural Mechanics Lab

Code: CE- 394
Credits -2

Tension test on Structural Materials: Mild Steel and Tor steel (HYSD bars)
Compression Test on Structural Materials: Timber, bricks and concrete cubes
Bending Test on Mild Steel
Torsion Test on Mild Steel Circular Bar
Hardness Tests on Ferrous and Non-Ferrous Metals: Brinell and Rockwell Tests
Test on closely coiled helical spring
Impact Test: Izod and Charpy

IV SEMESTER

MATHEMATICS-II

Code-CE-401

Contact- 3L + 1T

Credits- 4

Interpolation and application, finite differences, Newton Gregory and Lagrange's interpolation formulae, Inverse interpolation. Fundamentals of error expressions in interpolation formulae, Numerical differentiation. Numerical. Integration : trapezoidal rule and Simpson's one third rule.. Curve fitting by method of least squares'

(10L)

Numerical solution of algebraic and transcendental equation using methods of ordinary iteration, Regula-Falsi and Newton-Raphson, condition for convergence and rate of convergence. Multiple roots polynomial equations, Solution of' systems of non-linear equations by Newton-Raphson method. Simple problems.

(10L)

Solutions of systems of linear equations: Gauss Jacobi, Gauss-Seidel and Relaxation methods. Solutions of tridiagonal systems. Eigen values and eigen vectors of matrices and elementary properties. Computation of largest eigen value by Power Method.

(6L)

Numerical solution of initial value problems in ordinary differential equations by Taylor series method, Euler's methods of second and fourth orders.

(5L)

The moment generation function and its properties, Fundamental concepts of frequency distribution, mean, mode, standard deviation and their properties and application.

(5L)

Text Books: - S.S.Sastry: Introductory Method of Numerical Analysis, edn 1990, Prentice Hall. "";

S. A. Mollah "Numerical Analysis and Computational Procedures" Books and Allied Publishers

N. G. Das "Statistical Methods in Commerce, accountancy and economics – Vol 1"

Goon, Gupta and Dasgupta " Basic Statistics"

Reference Books:

Francis Scheid : Numerical Analysis edn. 1968 Schaum Publishing Co.

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Gerald C.F and Patrick D. Wheatley : applied Numerical analysis , third edn. 1984 Addison Wesley.

M.K.Jain , S.R.K. Iyengar and R.K. Jain : Numerical Methods for scientific and Engineering Computation , edn. 1985, Wiley Estern

Quantity Surveying, Specification and Valuation

Code-CE-402

Contact- 3L + 1T

Credits- 4

Quantity Surveying: Types of estimates, approximate estimates, items of work, unit of measurement, unit rate of payment, quantity estimate of a single storied building, bar bending schedule , details of measurement and calculation of quantities with cost, bill of quantities, abstract of quantities, estimate of quantities of road, underground reservoir, surface drain , septic tank. (16 L)

Analysis of rates: Earthwork, brick flat soling, DPC, PCC and RCC, brick work, plastering, flooring and finishing, (6L)

Specification of materials: Brick, cement, fine and coarse aggregates (2L)

Specification of works: Cement concrete, reinforced cement concrete, first class brickwork, cement plastering, pointing, white washing, colour washing, distempering, lime punning, painting and varnishing (6L)

Valuation: Values and cost, gross income, outgoing, net income, scrap value, salvage value, market value, Book Value, sinking fund, capitalised value, Y. P., depreciation, obsolescence, deferred income, freehold and leasehold property, mortgage, rent fixation, valuation table .

(6L)

References:

“Estimating, costing, Specification and Valuation in Civil Engineering” by M..Chakroborty

“Estimating and Costing in Civil Engineering” by B.N.Dutta, USB Publishers & Distributers

Civil Estimating, Costing and Valuation by Agarwal / Upadha

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Surveying-II

Code: CE- 403

Contact: 3L + IT

Credits: 4

Theodolite surveying: Components of a Theodolite, Adjustments, Horizontal and vertical angle measurements, Trigonometric leveling, problems on height and distances, traverse table, co-ordinates

(6L)

Tachometer: Definition, Principles of stadia, tangential systems, Details of stadia system. Analytic tachometer, Horizontal and inclined sight with staff vertical and normal for both fixed and movable hair tachometer, Errors in tachometer methods.

(6L)

Triangulation: Adjustments of station and figure, Leveling adjustment, Method of equal shifts.

(4L)

Curve surveying :

(1) Simple curves Definition, Notations Designations, Elements of simple curve, Setting out by linear methods and Rankine's tangential method. Two Theodolite and tachometric method,

(6L)

(2) Introduction to Compound and reverse curves, vertical curve: types (2L)

(3) Transition curves: lemniscates, cubic spiral, cubic parabola, setting out (4L)

Hydrographic surveying: Vertical control Datum: tide measurement, Horizontal Control: Shore line surveying, Sounding: Location of sounding and reduction, Three point problems, Nautical sextant and station pointer.

(4L)

Remote Sensing: Introduction to remote sensing and its application in civil engineering,

(1L)

Photographic Survey: Introduction to terrestrial and aerial photogrametry, determination of true north

(3L)

Reference Books:

Surveying -Vol 2,3 & 4 by B.C.Punmia.

Plane and Geodetic surveying -Vol 2 by David Clark

Surveying and leveling- Vol 2 by T .P. Kanetkar and Kulkarni

Fundamentals of surveying-by S.K.Roy, New Delhi.

Surveying –Bannister, Raymond and Baker, Pearson Education

Higher surveying by Norman Thomas

Surveying by Higgins.

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Structural Analysis- I

Code: CE- 404

Contact: 3L + 1T

Credits: 4

Determinate plane trusses: Analysis by method of joints, method of section and graphical method.

(2L)

Analysis of determinate portal frames

(1L)

Deflection analysis of beams: Area-moment theorem and Conjugate beam theory.

(3L)

Strain energy: Due to axial load, bending and shear, Torsion; Castiglino's theorems, theorem of minimum potential energy, principle of virtual work, Betti's law, Maxwell's theorem of reciprocal deflection, Unit-Load method.

(6L)

Use of energy principles for deflection analysis of determinate beams, trusses and simple portal frames.

(6L)

Influence line diagrams: Statically determinate beams and trusses under series of concentrated and uniformly distributed rolling loads, criteria for maximum and absolute maximum moments and shears.

(8L)

Redundant structures: Concepts of statical and kinematic indeterminacy of beams, trusses and portal frames; Application of second theorem of Castigliano and method of consistent deformation for analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading cases.

(10L)

Reference books:

Engineering Mechanics of Solid – E. P. Popov, Pearson Education

Basic structural Analysis by C.S. Reddy

Statically indeterminate structures by C.K.Wang

Elementary structural analysis by Norris and Wilber

Structures – Schodek, Pearson Education

Elementary structural mechanics by Tung Au.

Indeterminate structural analysis by Kinney

Elastic analysis of structures by Kennedy and Madugula [Harper and Row]

Structural Analysis Vol.I by S.S.Bhavikatti

Elements of Structural Mechanics by N.C.Sinha & S.K.SenGupta [S.Chand Pub]

Elementary theory of structures by Jindal

Structural Analysis by Ramamurtham.

Analysis of Structures – Vol.I & Vol. II by Vazirani & Ratwani.

Structural Design- I

Code: CE- 405

Contact: 3L +1T; Credits: 4

Introduction: Principles of design of reinforced concrete members - Working stress and Limit State method of design.

(2L)

Working stress method of design: Basic concepts and IS code provisions for design against bending moment and shear forces - Balanced, under reinforced and over-reinforced beam/ slab sections; design of

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singly and doubly reinforced sections.

(5L)

Limit state method of design: Basic concepts and IS code provisions (IS:456) for design against bending moment and shear forces; concepts of bond stress and development length; Use of 'design aids for reinforced concrete' (SP:16).

(5L)

Analysis, design and detailing of singly reinforced rectangular, 'T', 'L' and doubly reinforced beam sections.

(5L)

Design and detailing of one-way and two-way slab panels as per IS code provisions.

(6L)

Design and detailing of continuous beams and slabs as per IS code provisions.

(3L)

Staircases: Types; Design and detailing of reinforced concrete doglegged staircase.

(3L)

Design and detailing of reinforced concrete short columns of rectangular and circular cross-sections under axial load,

(3L)

Shallow foundations: Types; Design and detailing of reinforced concrete isolated square and rectangular footing for columns as per IS code provisions.

(4L)

Text Books:

IS: 456-2000 - "Indian Standard Plain and reinforced concrete – code of practice"

SP: 16-1980 - "Design aids to IS: 456"

Reinforced concrete Design by Mallick & Gupta

Reinforced concrete Limit state design by Ashok K. Jain

Limit State Design of Reinforced Concrete by P.C. Varghese

Reinforced Concrete Design by Pillai and Menon [TMH]

Reinforced concrete by S.N.Sinha [TMH]

Reinforced concrete by H. S. Shah.

Reinforced concrete structure by I.C. Syal and A.K. Goel

Design of concrete structures by B.C. Punmia

Fundamentals of reinforced concrete by N.C.Sinha and S.K. Roy [S.Chand &Co.]

Limit state theory and design of reinforced concrete by S.R.Karve and V.L. Shah.

Concrete Technology – Neville, Pearson Education

Surveying Practice-I

Code: CE- 491

Credits -2;

Contact- 3P

Chain surveying:

Preparing index plans, Location sketches. Ranging

Construction of Geometric figures, Heights of objects using chain and ranging rods.

