Shri Jagdishprasad Jhabarmal Tibrewala University

(Civil Engineering Department)

Detailed Syllabus of B.Tech.

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: II **Semester: III**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	CE-301	Strength of Materials–I	3	1	-	3	30/12	70/28	100/40
2	CE-302	Building Material & Construction	3	1	-	3	30/12	70/28	100/40
3	CE-303	Engineering Geology	3	1	-	3	30/12	70/28	100/40
4	CE-304	Computer Applications in Civil Engineering	3	1	-	3	30/12	70/28	100/40
5	CE-305	Fluid Mechanics	3	1	-	3	30/12	70/28	100/40
6	CE-306	Engineering Mathematics	3	1	-	3	30/12	70/28	100/40
Practical's									
7	CE-307	Material Testing lab	-	-	3	3	40/16	60/24	100/40
8	CE-308	Fluid Mechanics Lab	-	-	3	3	40/16	60/24	100/40
9	CE-309	Engineering Geology Lab	-	-	3	3	40/16	60/24	100/40
10	CE-310	Computer Application lab	-	-	3	3	40/16	60/24	100/40
		Total	**18**	**6**	**12**				**1000**
		Total Teaching Load	**36**						

CE-301 STRENGTH OF MATERIALS - I

UNIT 1

Simple Stresses and Strains : Concept of stress and strain in three dimensions and generalized Hooke's law; Direct stress and strain: free body diagrams, Hooke's law, Young's modulus; Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress; Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants; Strain energy for gradually applied, suddenly applied and impact loads.

UNIT 2

Compound Stress : Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & it's application.

Columns : Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae.

UNIT 3

Centroid and Moment of Inertia : First moment of area, Centroid and moment of inertia of symmetrical & unsymmetrical sections, radius of gyration, polar moment of inertia, product moment of inertia, parallel axis theorem, principal axes and principal moment of inertia.

Plane trusses : Simple pin jointed trusses and their analysis: method of joints, method of section and introduction to computer methods.

UNIT 4

Bending of Beams : Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures; Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected o various types of loads and moments.

UNIT 5

Vibrations : Stress tensor and failure criterion. Elementary concepts of structural vibration, degree of freedom, free vibration of undamped single degree of freedom systems. Newton's law of motion, D'Almbert's principle, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping, analysis of viscously damped, under-damped, over-damped & critically-damped systems, logarithmic decrement.

CE-302 BUILDING MATERIAL AND CONSTRUCTION

Unit –I

Building Materials: Classification, Properties and selection criteria of Bricks Burning of Bricks, tests for bricks, stone Classification, characteristics of good building stone, common building stones in India, lime , IS specifications , Field tests of Building limes, timber, Characteristics of good timber, defects in timber, seasoning of timber, tests on timber, plywood, glass, plastics, P.V.C.

Mortar: Types, classification and strength, I.S. specifications.

Unit –II

Cement, Manufacture of cement, Different types of cement such as slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties, Tests on Cements, Admixtures, Aggregates and Testing of Aggregates: Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties.

Unit –III

Building Constuction: Classification of buildings, Recommendations of NBC, Building byelaws, modular co-ordination; orientation of buildings, desirable conditions of conforts, components of building area considerations. Types of foundations and selection criteria Brick masonry, stone masonry. Types of walls, partition and cavity walls. Prefabricated construction. Plastering and pointing. Damp proofing materials and techniques, Antitermite treatment.

Unit – IV

Types floors,construction details and selection criteria.
Types of roofs and roof covering, treatment for water proofing.
Stair and staircases : Types, materials, proportions
Doors and windows : sizes and locations, proportions.

Unit –V

Lifts and escalators. White washing, colour washing, painting, distempering.
Shuttering, scaffolding and centering. Expansion and construction joints
Sound and fire proof construction, I.S. specifications

References :

1. Arora, S.P. & Bindra, S.P., 'A text book of Building Construction" Dhanpat Rai & Sons, Delhi,
2. Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, Delhi,1977.
3. Kulkarni, C.J., "A text book of Engineering Materials", Ahmedabad book Depot, Ahmedabad,
4. Kulkarni, C.J., "A text book of Engineering Construction", Ahmedabad Book Depot,
5. Kumar Sushil, "Engineering Materials, "Standard Publishers Distributors, Delhi, 1994.

