

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)

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. 979, 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.

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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.