Getting outline of the structures by enclosing them in triangles/quadrilaterals.

Distance between inaccessible points.

Obstacles in chain survey.

Compass surveying :

Measurement of bearings, Construction of Geometrical figures

Distance between two inaccessible points by chain and compass.

Chain and compass traverse

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Plane Table survey:

Temporary adjustments of plane table and Radiation method
Intersection, Traversing and Resection methods of plane tabling.
point problem by at least 3 different methods.
2 point problem.

Leveling:

Temporary adjustment of Dumpy level and Differential levelling.
Profile levelling and plotting the profile
Longitudinal and cross sectioning.
Gradient of line and setting out grades.

Reciprocal leveling.

Sensitiveness of Bubble tube
Permanent adjustment of Dumpy levels – third adjustment (Two peg method).
Contouring
Direct contouring
Indirect contouring – Block leveling
Indirect contouring – Radial contouring
Demonstration of minor instruments.

Fluid Mechanics Laboratory

Code: 492;Credits-2;

Contact- 3P

Determination of Orifice co-efficient

Calibration of Orifice meter

Calibration of V- Notch

Measurement of velocity of water in an open channel using a pitot tube

Measurement of water surface profile for flow over Broad crested weir

Preparation of discharge rating curve for a sluice

Measurement of water surface profile for a hydraulic jump

Determination of efficiency of a Centrifugal pump

Determination of efficiency of a Reciprocating pump

Determination of efficiency of a Pelton wheel Turbine

Determination of efficiency of a Francis Turbine

Determination of efficiency of a Hydraulic Ram

Note: Students will have to study the Layout experimental units in the laboratory

Building Design and Drawing

Code: CE- 493;

Credits: 2;

Contact- 3P

Foundations: Spread foundation for walls, and columns of brick masonry; footing for an RCC Column; raft and pile foundations;

Doors and Windows; Glazed and panelled doors standard sizes. Glazed and panelled windows standard sizes, special windows and ventilators

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Stairs: Proportioning and design of a dog-legged, open well RCC stair case for an office residence building; details of reinforcements for RCC stair cases: plan and elevation of straight run, quarter turn, dog-legged and open well RCC stair cases.

Roofs and Trusses: Types of sloping roofs, lean-to roofs; pitched roofs (showing gabled ends and hipped ends); RCC roof with details of reinforcements; Kingpost and Queenpost trusses.

Functional Design of Buildings: To draw the line diagram, plan, elevation and section and line of the following

Residential Buildings (flat, pitched and combined roofs)

Office Buildings (flat roof)

School

The designs must show positions of various components and their sizes.

Introduction to drawing by using software package.

References:

Principles of Building Drawing by Shah & Kale

Text Book of Building Construction by Sharma and Kaul

Building Construction by B.C.Punmia

Numerical Analysis and Computer Programming – I

Code: CE- 494;

Credits: 2;

Contact- 1L + 2P

Computer language - C: Statements, Numerical input/output; transfer of control, principles of flow charting; sub -routines, file handling and system, programming techniques.

Numerical Analysis: Newton - Raphson Method, Secant method, Bi- section method, Solutions of systems of linear simultaneous equations, interpolation, matrix operation and solutions of ordinary differential equation: Runge- Kutta method.

Development of C programme to solve matrix and other numerical problems as mentioned above.

V SEMESTER

SOIL MECHANICS – I

CODE-CE 501

CONTACT-3L+1T

CREDITS-4

Origin & formation of Soil :- Types, Typical Indian Soil, Fundamental of Soil Structure, Clay Mineralogy. (2L)

Soil as a Three Phase System :- Weight- Volume Relationship, Measurement of Physical Properties of Soil: Insitu Density, Moisture Content, Specific Gravity, Relative Density. (5L)

Particle Size Distribution :- By Sieving, Sedimentation Analysis. (3L)

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Index Properties of Soil :- Attarberg's Limits- Determination of Index Properties of Soil by Casagrande's Apparatus, Cone Penetrometer, Soil Indices. (4L)

Soil Classification :- As per Unified Classification System, As per IS Code Recommendation, AASHTO Classification, Field Identification of Soil, Consistency of Soil. (3L)

Soil Moisture :- Darcy's Law, Capillarity in Soil, Permeability, Determination of Coefficient of Permeability of Soil in Laboratory, Permeability for Stratified Deposits. (4L)

Effective Stress Principles:- Definition of Effective Stress, Estimation of Effective Pressure Due to Different Conditions, (4L)

Two Dimensional Flow Through Soil :- Laplace's Equations, Flow nets, Flow Through Earthen Dam, Estimation of Seepage, Uplift due to Seepage, Design of Fillers, Critical Hydraulic Gradient, Quick Sand Condition. (5L)

Stress Distribution In Soil :- Bousinesq's & Westergaad's Assumption & Formula for Determination of Stress due to Point Loads, Stress Beneath Line, Strip & Uniformly Loaded Circular - Pressure Bulbs, Newmark's charts- Use For Determination of Stress due to Arbitrarily Loaded Areas, Contact Stress Distribution for various types of Loading & on Different Types of Soils. (6L)

References :-

- 1.Principles of Soil Mechanics & Foundation Engineering by – V.N.S. Murthy (UBS Publishers).
- 2.Soil Mechanics & Foundation Engineering by – B.C.Punmia (Laxmi Publications).
- 3.Introduction of Soil Mechanics by- B.M.Das (Galgotia Publications).
- 4.Soil Mechanics by – T.W.Lambe & R.V.Whitman.
- 5.SP-36 (Part – I & Part - II).
- 6.Basic & Applied Soil Mechanics by- Gopal(Ranjan & A.S.R.Rao (Willes EasternLtd.)

CONCRETE TECHNOLOGY

CODE-CE 502

CONTACT-3L+1T

CREDITS-4

Concrete as a Structural Material, Good Concrete Manufacture of Portland Cement, Chemical Composition of Cement, Hydration of Cement, Heat of Hydration and Strength, Tests on Cement and Cement Paste – fineness, consistency, setting time, soundness, strength. (6L)

Types of Portland Cement – ordinary, Rapid hardening, low-heat, sulphate resisting, Portland slag, Portland pozzolana, super sulphated cement, white cement (6L)

Aggregates – Classification, Mechanical and Physical Properties, Deleterious Substances, Alkali-Aggregate Reaction, Sieve Analysis, Grading Curves, Fineness modules, Grading Requirements. Testing of Aggregates – Flakiness, Elongation Tests, Aggregate Crushing Value, Ten Percent Fines Value, Impact Value, Abrasion Value.

Quality of Water – Mixing Water, Curing Water, Harmful Contents. (6L)

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Properties of Fresh Concrete – Workability, Factors Affecting Workability, Slump Test Compacting Factor Test, Kelly Ball Test, Flow Table Test, Segregation, Bleeding, Setting Time, Mixing and Vibration of Concrete, Mixers and Vibrators, curing, Methods, Maturity.

(6L)

Strength of Concrete – Water/Cement ratio, Gel/Space ratio, Strength in Tension, Compression, Effect of Age on Strength, Relation between Compressive and Tensile Strength, Fatigue Strength, Stress Strain Relation and Modules of Elasticity, Poisson's Ratio, Shrinkage and Creep, Compression Test on Cubes, Cylinders, Non-Destructive Tests.

(6L)

Admixtures – different types, effects, uses, Retarders and Super plasticizers.

Mix Design by I.S. Code method.

Light-weight, Polymer and Fibre-reinforced concrete. (6 L)

References:

1. Concrete Technology by M.L. Gambhir (Tata McGraw Hill Publishing Co. Ltd.)
2. Concrete Technology by M.S. Shetty (S.Chand)
3. Text book of Concrete Technology by P.D. Kulkarni (Tata McGraw Hill Publishing Co. Ltd.)
4. Concrete Technology by A.R. Santakumar

Environmental Engineering -I

Code:CE 503

Contact: 3L + IT

Credits: 4

Water demands: Types of demands for domestic, commercial, industrial, fire, public use and losses, per capita demand, variations in demand, factors affecting demand. Design period. Forecasting population-different methods and their suitability. (4L)

Sources of water: surface water: rivers, streams, lakes and impounded reservoirs, determination of quantity of water in the above sources. Under ground sources Springs, wells and infiltration galleries, measurement of yield of open wells., tube wells, artesian wells and infiltration galleries.