CE-303 ENGINEERING GEOLOGY

UNIT – I

Earth Sciences and its importance in Civil Engg. Minerals and their physical properties. Study of common rock forming minerals. Internal structure of the earth. Suitability of rocks as engineering materials. Building stones occurrences and characteristics, selection

UNIT – II

Rocks origin, Characteristics, Texture, structure and classification of igneous, sedimentary and metamorphic rocks. Engineering properties of rocks.

UNIT – III

Strike and dip of strata, folds, faults, joints, unconformity and their classification, Causes and relation to engineering behaviour of rock masses. Overlap. Landslides causes, classification and preventive measures.

UNIT – IV

Earthquake causes, classification, earthquake waves, intensity and magnitude, Seismic zones for India, Geological consideration for construction of building.

Underground water, sources, Aquifer, Aquiclude, Artesian well, Ground water provinces of India and its role as geological hazard.

UNIT – V

Geological investigations for site selection of dams & reservoirs, tunnels, bridges and highways. Reservoir induced seismicity. Methods of Geophysical explorations-gravity, electrical and seismic, methods.

References

1. Prabin Singh, "Engineering and General Geology", Katson publishing house.
2. Legget, R.F., "Geology and Engineering", McGraw Hill, New York.
3. Blyth, F.G.M., "A Geology for Engineers" , Arnold, London.
4. P.K. Mukerjee, "A Text Book of Geology", Calcutta, world publisher.
5. Krynine and Judd: "Principles of Engineering Geology & Geotechnics," Mc Graw Hill,
6. 6. B.S. 7. K.S. Valdiya: "Environmental Geology", Tala Mc Graw Hill, New Delhi.

CE-304 COMPUTER APPLICATIONS IN CIVIL ENGINEERING

UNIT 1

Approximation & Error analysis: Approximations and round of errors, Truncation errors and Taylor Series. **Roots of Non-linear Equations:** Determination of roots of polynomials and transcendental equations by Bisection, Secant and Bairstow's method, Newton-Raphson method, Successive substitution method etc.

UNIT 2

Linear Algebraic Equation: Solutions of linear simultaneous linear algebraic equations by Gauss Elimination and Gauss-Siedel iteration methods Successive substitution method and Decomposition methods.

UNIT 3

Curve fitting & Numerical Differentiation: Curve fitting – linear and nonlinear regression analysis; Backward, Forward and Central difference relations and their uses in numerical differentiation and integration, Application of difference relations in the solution of differential equations.

UNIT 4

Numerical Integration and Area under a Curve: Introduction to numerical integration and Area under a Curve; Trapezoidal method, Simpson's 1/3 method, Simpson's 3/8 method and Newton's method for integration.

UNIT 5

Ordinary Differential Equation: Numerical solution of ordinary differential equations by Euler, Modified Euler, Runga-Kutta and Predictor-Corrector method.

Partial Differential Equation: Elliptic equation & parabolic equation & their solution techniques. Finite Element Method: – General approach, application in one dimension. Computer programming using C/ C++ on these topics.

CE-305 FLUID MECHANICS

UNIT I:

Introduction: Physical properties of fluids: Viscosity, Compressibility, Surface Tension, Capillarity, Vapour Pressure; Cavitation; Classification of fluids including rheological classification.

Fluid Statics: Pascal's law; Pressure-density-height relationship; Measurement of pressure by Manometers and mechanical gauges; Pressure on plane and curved surfaces; The Hydrostatic law; Total Pressure and Centre of pressure; Buoyancy; Stability of immersed and floating bodies; Fluid masses subjected to uniform horizontal and vertical accelerations.

UNIT II:

Fluid Kinematics: Description of Fluid flow: Lagrangian and Eulerian approach; Types of fluid Flows: Steady and unsteady, Uniform and non-uniform, Laminar and turbulent flows, 1, 2 and 3-D flows; Stream lines, Path lines and Streak lines; Stream tube; Acceleration of a fluid particle along a straight and curved path; Differential and Integral form of Continuity equation; Rotation, Vorticity and Circulation; Elementary explanation of Stream function and Velocity potential; Flow net characteristics, uses and experimental and graphical methods of drawing.

Fluid Dynamics: Euler's equation of motion along a streamline and its integration, Bernoulli's equation and its applications – Pitot tube, Flow through orifices, Nozzles, Notches, Weirs, Sluice gates under free and submerged flow conditions; Free and Forced vortex motion.

UNIT III:

Laminar Flow: Reynolds Experiment**;** Equation of motion for laminar flow through pipes; Flow between parallel plates; Kinetic energy and Momentum correction factors; Stokes law; Flow through porous media; Darcy's Law; Measurement of viscosity; Transition from laminar to turbulent flow.

UNIT IV:

Flow Through Pipes: Nature of turbulent flow in pipes; Equation for velocity distribution over smooth and rough surfaces; Major and Minor energy losses; Resistance coefficient and its variation. Hydraulic gradient and total energy lines; Flow in sudden expansion, contraction, diffusers, bends, valves and siphons; Concept of equivalent length; Branched pipes; Pipes in series and parallel; Simple pipe networks.

Unit V:

Compressibility Effects in Pipe Flow: Transmission of pressure waves in rigid and elastic pipes; Water hammer; Analysis of simple surge tank excluding friction.

Ideal (Potential) Fluid Flow: Importance; Elementary concept of the uniform flow, the source flow, the sink flow and the free vortex flow. **Flow Past Submerged Bodies:** Drag and lift, Types of drag force, Drag on sphere, Cylinder and airfoil; Circulation and Lift on a cylinder and airfoil; Magnus effect.

REFERENCES:

1. R J Fox: Introduction to Fluid Mechanics
2. Hunter Rouse: Elementary Mechanics of Fluids, John Wiley and sons, Omc/ 1946.
3. L H Shames: Mechanics of Fluids, McGraw Hill, International student edition.
4. K L Kumar: Engineering Fluid Mechanics
5. 7. V Gupta and S K Gupta, Fluid Mechanics and its Applications, Wiley eastern ltd.
6. 8. Som and Biswas: Introduction to Fluid Mechanics and Machines, TMH.
7. 9. R K Bansal: Fluid Mechanics and Hydraulic Machines
8. 10. Modi and Seth: Fluid Mechanics and Fluid Machines

CE-306 ENGINEERING MATHEMATICS

UNIT 1

Fourier Series & Z Transform – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Introduction, Properties, Inverse Z Transform.

UNIT 2

Laplace Transform - Laplace transform with its simple properties. Unit step function, Dirac delta function their Laplace transforms, Inverse Laplace, transform – convolution theorem, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations

UNIT 3

Fourier Transform - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.

UNIT 4

Numerical Analysis: Difference operation Forward backward and central, shift and average operators and relation between them. Newton’s forward and backward differences interpolation formulae. Sterling’s formulae, Lagrange’s interpolation formula. Numerical differentiation and integration. Trapezoidal rule, Simpson's one third and one eighth rule.

UNIT 5

Numerical integration: Numerical integration of ordinary differential equations of first order, Picards method, Euler's method & Modified Euler's Method, Mille's method and Ranga Kutta fourth order methods

PRACTICAL AND SESSIONALS

CE-307 MATERIAL TESTING LAB

1. Tensile Strength Test – Mild Steel and HYSD bar
2. Compressive Strength Test – Mild Steel and Cast Iron
3. Compressive Strength Test – Cement Cubes and Concrete Cubes
4. Compressive Strength Test – Bricks
5. Compressive Strength Test – Wooden Blocks
6. Hardness Test – Rockwell Hardness and Brinell Hardness
7. Impact Test – Izod and Charpy
8. Modulus of Rupture of Wooden Beam
9. Fatigue Test
10. Spring Test
11. Torsion Test

CE-308 FLUID MECHANICS LAB.

1. To verify the Bernoulli's theorem.
2. To calibrate the Venturimeter.
3. To calibrate the Orificmeter.
4. To determine Metacentrie Height.
5. To determine Cc, Cv, Cd of an orifice.
6. To determine Cd of a mouthpiece.
7. To determine Cd of a V-notch.
8. To determine viscosity of a given fluid.
9. Bye Pass.

CE-309 ENGINEERING GEOLOGY LAB

Part I

1. Identification of Materials by Visual Inspection
2. To Study the Procedure for Testing of Portland Cement (IS: 269-1967)
3. To Study the Utilization of Fly Ash
4. To Study the Procedure for Testing of Stone
5. To Study the Fiber Reinforced Concrete
6. To Study the Properties and Use Of Different Glasses
7. To Study the Different Aluminum and Steel Sections
8. To Study the Manufacture and Use of Concrete Hollow Blocks
9. To Determine Compressive and Tensile Strength of Timber Parallel and Perpendicular To Grain
10. To Study the Properties and Uses of Kota Stone
11. To Find out the Water Absorption and Tolerance Limit of Bricks