(6L)

Quality of water: Pollution and contamination of water. Sources, classification and prevention of pollution. Water borne diseases. Impurities in water. Water analysis Physical chemical and biological tests, standards for potable water. (6L)

Collection and conveyance of water: Intakes-river, lake, reservoir and canal. Hydraulic design of pressure pipes. Hydrostatic tests on pipes. (4L)

Treatment of water: Aeration, Plain sedimentation, sedimentation with coagulation- coagulant feeding devices, optimum dosage of coagulant. Filters and their different types, disinfection, water softening. The functional design of treatment unit. Removal of iron, manganese, colour, odour and taste, Fluoridation, desalination. (8L)

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Distribution: Systems of distribution, layout of distribution system, Pressure in distribution system, Storage and distribution reservoirs. Capacity of reservoirs. Type of reservoirs. Detection and presentation of leakages. (8L)

References :

Envirmental Engineering S.K. Garg -Khanna Pub
Water Supply & Waste Water Disposal –G . M . Fair ,J . C . Geyer ,D . A . Okun . –Jhon Wiley & Sons .
Water Supply Engineering Volume I by Kshirasagar.
Manual of Water Supply & treatment - A Government of India Publication.
Water Supply and Sanitary Engineering By G.S.Birdi
Water supply engineering by Babbit and Doland
Water supply sanitary engineering by G.S. Birdi

Structural Analysis-II

Code: CE- 504

Contact: 3L + 1T;

Credits: 4

Arches: Introduction. Three hinged arch-analysis and influence line.
Two hinged arch and fixed arch --application of unit load method,
Castigliano's method and elastic center method, Influence line for arches. (8L)

Portal frame: Solution by- unit load method, Castigliano's method. (3L)

Moment distribution method - solution of continuous beam, effect of settlement and rotation of support, frames with or without side sway. (4L)

Slope Deflection Method – Method and application in continuous beams and Frames.
Cables & Suspension bridges with three hinged stiffening girders. (4L)

Curved beams- analysis
Hooks, Rings and Bow girders. (4L)

Un-symmetrical bending. (4L)

Column analogy –method, application (2L)

Stiffness and carry over factors for non-prismatic members. (4L)

Kani's method: application to indeterminate beams and frames. (3L)

References:

Theory of structures: by S.P.Timoshenko
Theory of structures: by S.Ramamurthum.
Mechanics of structures: by Thadani
Indeterminate structural analysis: by Kinney
Statically indeterminate structures: by C.K.Wang
Basic structural analysis: by C.S. Reddy
Matrix method of structural analysis: by M.B.Kanchi

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Structural analysis – A matrix approach by G.S.Pandit and Gupta
Theory of structures: by Vazirani and Rathwani Vol. II and Vol. III.
Intermediate structural Analysis: by Wang.
Structural Analysis Vol.II: by S.S. Bhavikatti.

Structural Design- II

Code: CE- 505

Contact: 3L +1T; Credits: 4

Design of Steel Structures

Materials and Specification :-Rolled steel section, types of structural steel , specifications
(1L)

Structure connections:- i) Riveted, Welded and Bolted including High strength friction grip bolted Joints. – types of riveted & bolted joints, assumptions, failure of joints ,efficiency of joints, design of bolted ,riveted & welded joints for axial load.

ii) Eccentric connection : - Riveted & bolted joints subjected to torsion & shear, tension & shear, design of riveted, bolted & welded connection. (8L)

Tension members :- Design of tension members , I.S code provisions. Permissible stresses, Design rules, Examples. (3L)

Compression members : – (1) Design of compression members , effective lengths about major & minor principal axes, I.S code provisions. Permissible stresses, Design rules, Examples.

Design of one component, two components and built up compression members under axial load.
(4L)

(2) Built up columns under eccentric loading

Design of lacing and batten plates.

Different types of Column Bases- Slab Base , Gusseted Base, Connection details.

(5L)

Beams : - Permissible stresses in bending , compression and tension. Design of rolled steel sections ,Plated beams. Simple Beam end connections, Beam -Column connections. I.S code provisions

(5L)

Plate girders - Design of Webs & Flanges , Concepts of curtailment of flanges – Riveted & Welded

Web stiffeners , Web Flange splices - Riveted, Welded& Bolted.

(6L)

Gantry Girder : Design gantry girder considering lateral buckling – I.S code provisions.

(5L)

Reference:

IS 800 – **2007**(Latest Revised code)

S.P.: 6(1) – 1964 Structural Steel Sections

Pasala Dayaratnam – Design of steel structures A.H.Wheeler & Co Ltd. 1990

A.S.Arya and J.L.Ajmani – Design of steel structures – Nem chand & Bros.,

Ramachandra – Design of steel structures, Vol. I & II

B.S.Krishnamachar and D.Ajitha Sinha – Design of steel structures Tata McGraw – Hill publishing Co. Delhi.

S.M.A.Kazmi and R.S.Jindal – Design of steel structures – Prentice Hall of India – 1988.

Ramamurtham – Design of steel structures.

Design Of Steel Structures - S.K.Duggal Tata Mc-Graw Hill , New Delhi.

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Civil Engineering Lab- I
Code CE – 591
Credits: 2

Tests on cement – specific gravity, fineness, soundness, normal consistency, setting time, compressive strength on cement mortar cubes.

Tests on fine aggregate – specific gravity, bulking sieve analysis, fineness modulus, moisture content, bulk density, voids and deleterious materials.

Tests on coarse aggregate - specific gravity, sieve analysis, fineness modulus, bulk density and voids.

Tests on bricks and tiles (Roofing and Flooring) - Water absorption, breaking loads.

References:

BIS on testing of cement, fine and coarse aggregates, Bricks and tiles.

Laboratory manual of concrete testing (Part I) – V.V Sastry and M. L. Gambhir.

Surveying Practice II
Code: CE – 592
Credits: 2

Theodolite surveying: Measurement of horizontal angles, repetition and Reiteration methods, Single plane and double plane method of trigonometric leveling Theodolite traverse adjustments.

Tachometric surveying: Tacheometric constants, Measurement of horizontal and vertical distance. Tacheometric traverse and contouring.

Curve surveying: setting out simple curve by chain and tape, offsets from longchord and tangent, from chord produced, Simple curve by rankine's method, setting out compound and reverse curve, Transition curves, Bernoulli's Lemniscate.

Demonstration: Box – Sextant, Nautical sextant and EDM instruments. Use of Total station.

Soil Mechanics Lab. – I
Code – CE 593
Credits – 2

1. Field identification of different type of soil different type of soil as per Indian standards [collection of field samples and identifications without laboratory testing], determination of natural moisture content.
2. Determination of specific gravity of i) Cohesionless ii) cohesive soil
3. Determination of Insitu density by core cutter method.
4. Determination of Insitu density by sand replacement method.

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5. Grain size distribution of cohesionless soil by sieving.
6. Grain size distribution of finegrained soil by hydrometer analysis.
7. Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit).
8. Determination of co- efficient of permeability by constant head pemeameter (coarse grained soil).
9. Determination of co- efficient of permeability by variable head parameter (fine grained soil).

References:

1. Soil Testing by T.W. Lamb (John wiley)
2. 2. SP-36 (Part I- & Part – II)
3. Measurement of Engineering properties of soil by E Saibaba Reddy & K. Rama Sastri. (New age International publication.

Structural Design and Drawing – I

Code CE: 594

Credits: – 2

General considerations, design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision.

Design & detailing of a i) simply supported R.C.C Beam
ii) Continuous T- Beam.

Design & detailing of a i) simply supported one way slab
ii) One way Continuous slab.

Design of different units – slab, beam column, roofing and staircase from floor plan of a multistoried frame building – two way action of floor slab.

References:

1. Fundamental of Reinforced concrete – N.C. Sinha & S.K.Roy.
2. Design of concrete structures – Ramachandra.
3. Limit State Method of Design – Varghese. PHL Ltd.
4. I.S- 456-2000
5. I.S. 875
6. 6.SP- 16

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VI- SEMESTER

SOIL MECHANICS – II

CODE-CE 601

CONTACT-3L+1T

CREDITS-4

Compaction of Soil :- Principles of Compaction, IS Light & Heavy Compaction Test, Field Compaction Equipments, Various methods of field Compaction Control, CBR Test (Soaked, Un-soaked & Field) as per IS recommendation. 5h

Compressibility & Consolidation of Soil :- Terzaghi's Theory of One Dimensional Consolidation, Compressibility characteristics of Soils, Compression Index, Coefficient of Compressibility & Volume change, Coefficient of Consolidation, Degree & rate of Consolidation, Consolidometer & Laboratory One Dimensional Consolidation Test as per latest IS Code, Determination of Consolidation Parameters under Consolidated, Normally Consolidated & Over Consolidated Soil, Secondary Consolidation. 8h

Shear Strength of Soil :- Basic Concept of Shear Resistance & Shear Strength of Soil, Mohr- Columb's Theory, Determination of Shear Parameter of Soil- Stress Controlled & Strain Controlled Test, Laboratory Determination of Soil Shear Parameter- Direct Shear, Tri-axial Test, Unconfined Compression, Vane Shear Test as per Relevant IS Codes, Stress- Strain Relationship of Clays & Sands, Concept of Critical Void Ratio. 8h

Earth Pressure Theories :- Plastic equilibrium of soil , Earth pressure at rest , Active & passive Earth pressure , Rankin's&Coulombs earth pressure theories , wedge method of analysis , estimation of earth pressure by graphical construction (colmann Method). 5h

Retaining Wall & sheet pite structures: Proportions of retaining walls, stability checks , cantilever and anchored sheet piles , free earth and fixed earth method of analysis of anchored bulk heads , coffer dam structures types and suitability. 5h

Stability of slopes : Analysis of finite and infinite slopes , swedish And friction circle method, Taglor's stability number , Bishop's method of stability analysis stability consideration of Earthen dams. 5h

References:

1. Principles of Geotechnical By B.M. Das (Thomson)
2. Principles of soil Mechanics & Foundation Engineering by VNS Moorthy(UBS Publication)
3. Soil Mechanics and Foundation Engg.
By B.C. Punnia (Luxmi Publication)
4. Soil Mechanics – by T.W. Lambe & R.V. Whitman(WEL)
5. SP-36 (Part-I & Part-II)
6. Basic & Applied Soil Mechanics
By Gopal Ranjan & A.S.R. Rao (Wiley Easter Ltd.)

Transportation Engineering- I

Code :CE- 602

Contact: 3L + 1L

Credits: 4

Introduction to Highway Engineering:

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Scope of highway engineering; Jayakar Committee Report; saturation system; highway financing ('pay as you go method and credit financing method) and highway economics (quantifiable and non quantifiable benefits to highway users, cost of vehicle operation, annual cost method, and benefit-cost ratio method) 4h.