Part II

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models

a) Structural Geological Diagrams
b) Petrological Diagrams
c) Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

CE-310 COMPUTER APPLICATION LAB

1. To develop computer programmes in C/C+ for revision of basic tools of programming.
2. To develop computer programmes in C/C+ for solving linear and non-linear equations by methods as covered in theory.
3 To develop computer programmes in C/C+ for solutions of differential equations by methods as covered in theory.
4. To develop computer programmes in C/C+ for Integration and area calculation by methods as covered in theory.
5. To develop computer programmes in C/C+ for best fitting curves by methods as covered in theory.
6. Writing computer programmes for solving simple problems related to Engineering, (in general Civil Engineering).

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: II **Semester: IV**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	CE-401	Strength of Materials–II	3	1	-	3	30/12	70/28	100/40
2	CE-402	Concrete & Construction Technology	3	1	-	3	30/12	70/28	100/40
3	CE-403	Hydraulics & Hydraulic Machines	3	1	-	3	30/12	70/28	100/40
4	CE-404	Surveying-I	3	1	-	3	30/12	70/28	100/40
5	CE-405	Building Technology	3	1	-	3	30/12	70/28	100/40
6	CE-406	Traffic Engineering	3	1	-	3	30/12	70/28	100/40
Practical's									
7	CE-407	Hydraulics & Hydraulic Machines lab	-	-	3	3	40/16	60/24	100/40
8	CE-408	Basic Survey Field Work lab	-	-	3	3	40/16	60/24	100/40
9	CE-409	Concrete & Construction Technology lab	-	-	3	3	40/16	60/24	100/40
10	CE-410	Traffic Engineering lab	-	-	3	3	40/16	60/24	100/40
		Total	**18**	**6**	**12**				**1000**
		Total Teaching Load	**36**						

CE-401 : STRENGTH OF MATERIALS-II

UNIT 1

Deflection of Beams : Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.

UNIT 2

Fixed Beams & Continuous Beams: Analysis of fixed beams & continuous beams by three moment theorem and area moment method.

UNIT 3

Torsion : Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Springs: stiffness of springs, close coiled helical springs, springs in series and parallel, laminated plate springs.

UNIT 4

Introduction to Energy Methods : Strain energy due to bending, shear and torsion; Castiglione's theorems, unit load method & their applications in analysis of redundant frames up to two degree of redundancy and deflection of determinate beams, frames and trussed beams; Stresses due to temperature & lack of fit in redundant frames. Theories of Failures..

UNIT 5

Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections. Introduction to unsymmetrical bending.

CE-402 CONCRETE & CONSTRUCTION TECHNOLOGY

UNIT 1

Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, gel/pace ratio, concrete mix deign (ACI, IS method), quality control for concrete. Properties of fresh concrete including workability, air content, flow ability, methods to determine and factors affecting. Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, standard tests on fresh and hardened concrete as per IS code. Aggregate, cement interface, maturity concept.

UNIT 2

Concrete Handling in Field : Interaction to mixing & batching methods, placing, transportation and Compaction methods, curing methods and compounds.

Admixture in concrete : Chemical and mineral admixtures, their types, use of water reduces, accelerator, retarders, water-proofing plasticizers and super plasticizers, use of fly ash and silica fume in concrete, their properties, effect and production of high strength concrete, properties of high strength concrete & application.

UNIT 3

Parts of Building: Definition of a building, Classification of building based on occupancy, Explanation of different parts of a building, Purpose of walls, Types of walls- Load bearing, non-load bearing, Partition walls - construction details, suitability and use of brick and wooden partition walls, Cavity walls - Brief description and constructional detail of cavity walls

UNIT 4

Foundation: Concept of foundation, Factors affecting selection of foundations, Definition and importance of bearing capacity, Average bearing capacity of common soils, Types of foundations- shallow and deep foundations, Shallow foundation- spread footings, raft and inverted arch foundation. Rankine's formula for depth of foundations, Deep Foundation - Pile foundation, their suitability, Classification of piles according to function, material and installation, Causes of failure of foundation and remedial measures.

UNIT 5

Dampness and its prevention: Causes of dampness in buildings and principles of its prevention, Materials commonly used for damp proofing, Damp proof course, Anti termite treatment of buildings before and after construction

CE-403 HYDRAULICS AND HYDRAULIC MACHINES

Unit –I

I**ntroduction**: Difference between open channel flow and pipe flow, geometrical parameters of a channel, Velocity and pressure distribution in an open channel, Continuity equation.
Uniform Flow: Chezy's and Manning's equations for uniform flow in open channel, Equivalent roughness, most efficient channel section, simple problems of compound channel sections.