Highway Alignment:

Requirements; factors controlling alignment; engineering surveys for highway alignment and location. 2h

Highway Geometric Design:

Cross-sectional elements (friction, unevenness, light reflecting characteristics, camber, kerbs, shoulders, footpaths, width of carriageway, formation, and right of way); PIEV theory, geometric design elements like design speed, passing and non-passing sight distances; requirements and design principles of horizontal alignment including radius of curvature, super elevation, extra-widening, design of transition curves, curve resistance and grade compensation and vertical alignment. 12h

Pavement design: Evaluation of soil subgrade, sub-base, base and wearing courses; design factors for pavement thickness (including design wheel load and ESWL, strength of pavement materials and plate load tests, and effect of climatic variations) Group Index and CBR, IRC method of flexible pavement design; Westergaards analysis of wheel load stresses in rigid pavements; frictional stresses and warping stresses; IRC recommendations for design of rigid pavements; design of expansion and contraction joints. Benkelmen Beam Test . 8h

Pavement construction Technique:

Types of pavement; construction of earth roads, gravel roads, WBM, bitumen and cement concrete roads; joints in cement concrete pavements. 6h

Road Materials and Testing : Soil, Stone Aggregate, Bitumen, Marshal Stability Test . 4h

References : High Way Engineering By Khanna & Justo
Transportation Engineering -Vazirani & S.P Chandala Khanna Pustlishers
I.S Specifications on Concrete , Aggregate & Bitumen
Principles of Transportation Engineering: P. Chakraborty & A. Das(PHI)
Transportation Engineering- C.J Khisty & B.K Lall.

Environmental Engineering -II

Code :CE- 603

Contact: 3L + IT Credits: 4

Sewage and drainage: Definition of some common terms used in sanitary engineering. Systems of sanitation, systems of sewerages. Types of sewage. Sources of sanitary sewage. Estimating the quantity of sanitary sewage and storm sewage. 4h

Design of sewers.Nomograms, partial flow diagrams. Testing of sewer lines Sewer appurtenances.

Pumping of sewage. House drainage. 6h

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Characteristics of sewage: Physical, Chemical and Biological. Test on sewage; Solids, dissolved oxygen, biochemical oxygen demand, stability and relative stability, chlorides, sulphide, nitrogen. pH value, grease, oil and fat. Biological tests, carbon, nitrogen and sulphur cycles. 6h

Solid waste disposal: Quality and quantity of refuse, Collection and conveyance of solid wastes. Disposal of solid waste by composting, and other methods, Salvaging, grinding and discharging into sewers. " 5h

Disposal by other methods: Oxidation pond, oxidation ditch, aerated lagoon, septic tank, Iimhoff tank, Disposal by dilution, irrigation and farming, stream sanitation. 5h

Treatment of sewage: Primary treatment - screen, grit chamber, detritus tank, skimming tank, plain sedimentation sedimentation with coagulation. Secondary treatment - Filtration, normal rate trickling filters, high rate trickling filters activated sludge process, aeration units, types of activated sludge process, sludge digestion. Functional design of primary and secondary treatment units. 10h\

References

Envirmental Engineering S.K. Garg -Khanna Pub .

Water Supply , Waste Disposal &Enviormental Pollution Engineering – A . K . Chatterjee – Khanna Pub .

Water Supply & Waste Water Disposal –G . M . Fair ,J . C . Geyer ,D . A . Okun . –Jhon Wiley & Sons .
 Sanitary Engineering Volume II by Kshirasagar.

Manual of treatment - A Government of India Publication.

Water Supply and Sanitary Engineering By G.S.Birdi

Structural Analysis -III

Code :CE- 604 ;

Contact : 3L + 1T ;

Credits : 4

Influence line for Redundant structures:(Beams & Trusses) 4h

Approximate analysis of building frames-Cantilever and portal method 6h

Matrix methods in structural analysis;Flexibility and Stiffness method; Elements of matrix algebra;
 Application of matrix methods to plane truss; continuous beam & frames. 10h

Finite Difference and Relaxation technique-Application to simple problems 4h

Introduction to structural dynamics- free vibration ,forced vibration. SDOF, 6h

Finite Element Technique in structural analysis

- Fundamental concept, Finite Element modeling, Finite element formulation to One Dimensional Problems. 6h

Reference

- 1) Analytical Methods in structural Engineering-S.A.Raz, New Age International Pub.
- 2) Structural analysis-Negi & Jangid.-Tata McGrawhill Co.

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- 3) Theory of structures by S.P. Timoshenko
- 4) Theory of structures by S. Ramamurtham.
- 5) Matrix method of structural analysis by M.B. Kanchi
- 6) Structural analysis – A matrix approach by G.S. Pandit and Gupta
- 7) Theory of structures by Vazirani and Rathwani Vol. II and Vol. III.
- 8) Intermediate structural Analysis by Wang.

Water Resources Engineering – I

Code- CE-605;

Contacts: 3L+1T;

Credits-4

Water Resources Engineering Code CE-605 Contact 3L + 1T Credits: 4	
Course Content	Number of Lectures
Catchment area and its physical characteristics; Hydrologic cycle; Hydroclimatology.	2
Precipitation types and forms, Measurement of rainfall – Rain gauges, Estimation of missing rainfall data, checking of consistency, Optimum number of Rain gauges. Calculation of average rainfall over area – different methods. Frequency analysis of rainfall intensity duration curve. Rainfall mass curve, hyetograph.	4
Evaporation, evapotranspiration and infiltration – the processes, measurement and estimation.	2
Factors affecting run off, estimation of run off, rainfall run off relationship. Flow duration graph. Time for concentration. Peak flow.	4
Stream flow measurement; direct and indirect methods, stage discharge curve; backwater effects.	4
Hydrographs; characteristics. Base flow separation. Unit Hydrographs. Derivation of unit hydrographs. S-curve. Snyder's and Clark's synthetic unit hydrographs.	4
Types of Irrigation systems, methods of irrigation.	2
Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty & Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons.	4
Canal Irrigation: Introduction, classification of irrigation canals, Efficient section, certain important definitions, Time factor, Capacity factor, full supply co-efficient, Nominal duty, Channel losses, Examples.	4
Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, concept of True regime Initial regime and final regime, design procedure using Lacey's theory, Methods of prevention of silt deposition in canals and reservoirs, examples. Lining of Irrigation Canals : Objectives, advantages and disadvantages of canal lining , economics and requirements of canal lining, Types of lining, Design of lined Canals- examples	6

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References :

1. Water Resources Engineering – Ralph A. Wurbs and Wesley P. James- Prentice Hall of India.
2. Water Resources Engineering- Larry W. Mays – John Wiley & Sons, Inc.
3. Hydrology Principles, Analysis and Design by H. M. Raghunath.
4. Hydraulics of Groundwater – J. Bear – McGraw-Hill.
5. Water Resources Engineering Through Objective Questions – K. Subramanya – Tata McGraw-Hill.
6. Engineering Hydrology-K. Subramanya-Tata McGraw-Hill.
7. A Text Book of Hydrology-P. Jaya Ram Reddy-Luxmi Publications-New Delhi.
8. Hydrology & Water Resource Engineering-S.K Garg-Khanna Publishers.
9. Irrigation, Water Resource & Water Power Engineering-Dr. P.N Modi-Standard Book House-New Delhi.
10. Irrigation & Water Power Engineering-B.C Purnia, S Pande-Standard Publication-New Delhi.
11. Irrigation Engineering-G.L Aswa-Wiley Eastern-New Delhi.

Soil Mechanics Lab.-II

Code-CE-691

Credit –2

1. Determination of compaction characteristics of soil.
2. Determination of compressibility characteristics of soil by Oedometer test (co-efficient of consolidation & compression Index)
3. Determination of unconfined compressive strength of soil
4. Determination of Shear parameter of soil by Direct shear test
5. Determination of undrained shear strength of soil by vane shear test.
6. Determination of shear parameter of soil by Triaxial test
7. Determination of CBR of a soil specimen as per IS code recommendation.
8. Standard Penetration Test.
Expt No.8 by large groups in the field .

Reference:

1. Soil testing by T.W. Lamb (Joh willey)
2. SP-36 (Part-I & Part –II)
3. Measurement of engineering properties of soil by E.Jaibaba Reddy & K. Ramasastry.

Civil Engg. Laboratory – II

Code :CE- 692 :

Credits : 2

Tests on Concrete & Steel:

Fresh Concrete Workability : Slump, Vee-Bee, Compaction factor tests

Hardened Concrete: Compressive strength on Cubes, split Tensile Strength, Static modulus of elasticity, Flexure tests , Non destructive testing .Mix Design of Concrete.

Tests on Steel bars–Tension Test- Bend & rebend test –Code provisions.

References :

BIS Codes on Concrete, Steel.

Laboratory manual on Concrete Testing (Part II) V.V.Sastry and M.L.Gambhir

Highway Materials Testing – S.K. Khanna and C.E.G Justo

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Sessional

STRUCTURAL DESIGN & DRAWING II

Code : CE-693,

Credits -2

Problems on general consideration and basic concepts

Discussion on different loads (i.e. wind load , Dead load , live load and others) as per IS800

Design & drawing of the following components of a roof truss:

1. Members of the roof truss.
2. Joints of the roof truss members
3. Pur lines
4. Gable bracings
5. Column with bracings
6. Column base plate
7. Column foundation

Reference:

- Books:
1. Design of steel structure – L S Negi(Tata Mccrawhill Publication)
 2. Design of steel structures- Arya and Ajmami (Nem Chand & Brs; Roorkee ,U.P.)
 3. Design of Steel Structures- Duggal(Tata Mc graw hill)
 4. I.S. Code 800
 5. I.S. SP-6
 6. Handbook on Design and Detailing of Structures-Dayaratnam P.(Wheeler)
 7. Design of steel Structure-P. Dayaratnam
 8. Structural Design in steel- S.A. Roy (NewAge Int. Pvt. Ltd.)