Unit –II

Energy and Momentum Principles: Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

Unit –III

Non-Uniform flow in Open Channel: Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels.
Mobile Bed Channel Hydraulics: Difference between rigid and alluvial channels, Incipient motion condition, Different approaches to study sediment motion, Tractive force approach, Shields curve, Types of bed forms or regimes of flow, characteristics and types of sediment load.

Unit-IV

Hydraulic Jump, Surges, Water Waves: Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Use of jump as an energy dissipater, End depth in a free overfall, Equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves.

Hydraulic Pumps: Rotodynamic pumps, basic equations, axial and mixed flow pumps, cavitation in pumps, characteristics curves

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Unit –V

Hydraulic Turbines: Introduction, Rotodynamic Machines, Including elementary concept of bulb and tubular turbines pelton Turbine, equations for jet and roter size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, basic equation for type, Head on reaction turbine, basic equation for rotodynamic machines, similarity law and specific speed, cavitation characteristic curves.

References:

1. Chow, V.T., Open channel Hydraulics, McGraw Hill International
2. Henderson, F.M., Open Channel Flow, McGraw Hill International
3. Subramanya, K., Flow in Open Channels, Tata McGraw Hill
4. Ranga Raju, K.G., Flow through open channels, T.M.H.
5. French, R.H., Open Channel Hydraulics, McGraw Hill International
6. Graf, W.H., Hydraulics of Sediment Transport, McGraw Hill International

CE-404 SURVEYING-I

Unit - I

Introduction

Importance of surveying to Engineers –Examples from different fields; Plane and Geodetic Surveying, Control Points, Classification of surveys, Methods of locating a point, Sources and Types of errors, Principle of working from whole to part.

Measurement of Distances

Principle of different methods and their accuracy, Measurement by chain and tape. Sources of errors and precautions, Corrections to tape measurements, Field problems, Use and adjustment of auxiliary instruments, Introduction of modern trends: EDM and Total Stations.

Unit II

Measurements of Angles and Directions

Compass Surveying: Reference meridians, Bearing and azimuths, Magnetic declination and its variations, Use and adjustment of compass.

Theodolite Surveying: Vernier theodolite, micro-optic and electronic theodolites, Temporary and permanent adjustments, Measurement of horizontal and vertical angles.

Unit III

Traversing

Principles of traversing by compass and theodolite, Field work and checks, Computation of coordinates, Sources of errors, Precision of traversing, Checking and adjusting of traverse, omitted measurements.

Tacheometry

Definitions, Principles of stadia systems, Instrument constants, Subtense and tangential systems, Construction and use of Reduction Tacheometers, Errors and Precision.

Unit IV

Measurements of Elevation and Contouring

Different methods of determining elevation; Spirit levelling: Definition of terms, Principle, Construction, Temporary and permanent adjustments of levels. Automatic levels, Levelling staves, Methods of spirit levelling, Booking and reduction of fields notes, Curvature and refraction, Reciprocal leveling, Construction and field use of altimeter, Trigonometric levelling-simple and reciprocal observations, Sources of errors and precision of levelling procedures. Methods of relief representations, Definition and characteristics of contours, Use of contour maps, Direct and Indirect methods of contouring, Digital Elevation Model.

Unit V

Plane Table Surveying

Principle, Advantages and disadvantages, Plane Table equipment, Use of telescopic alidade and self-reducing alidades, Different methods of Plane Table Surveying, Resection-Two and three point problems, Advantages and disadvantages of Plane Table surveying.

Sheet Numbering System

CIM and I &A C series, scales and numbering of Indian topographic maps.

CE-405 BUILDING TECHNOLOGY

UNIT 1

Parts of Building: Definition of a building, Classification of building based on occupancy, criteria for location and site selection, site plan and its detail, Explanation of different parts of a building, Purpose of walls, Types of walls- Load bearing, non-load bearing, Partition walls - construction details, suitability and use of brick and wooden partition walls, Cavity walls - Brief description and constructional detail of cavity walls

UNIT 2

Foundation: Concept of foundation, Factors affecting selection of foundations, Definition and importance of bearing capacity, Average bearing capacity of common soils, Types of foundations- shallow and deep foundations, Shallow foundation- spread footings, raft and inverted arch foundation. Rankine's formula for depth of foundations, Deep Foundation - Pile foundation, their suitability, Classification of piles according to function, material and installation, Causes of failure of foundation and remedial measures.