Computer Programming in Civil Engineering

Code :CE- 694 ;

Contact : 1L + 2P ;

Credits : 2

Solution of problems from different areas of Civil Engineering.

Semester VII

Water Resources Engg- II

Code –CE701

Contacts = 3L + 1L

Credits- 4

Ground Water: Introduction, Modes of occurrence of ground water, Darcy's Law for determining ground water velocity, Empirical formulae for ground water velocity determination. Concept of aquifer, confined aquifer, unconfined aquifer, leaky or semi-confined aquifer, perched aquifer, aquiclude, aquitard, steady flow to wells- Dupuit-Thiem's theory of well hydraulics- for both unconfined and confined aquifers- assumptions, derivation of the mathematical expressions. Unsteady radial flow towards wells- Thiems non-equilibrium formula for confined aquifers, Evaluation of aquifer parameters from Thiems equation-

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Cooper and Jacob method, Artificial recharge of ground water – spreading method , well method, induced infiltration method, Sea water intrusion in coastal aquifers.

Aquifers, Advantages of ground water reservoir. Ground water exploration in brief, safe yield , Examples.

Wells: Definition, Types-open well or Dug well, Tube well, open well-shallow open well, deep open well, cavity formation in open wells, construction of open wells, Yield of an open well – Equilibrium pumping test, Recuperating test, examples, Tube wells- Strainer type, cavity type, slotted type. Construction and Boring of Tube wells, Examples.

River Engineering: Introduction, types of rivers and their characteristics , classification of rivers , Meanders- causes, Meander parameters, Development of a cut-off, cut-off ratio.

Control and Training of Rivers: Concept, objectives.

Classification of River Training: Marginal embankment or levees, Guide Bank, Groynes or spurs, Artificial cut-off, Pitched Island, Pitching of banks and provision of launched apron, Miscellaneous method such as sills etc. Examples.

Bridges and culverts: Introduction, Data collection , High flood discharge computation, Alignment, waterway, Number of spans, economic span, scour depth, Afflux, clearing depth of foundation causeway, submersible bridges , Examples.

Water resources planning:

India's water resources, water resources development, purpose, classification, functional requirements of multipurpose projects, project formulation, evaluation, future strategies, planning & management strategies.

Reference:

- 1] Irrigation Engineering and Hydraulic Structures –By Santosh Kr.Garg.Khanna Publishers.
- 2] Irrigation, water Resources and water Power Engineering – By Dr. P.N.Modi- Standard Book House
- 3]Engineering hydrology – K. Subramanya,Tata Mc Graw-hill Publishers company Limited , New Delhi.
- 4] A Text Book of Hydrology – By P. Jaya Rani Raddy, Laxmi Publications. Delhi, New Delhi, Madras, Jalandhar.
- 5]Ground water – By H.M. Raghunath.Wilay Eastern Limited , New Delhi , Bagalore, Bombay, Calcutta, Madras, Hyderabad.
- 6] Essential Bridge Engineer- By D. Johnson Victor,Exford & IBH Publishing Co. New Delhi, Bombay, Calcutta.
- 7] Water Resource Systems, Planning and analysis By D.P. Luches
Jery R. Stedinger, D.A. Haith, Prntice Hall,Ine, Englewood cliffs, New Jersey 07632.
- 8]Water Resources Engineering—Purnima.

Transportation Engineering -II

Code : CE - 702

Contact : 3L+IT

Credits : 4

Railway Engineering:

Introduction to Railway Engg.: Railway terminologies, survey for track alignment, railway track component parts, gauges, wheel and axle arrangements.

Tractive Resistance: Resistance to traction, various resistances and their evaluation, hauling capacity and tractive effort.

Permanent way: Permanent way component parts, rails, railway sleepers, types, railway creep, anti creep devices, check and guard rails, ballast requirements, types, specifications, formation, cross section and drainage.

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Geometric Design: Alignment, horizontal curves, super elevation, equilibrium cant and cant deficiency, Gradients and grade compensation.

Railway Station Yard: Site, requirements, classification of railway stations.

Signaling and Inter locking: Objectives, principles of signaling, classification and types of signals in stations and yards & methods of interlocking.

Docks & Harbours :

- i) Harbours : Types, accessibility and size
- ii) Tides, wind and waves : Definitions, spring and neap tides, wave movement, littoral drift, deflection of waves, length of waves and wave action on marine structures.
- iii) Breakwaters : Classifications, materials used, methods of construction and protection
- iv) Docks : Shapes of docks and basin, location, arrangement of berth, dockwalls, dock entrances, repair dock types.
- v) Quays : Forces, types and design consideration.
- vi) Miscellaneous topics on docks and harbours, Transit sheds, warehouses, navigational aids.

Airports:

Introduction to airport planning and development: General philosophy of airport planning and development, ICAO classification of airports, site selection factors, characteristics of jet aircraft.

Airport design standards ; Orientation of runways, length of runways and corrections, width of runways, sight distances, gradients and clearances, taxiways and Aprons.

Airport planning : Centralized and decentralized planning concepts, terminal requirements, terminal facilities and Typical layout of airports.

References

A Text Book of Railway Engineering – S.P. Arora & S.C. Saxena

Docks, Harbours and Tunnels by Srinivasan

Transportation Engineering by Vazirani & Chandola

Airport planning and Desigri. S.K.Khanna & M.G.Aro

Airport Transportation Planning & Design- Virendra Kumar & Satish Chandra; Galotia Publication Pvt. Ltd. New Delhi.

Foundation Engineering

Code – CE- 703

Contacts-3L + 1T

Credits-4

Site Investigation & Soil Exploration: Planning of sub-surface exploration , methods , sampling, samples, Insitu tests:

SPT, SCPT, DCPT, field vane shear , Plate load test, Bore log, preparation of sub-soil Investigation report .

Foundations: Classification, selection- shallow and deep foundations.

Shallow foundations : Bearing capacity, Terzaghi's bearing capacity theory, effect of depth of embedment, eccentricity of load, foundation shape on bearing capacity , Bearing capacity on layered media, Bearing capacity as per IS 6403.

Settlement: Immediate and consolidation settlement , correction for rigidity and dimensional effects, settlement in various types of soil , IS-1904 recommendations.

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Allowable bearing capacity: Definition, Determination of allowable bearing capacity from insitu test- SPT , SCPT and Plate load test.

Deep foundations: Pile: Types, load transfer mechanism , method of installation of piles- classification base on material , Installation Techniques – Selection and uses, Determination of load carrying capacities of piles by static and Dynamic formulae, Pile group .
Group efficiency, Negative skin friction, pile load test,

Drilled shafts : Types , Design consideration , Load carrying capacity : Wells: Types, Well Sinking, Caissons, Problems & Remedies.

Introduction to Ground Improvement Technique: Stabilisation using admixtures , stone columns , sand drains, grouting, geotextiles vibroflotation.

Problems for foundation on expansive soil and its remedies

Reference:

1. Foundation Analysis & Design By J.E. Bowels (Mc Graw Hill)
2. Principles of Foundation Engg. By B.M. Das (PWS Publishing)
3. Soil Mechanics & foundation Engg. By WNS Murthy.
4. SP- 36 (Part I & Part II)
- 5 Foundation Engineering By S.P Brahma (TMH)
6. Relevant IS Codes.
7. Foundation Engineering: P.C Vargheese.

Structural Design –III

Code –CE 704

Contact-3L +LT

Credits-4

Design of RCC liquid storage structure resting on ground (rectangular and circular), I.S code method.

Fundamental concept on effect of lateral loads due to wind and earthquake on building frame (as per IS 875 and 1893)

Basic principles of Pre-stressed concrete, Materials, Stress, strain and load balancing concept, Losses of prestress, Analysis in flexure and shear.

R.C.C.Bridges: Different Types – IRC loading – General consideration IRC specification simple design of a solid slab bridge.

Steel Bridges – Introduction – Different types, class of loading . Design of stringer and floor beams.

Plastic Design of steel structures: Introduction. Plastic hinges & Collapse mechanism, Design of beams, simple portals frame.

Reference:

Relevant IS and IRC codes.

Prestressed Concrete – S. Ramamath - Jhanpat Rai Publishers.

Fundamentals of Prestressed concrete – N.C. Sinha & S.K.Roy.

Design of Bridge Structures – Jagadish & Jayaram – Prentice Hall

Principle & Practice of Bridge Engineering – S.P. Bindra- Dhanpat Rai.

Prestressed Concrete-Ramamrutham.

Design Steel Structures- Arya Azmani – Nemchand Bros.

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Design of Steel Structures- Duggal- Tata Mc Graw Hill

Design of Steel Structures by N.Subramanian, OUP.

The Steel Skeleton Vol-II Baker, Horne & Heymean- ELBS

Plastic Design of Steel Frames – Beedle – Jhon Wiley & Sons.

Advanced Design in Structural Steel – Lothers – Prentice – Hall.

Hydraulic Structures

Code CE 705

Contacts- 3L + 1T

Credits: 4

Diversion Head works:

Necessity, Difference between weir and Barrage, Type of Weirs, Selection of site , layout and description of each part, Effects of construction of a weir on the river regime, causes of failure of weirs on permeable foundation and their remedies, Regulation and silt control at head work.

Theories of seepage and Design of weirs and Barrages: Failure of Hydraulic Structures Founded on Pervious foundations: I) By piping ii) By Direct uplift, Bligh's creep theory of seepage flow, Khoslas theory & concept of flownets, concept of exit gradient and critical exit gradient, Khosla's method of independent variable for determination of pressures and exit gradient for seepage below a weir or a barrage, necessary corrections, examples.

Hydraulic structures for canals: Canal falls – necessity, locations, various types and description of each type, Head regulator and cross regulator- location, description,

Cross-Drainage Works: Necessity, types, selection of a suitable type, Description of each type Design consideration – in brief.

Dam (General): Definition, classification of Dams, factors governing selection of type of dam , selection of suitable site for a dam, Salient features of important dams of India.

Earthen Dams: Introduction, Types of Earthen Dams, Methods of Construction, Causes of failure, Design Criteria, Determination of line of seepage or phreatic line in Earthen Dam, stability of u/s and d/s slopes, seepage control in Earthen Dam, Design of filters, slope protection, examples.

Gravity Dam: Definition, Typical cross- section, Forces acting on Gravity Dam, Combination of forces for design, Mode of failure and criteria for structural stability of Gravity Dams, Principal and shear stresses. Elementary profile of a Gravity Dam, Concept of High and low Gravity Dam, Profile of a Dam from Practical consideration, Design consideration of Gravity Dam- in brief. Foundation treatment of Gravity dam: Examples.

Spillways, Energy Dissipators and Sillway Gates: Introduction, Location, Essential requirements, spillway capacity. Components of spillway, Controlled and un-controlled spillways, various types of spillways- description of each type in brief, Energy Dissipation below overflow spillways- Hydraulic jump formation, stilling basins, spillway crest Gates- various types and description: Examples.

Reference:

- 1.Irrigation Engineering and hydraulic structures By Santosh Kumar Garg. Khanna Publishers.
- 2.Irrigation , water Resources and Water Power Engg. – By Dr.P.N. Modi,Standard Book House. Post Box : 1074- Delhi-6
- 3.Water Resources Engineering Principle and practice By Satya Narayana Murthy Challa. New Age ,Internation (P) Ltd. Publishers. New delhi, Bangalore, Chennai , Hyderabad, Kolkata, Lucknow , Mumbai.
- 4.Design of Small Dams. United States Department of the Interior Bureau of Reclamation.
5. Concrete Danms- By- R.S. Varsney , Oxford & I & H Publishing Co. New Delhi, Bombay , Calcutta.

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ENVIRONMENTAL ENGINEERING LAB

CODE: CE-791

CRDIT-2

Experiments :

pH colour , turbidity
Solids – suspended , dissolved , settleable and volatile ,
Dissolved oxygen, BOD , COD
Determination of fluorides and Iron
Hardness , Chlorides
Nitrite – Nitrogen and Ammonical – Nitrogen
Available chlorine in bleaching powder, Residual chlorine in water &
Chlorine demand .
Bacteriological quality of water – presumptive test, confirmative test
and Determination of MPN
Jar Test.

Highway Engineering Lab.

Code CE 792

Credits –2

Tests on highway materials – Aggregates- Impact value, Los-Angeles Abrasion value water absorption ,
Elongation & Flakiness Index.

Bitumen & bituminous materials – specific gravity, penetration value, softening point, loss on heating,
Flash & Fire point test.

Stripping value test
Design of B.C. & S.D.B.C. Mix
Marshal Stability Test.
Benkelman Beam Test.

Reference:

BIS codes on Aggregates & Bituminous Materials

Highway material testing (Laboratory Manual)

- S.K. Khanna and CE.G. Justo,
- I.R.C. codes.

Computer Application in Civil Engineering-I Lab

Code: CE 793

Credits: 2

Curve fitting, Straight line fitting by method of least squares

Matrix Applications.

- a) Solution of simultaneous equations.
- b) Integration, Trapezoidal rule, Simpsons Rule, Gauss-Quadrature.
- c) Application Programs.
 - i) Bearing Capacity Coefficient
 - ii) Stability of slopes

Application programs in hydraulics and fluid mechanics

- a. Coefficient of permeability for flow through layered soil,
 - i) Parallel to layers.

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- ii) Perpendicular to layers
- iii) Pipe Net work solution

Application programs in Structural Engineering:

- a. SF and BM at different sections of a simply supported beam with different loading conditions.
 - b. Design of rectangular sections of RCC beam.
 - i) Limit State method.
 - ii) Working Stress method.

Reference:

- 1. Weben Systems Inc- C Language user's Hand book '-Galgotia
- 2. Gary bronson – Stephen Menconi- 'Fundamentals of C Programming.

Semester VIII
ELECTIVE – I

Advanced Transportation Engineering

Code – CE 801/1

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Geometric Design of Highways: Cross-section design of Expressways and Arterial roads, Development of Super Elevation on Horizontal Curves, Design of Vertical curves.	4	36
2	Geometric Design of Intersections: Types, Forms, Intersection Operations, Design of Speed change lanes, Intersection sight distance (AASHTO consideration), interchange types(flow diagrams only), channelization of three and four legged right-angled intersections.	8	
3	Geometric Elements of round about	2	
4	Traffic Engineering: Stream variables; Spacing and Concentration, Headway and Flow, Time mean and Space mean speeds, Relation between speed, flow and density, Development of Stream flow equations-Problems, Stream Measurements by the Moving Observer Method.	6	
5	Capacity and Levels of Service for Uninterrupted Traffic Flow	2	
6	Traffic Signals: Types, Design of Isolated Fixed Time Signals.	4	
7	Design of Pavements: Determination of ESWL, EWLF, Damage, Stress Ratio, Load Distribution Characteristics of Flexible and Rigid Pavements, Burmister's Method of Flexible Pavement Design, Design of Flexible and Rigid Pavements by AASHTO methods, Fatigue consideration for Design of Rigid Pavement	10	

References:

Sl. No	Name	Author	Publishers
1	Pavement Analysis and Design, 2 nd . Edition	Yang H. Huang	Pearson Education
2	Principles of Highway Engineering and Traffic Analysis, 3 rd . Edition	Fred L.Mannering, Walter P. Kilareski Scott S. Washburn	Wiley Eastern India
3	Highway Engineering, 2nd.Edition, ,	Martin Rogers	Blackwell Publishing
4	Traffic and Transport Planning,	L.R.Kadiyali	
5	Highway Engineering	Hewes and Oglesby	

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6	Highways	O'Flaherty	
7	Transportation Engineering and Planning, ,	Papacostas	Pearson ducation
8	Highway Engineering	Khanna & Justo	Neem Chand & Brothers
9	Principles of Transportation Engineering	Chakraborty & Das	PHI

Environmental Pollution and Control

Code – CE 801/2

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Introduction: Environment. Pollution, Pollution control,	2	36
2	Air Pollution: Pollutants, Effects, Sources, Dispersion, Lapse Rate, Inversion, and Impact of wind, atmospheric pressure, moisture and precipitation on dispersion of air pollutants, Design of stack height.	8	
3	Air pollution Control: Self cleansing properties of the environment, Dilution method, Installation of engineering devices, control of the particulates, control of pollutants, control of air pollution from automobiles.	8	
4	Water pollution: Pollution characteristics of typical industries, Suggested Treatment	4	
5	Environmental Impacts: Thermal power plant, Mining, Radioactivity.	3	
6	Global Environmental issues: Ozone depletion, Acid rain, Global Warming-Green house effects, Noise Pollution: Definition, Effect, Characteristics, Measurement, Levels, Sources, control.	4	
7	Administrative control on environment	4	
8	Water Act, Air Act, Motor Vehicle Act	3	

References:

Sl. No	Name	Author	Publishers
1	Environmental Engineering,	S.K . Garg,	Khanna Publishers
2	Water Supply, Waste Disposal and Environmental Pollution Engineering, ,	A.K.Chatterjee	Khanna Publishers.
3	Environmental Engineering, Vol.II,	P. N. Modi,	Oxford University Press.
4	Environmental Modelling, ,	Rajagopalan	
5	Environmental Engineering	P. V. Rowe	TMH
6	Air Pollution	Rao	

Advanced Structural Analysis

Code – CE 801/3

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Matrix methods of analysis: Matrix formulation of redundant beam analysis (Clapeyrons three moment theorem and slope deflection method). Stiffness and flexibility approaches for beams, simple portal frame, trusses.	9	
2	Dynamic analysis of structural frames: Wind analysis of structures by using I.S. Code provisions, Seismic analysis as per IS 1893, Computer oriented algorithms.	9	

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3	Theory of plates and shells: Thin plate analysis. Differential equation of bending under point and uniformly distributed load, various support systems. Rectangular and circular plates. Membrane analysis of thin shell, meridional & hoop stress, shell of revolution, cylindrical shell, applications.	9	36
4	Introduction to finite element: Potential Energy, shape function, linear, triangular and rectangular element, fundamentals for one-dimensional, two dimensional structure, isoparametric formulation, simple two dimensional problems related to civil engg.	9	

References:

Sl. No	Name	Author	Publishers
1	Matrix Methods of Structural Analysis	M.B. Kanchi.	
2	Analysis of Structures	T.S. Thandavamoorthy	Oxford University Press
3	Structural Dynamics Theory & Computation	Mario Paz	CBS
4	Intermediate Structural Analysis	C.K. Wang	Mc Graw Hill
5	Theory of Plates & Shells	Timoshenko & Kreiger	Mc Graw Hill
6	Finite Element Method for Structural Engineers (A Basic Approach)	W. N. Al-Rifaie & A. K. Govil	Wiley Eastern Limited
7	Introduction to Finite Element Engineering	T. R. Chandrapatula & A. D. Belegundu	Pearson Education
8	Finite Element Analysis	Buchanan, Rudramoorthy	Mc Graw Hill
9	Computational Structural Mechanics	Rajasekaran & Sankarasubramanian	PHI
10	An introduction to the Finite Element Method:	J.N Reddy	Mc Graw Hill
11	IS 1893, IS 875 and relevant IS codes		

Advanced Foundation Engineering

Code – CE 801/4

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Soil Exploration and Site Investigation Planning of soil exploration programme, Field testing, Preparation of bore-log and soil investigation report Geo-physical exploration: Seismic refraction survey electrical resistivity method	4	
2	Shallow Foundations Bearing Capacity from SPT and SCPT and Plate load Test data, Proportioning of footing based on settlement criteria. Beams on elastic foundation: Infinite beam, Finite beam, Modulus of sub-grade reaction and effecting parameters. Raft Foundation: Settlement and Bearing Capacity analysis, Analysis of flexible and rigid raft as per IS 2950.	10	

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3	Deep Foundations Pile: Tension piles, Laterally loaded piles: Elastic continuum approach, Ultimate load Analysis, Deflection and maximum moment as per IS 2911, Pile load test Drilled Shaft: Construction procedures, Design Considerations, Load Carrying Capacity and settlement analysis Caissons: Types, Sinking and control.	8	36
4	Retaining walls and sheet pile structures Gravity cantilever and counter fort retaining walls: Stability checks and design Sheet Pile Structures: Cantilever sheet piling, Anchored sheet piling: Free and fixed earth support methods of Analysis, Braced Excavation	8	
5	Design of foundation for vibration control Elements of vibration theory, Soil- springs and damping constants, dynamic soil parameters, Types of Machine foundations, General consideration in designing dynamic bases.	4	
6	Foundations on Problematic soils: Problems and Remedies	2	

References:

Sl. No	Name	Author	Publishers
1	Foundation Analysis & Design	J.E. Bowels	Mc Graw Hill
2	Principles of Foundation Engineering	B.M. Das	Thomson Book
3	Foundation Design Manual	N. V. Nayak	Dhanpat Rai Publication Pvt. Ltd
4	Foundations for Machines: Analysis and design	Shamsher Prakash, Vijay K Puri	Wiley Series in Geotechnical Engineering
5	Advance Foundation Engineering	N. Som & S. C. Das	
6	Hand Book of Machine Foundation	P. Sirinivashalu & C.V. Vaiddyanathan	Tata McGraw Hill
7	IS –1904, IS 6403, IS 8009, IS 2950, IS 2911 etc	-----	Bureau of Indian Standard

Remote Sensing and GIS

Code – CE 801/5

Contact – 3L + 1T

Credits: 4

Sl. No	Details of Course Content	Hours	Total
1	Introduction: Definition and types of remote sensing, Tacheometry (Planimetry/ altimetry), Triangulation (Frame work / adjustment), Trilateration (EDM/ Total Station), Geodetics (physical/ geometrical geodesy), Error Analysis (causes / law of weights), Numerical example	7	
2	Photogrammetry: Camera System (phototheodolite/ aircraft), Ground photograph (oblique/orthogonal streophoto), Aerial photograph (perspective scale/ flight planning), distortion (relief / tilt), Geometrix (parallax / mapping), application (topographics / interpretation), Numerical examples	7	
3	Satellite survey: Satellite Sensing (Sensors / platforms), energy sources (electromagnetic / atmospheric interaction), visual interpretation (Band width), digital processing (imageries / enhancement), data integration (multi-approach / GIS), microwave imaging (active system / radars), applications	7	

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4	Astronomy: Celestial sphere (star-coordinates / transformation), field astronomy (azimuth, solar and polar method), 3D computation (local vs global), spherical trigonometry, Multilateration, Observation, Corrections in astronomy, Correlation of low, medium, remote objects, Global Positioning Systems	7	36
5	Geoinformatics: GIS concept (Introduction/ definition), planning and management, spatial data model, database and DBMS, linking of attributes, geospatial analysis, modern trends	8	

References:

Sl. No	Name	Author	Publishers
1	Surveying (Volume 2):	Duggal S.K.	Tata Mc Graw Hill
2	Remote Sensing & GIS:	Bhatta B.	Oxford Univ Press
3	Geographic Information System:	Tor Bern Herdgen	Wiley
4	Surveying:	Bannister, Raymond & Baker	Pearson Education
5	Remote Sensing & Image Interpretation:	Lilesand, Kiefer and Chipman	Wiley
6	Surveying (Volume 2):	Kanetker & Kulkarni	
7	Remote Sensing & Geographical information System	Reddy M.A.	(BS publication).
8	Advanced Surveying	Rampal K.K.	
9	Fundamentals of Geographic Information System:	Demers M.N.	(Wiley)

ELECTIVE – II

Soil Stabilisation & Ground Improvement Technique

Code – CE 802/1

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Soil Stabilization: Introduction, Stabilization of soil with granular skeleton and soil without granular skeleton, common nomenclature of stabilized soil systems and stabilization methods, specific methods of soil stabilization: Stabilization with cement, lime fly-ash	8	36
2	Insitu densification: Introduction, Compaction: methods and controls <i>Densification of granular soil:</i> Vibration at ground surface, Impact at ground surface, Vibration at depth (Vibroflotation), Impact at depth. <i>Densification of Cohesive Soils:</i> Preloading and dewatering, Design of Sand drains and Stone columns, Electrical and thermal methods.	12	
3	Geo-textiles: Over view: Geotextiles as separators, reinforcement. Geotextiles in filtration and drainage, geotextiles in erosion control.	6	
4	Grouting: Over view: Suspension and Solution grout, Grouting equipment and methods, Grout design and layout, Grout monitoring schemes.	6	
5	Soil stability: Reinforced earth fundamentals, Soil nailing, Soil and Rock Anchors, Underpinning	4	

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References:

Sl. No	Name	Author	Publishers
1	Foundation Analysis & Design	J.E. Bowels	Mc Graw Hill
2	Principles of Foundation Engineering	B.M. Das	Thomson Book
3	Foundation Design Manual	N. V. Nayak	Dhanpat Rai Publication Pvt. Ltd
4	Construction and Geotechnical methods in foundation engineering	R.M. Koener	Mc Graw Hill
5	Technology in tunnelling and dam construction	A.V. Shroff. & D.L. Shah	Oxford and IBH Publishing Co.Pvt.Ltd
6	Reinforced Earth	T S Ingold	Thoam Telford
7	Designing with Geosynthetics	R M Koerner	Prentice Hall

Bridge Engineering

Code – CE 802/2

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Introduction , - Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development. I.R.C Loads. Analysis of IRC Loads, Impact factors, Other loads to be considered, Importance of Hydraulic factors in Bridge Design.	4	36
2	Reinforced concrete solid slab bridge: Introduction, General design features, Effective width method. Simply supported and cantilever Slab Bridge, analysis and design	8	
3	Box Culvert: Introduction, Design method and Design example	2	
4	Beam and Slab Bridges Introduction, Design of interior panel of slab. Pigeauds method, Design of longitudinal girder, Calculation of longitudinal moment, design example.	6	
5	Balanced Cantilever Bridges: General Features, Arrangement of supports, design features Articulation, Design example.	5	
6	Steel Bridges: General features, types of stress, Design example.	3	
7	Plate Girder Bridge: Elements, design, lateral bracing, Box- girder Bridges.	3	
8	Composite Bridges: General aspects, method of construction, analysis of composite section, shear connectors, design of composite beam.	3	
9	Cable Stayed Bridge: General features, Philosophy of design.	2	

References:

Sl. No	Name	Author	Publishers
1	Principle & Practice of Bridge Engineering	S.P. Bindra–	Dhanpat Rai Pub
2	Essentials of bridge engineering	D.J. Victor	
3	Bridge engineering	Ponnuswamy	
4	Design of Bridge Structures	T.R. Jagadesh, M.A. Jayaram	
5	Bridge engineering	by Krishnaraju	
6	Design of concrete bridges	by Aswani, Vizirani , Ratwani	
7	Design of steel structures	Arya & Ajmani	

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8	Concrete Structures	Vaziram & Ratwani
9	Structures design and drawing	Krishnamurthy
10	Relevant IS & IRC codes	

Water Resources Management & Planning

Code – CE 802/3

Contact – 3L + 1T

Credits- 4

Sl. No	Details of Course Content	Hours	Total
1	Planning and analysis of Water Resource Systems: Introduction, System Analysis, Engineers and Policymakers	3	36
2	Methods of Analysis: Introduction, Evaluation of Time streams of Benefits and Costs. Plan formulation, Planning models and solution procedures, Lagranges Multipliers, Dynamic Programming, Recursive equations, Bellmans' principle of optimality. Curse of dimensionality of discrete dynamic programming. Examples	8	
3	Reservoir Operation: Sequential process, single Reservoir problem - with release as decision variable, with storage as decision variable (deterministic approach). Examples, Related Computer Programming. Multi-reservoir problems (Deterministic approach)	6	
4	Water Resources Planning under Uncertainty: Introduction, probability concepts and Methods – Random variable and Distributions, Univariate probability Distributions, properties of Random variable – Moment and Expectation (Univariate Distributions) , Moment Generating Functions, Measures of Central tendency, Measures of Dispersion, Measures of symmetry (Skewness), measures of peakedness (kurtosis), examples	10	
5	Stochastic River Basin Planning Model: Introduction, Reservoir operation, Stochastic, Dynamic programming, Operating Model, Probability Distribution of Storage volumes and Releases, examples	6	
6	Water quality Management: Prediction and Simulation, Water quality Management Modeling	3	

References:

Sl. No	Name	Author	Publishers
1	Applied Hydrology	V.T. Chow	
2	Hydrology	Raudkivi	
3	Stochastic Hydrology	Jayarami Reddy	
4	Water Resources Engg.	M.C. Chaturvedi	
5	Water Resources Systems Planning & Analysis	Ddenice P Loucks, Jery R Stedinger & Douglas A Heinth	Prentice Hall, Inc New Jersey.

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Prestressed Concrete

Code – CE 802/4

Contact – 3L + 1T

Credits-4

Sl. No	Details of Course Content	Hours	Total
1	Introduction of Prestressed concrete: Materials, prestressing system, analysis of prestress and bending stress, losses Shear and torsional resistance: design of shear reinforcement, design of reinforcement for torsion shear and bending. Deflections of prestressed concrete members: Importance, factors, short term and long term deflection	7	36
2	Limit state design criteria: Inadequacy of elastic and ultimate load method, criteria for limit states, strength and serviceability. Design of sections for flexure: methods by Lin and Magnel	6	
3	Anchorage Zone stresses in post tensioned members: stress distribution in end block, anchorage zone reinforcement	5	
4	Composite construction of prestressed and in-situ concrete: types, analysis of stresses Statically Indeterminate structures: advantages of continuous member, effect of prestressing, methods of achieving continuity and method of analysis of secondary moments	8	
5	Prestressed concrete poles and sleepers: Design of sections for compression and bending	5	
6	Partial prestressing and non prestressed reinforcement	5	

References:

Sl. No	Name	Author	Publishers
1	Prestressed Concrete, Fourth Edition,	N Krishna Raju	Mc Graw Hill
2	Design of Prestressed Structures,	T.Y.Lin and N.H.Burns,	Wiley Eastern Ltd
3	Fundamentals of Prestressed Concrete,	N.C.Sinha and S.K.Roy	
4	Prestressed Concrete,	S.Ramamurthan	

Structural Dynamics & Earthquake Engineering

Code – CE 802/5

Contact – 3L + 1T

Credits-4

Sl. No	Details of Course Content	Hours	Total
1	Theory of vibrations: Degrees of freedom, Undamped single degree freedom system, Damped single degree freedom system, Natural frequency, modes of vibration, Introduction to multiple degree freedom system	6	18
2	Response of single degree freedom system due to harmonic loading: Undamped harmonic excitation, Damped Harmonic excitation	8	
3	Response due to Transient loading: Duhamel's Integral, Response due to constant force, Rectangular load, Introduction to numerical evaluation of Duhamel's integral of undamped system.	6	

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4	Elements of seismology: Fundamentals: Elastic rebound theory, Plate tectonics, Definitions of magnitude, Intensity, Epicenter etc., Seismographs, Seismic zoning, Response of Simple Structural Systems	4	36
5	Principles of earthquake resistant design: Terminology, General principles and Design criteria, Methods of Analysis, Equivalent lateral force method of Analysis for multistoried building as per Indian Standard Code of Practice, Introduction to Response Spectrum Method, Fundamental concepts of Ductile detailing	12	

References:

Sl. No	Name	Author	Publishers
1	Structural Dynamics (Theory and Computation)	Mario Paz.	CBS Publishers and Distributor
2	Dynamics of Structure (Theory and Application to Earthquake Engineering)	A.K.Chopra	Pearson Education
3	Elements of Earthquake Engineering	Jai Krishna, A. R. Chandrashekhar and Brijesh Chandra	South Asian Publishers
4	Earthquake Resistant Design	D. J. Dowrick	John Willey & Sons
5	IS 1893 (Part 1): 2002, IS 3920, IS 4326	-----	Bureau of Indian Standard

Construction Management, Technology & Departmental Procedure

Code –CE 803

Contact- 3L+ 1T

Credits –4

Sl. No	Details of Course Content	Hours	Total
1	Planning: General consideration, Definition of aspect, prospect, roominess, grouping, circulation privacy, acclusion	2	36
2	Regulation and Bye laws : Bye Laws in respect of side space, Back and front space, Covered areas, height of building etc., Lavatory blocks , ventilation, Requirements for stairs, lifts in public assembly building, offices	4	
3	Fire Protection: Fire fighting arrangements in public assembly buildings, planning , offices, auditorium	2	
4	Construction plants & Equipment: Plants & equipment for earth moving, road constructions, excavators, dozers, scrapers, spreaders, rollers, their uses. Plants & Equipment for concrete construction: Batching plants, concrete mixers, Vibrators etc., quality control	8	
5	Planning & Scheduling of constructions Projects: Planning by CPM & PERT, Preparation of network, Determination of slacks or floats. Critical activities. Critical path, project duration . expected mean time , probability of completion of project, Estimation of critical path, problems.	8	
6	Management: Professional practice, Defination, Rights and responsibilities of owner, engineer, Contractors, types of contract	4	
7	Departmental Procedures: Administration, Technical and financial sanction, operation of PWD, Tenders and its notification, EMD and SD, Acceptance of tenders, Arbitration	8	

* Serial 1, 2, 3 are as per National Building Code and KMDA specification

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References:

Sl. No	Name	Author	Publishers
1	Construction Planning, Equipments and methods	Puerifoy, R.L.	McGraw Hill.
2	Management in construction industry	P.P.Dharwadkar	Oxford and IBH Publishing company New Delhi
3	Construction Management, Critical path Methods in Construction,	J.O.Brien	Wiley Interscience
4	PERT and CPM	L.S. Srinath	
5	Project planning and control with PERT and CPM? Construction equipments and its management	B.C.Punmia and K.K.Kandelwal S.C.Sharma	

Accountancy & Economics

Code : CE – 804

Contact : 3L + 1T

Credits : 4

Sl. No	Details of Course Content	Hours	Total
1	Financial Accounting: Meaning, Nature and scope of Financial Accounting, Accounting concepts & conventions, Business Transactions, Different types of Vouchers, Analysis of Transactions, Recording in Journals and cash books, Posting of Ledgers, Preparation of Trial balance, Preparation of Final Accounts (Trading Account, Profit & Loss A/C and Balance Sheet)	12	
2	Cost Accounting: Introduction, Classification of Costs; Break-even Analysis; Budgeting & Budgetary Control, Objectives, Advantages & Limitations of Budgeting, Cash Budget, Flexible Budget, Master Budget, etc	4	
3	Financial Management: Cost of Capital: Capital Budgeting, Working Capital Management	4	

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4	<p>Economics Introduction: Definition of Economics- scope and nature of economic science- Economic decision and technical decision- Economic efficiency and Technical efficiency, Forms of business organization. Capitalistic, Communist and mixed economics, Developing and developed economics, Characteristics of Indian economy</p> <p>Demand and revenue analysis: Meaning of demand, Determinants of demand, Exception to the law of demand. Elasticity of demand- Meaning, Price Elasticity of demand</p> <p>Demand Forecasting: Basic concepts and tools used in Analysis of demand forecasting for new demands, existing products and consumer products.</p> <p>Cost and Production Analysis: Cost concept: Classification of cost- Cost output relationship- Cost function and its determinants, Estimation of Cost function, uses of Cost function. Production: Meaning, Factors of production- Land, Labour, capital and organization.</p>	16	36
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References:

Sl. No	Name	Author	Publishers
1	Modern Accountancy	A. Mukherjee & M. Hanif	Tata McGraw- Hill
2	Accountancy (Vol.1)	Dr. S.K. Paul	New Central Book Agency
3	Practice in Accountancy	S. P. Basu & Monilal Das	Rabindra Library
4	Modern Economic Theory	K.K. Dewett	S.Chand
5	Fundamentals of Economic Principles and problems	A. Banerjee & D. Maumder	ABS Publishing House
6	Economics for Business	John Sloman & Mark Sutcliffe	Pearson Education
7	Management Accounting	R.K. Sharma & S. Gupta	Kalyani Publishers
8	Financial Management	Dr. S. Kr. Paul	New Central Book Agency
9	Financial Management	Dr. D. Majumder; Sk. Raju Ali & Lutfun Nesha	ABS Publishing House

Computer Application in Civil Engineering - II

Code: CE 891

Contact: 0 0 3

Credits: 2

Mathematical formulation, Algorithm, Flow Chart & Programming of at least 5 (five) of the following problems:

1. Digital terrain model from leveling data
2. WGS (World Geodetic System Co-ordinate) from total station traverse
3. Estimation of flood hydrograph at a section from given rainfall data
4. Flood routing through storage reservoir with given area level parameter and inflow hydrograph
5. Water quality management programme
6. Analysis of simple framed structure by direct stiffness method
7. Analysis of two way slab by IS 456 2000
8. Design of flexible pavement by IRC 37 - 2001
9. Bearing capacity and settlement analysis of shallow foundation as per IS 6403 and IS 8009(Part I)
10. Design of super-elevation
11. Determination of stresses for rigid pavement
12. Design of water treatment plant

Demonstration of Standard application softwares.