UNIT 3

Brick Masonry : Definition related to brick masonry, Bond, necessity of bond, Types of bonds- English, Flemish, header and stretcher, T-junction, corner junction, Sketches for 1, 1½ and 2-

brick thick wall and square pillars, Construction of brick walls-method of laying brick in walls and precautions to be taken for it.

UNIT 4

Stone Masonry : Definition related to stone masonry, Dressing of stones - Hammer dressing, chisel dressing, General principles for construction of stone masonry, Brief description and sketches of different types of stone masonry- Ashlar, random rubble and coursed rubble, Ashlar facing to coursed, rubble and brick masonry, Brief description, sketches and uses of joggles, dowels and cramps in stone masonry,

UNIT 5

Scaffolding, Shoring and Underpinning: Brief description and application of different types of scaffolding and shores, Meaning and need for underpinning.

Dampness and its prevention: Causes of dampness in buildings and principles of its prevention, Materials commonly used for damp proofing, damp proof course, Anti termite treatment of buildings before and after construction

CE-406 TRAFFIC ENGINEERING

UNIT: 1

Traffic Studies: Road inventories, Traffic Volume Studies, Spot Speed Studies, Travel Time and delay Studies, Origin-Destination studies, Methodology and Analysis of O-D data, Traffic capacity, Parking studies and characteristics, Accident studies and characteristics, causes and preventive measures.

UNIT: 2

Role of traffic Engineer,Vehicle, highway and traffic factors. Traffic characteristics, Vehicular Road users, Introduction to Traffic Noise and Air Pollution and remedial measures. Interrupted and Un-interrupted Traffic Flow, Highway capacity: Urban, rural and intersection, Capacity of transit system, Traffic flow theory: Car Following and Queuing Theory.

UNIT: 3

Traffic Characteristics: Macroscopic and Microscopic Characteristics related to Volume, Speed and Density, their relationships, Road User Characteristics – Human and vehicular Characteristics.Traffic Engineering Design: Principles of Road Junction design, Design of Roundabouts, Bus Stops and Parking Lots, Design of Signals.

UNIT: 4

Traffic Management: Traffic Laws, Regulations and Ordinances for Drivers, Pedestrians and Mixed Traffic. Traffic control Measures – One Way streets, Kerb Parking Control, Intersection

Control, Speed Control, Access Control. Expressways. Traffic Control Devices – Traffic Markings, Signs, Signals, Traffic Islands, their Classification, types and Sketches, Street Lighting.

UNIT: 5

Traffic and Environment: Detrimental Effects of Traffic on the environment – air pollution, noise pollution, visual intrusion, aesthetics etc.

Road Safety: The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment.

Reference:

1. Introduction to Transportation Engineering: William w. Hay.
2. Introduction to Transportation Engineering planning =- E.K. Mortak
3. Metropolitan Transportation planning – J.w. Dickey.
4. Traffic Engineering, L.R. Kadiyali
5. Transportation Engineering, Khisty & Lall

PRACTICAL AND SESSIONALS

CE-407 HYDRAULICS & HYDRAULIC MACHINE LAB

1.To determine the minor losses.
2. To determine the friction factor.
3. To determine C_d of Broad crested wier.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given flume.
7. To plot characteristics curve of hydraulic jump.
8. To plot characteristics curve of Pelton Wheel.
9. To plot characteristics curve of Centrifugal Pump.

CE-408 BASIC SURVEY FIELD WORK LAB.

1. Ranging and Fixing of Survey Station.
2. Plotting Building Block by offset with the help of cross staff.
3. To determine the magnetic bearing of a line
    a. Using surveyor's compass
    b. Using prismatic compass
4. Measurement and adjustment of included angles of traverse using prismatic compass.
5. To determine the reduced levels using Tilting Level.
6. To determine the reduce levels in closed circuit using Dumpy Level.
7. To carry out profile leveling and plot longitudinal and cross sections for road.
8. To carryout temporary adjustment of Theodolite.
9. Measurement of horizontal angle.
    a. By method of repetition.
    b. By method of Reiteration.

10. To determine the tachometric constant.
11. To determine the horizontal and vertical distance by tachometric survey.
12. To study the various minor instruments.
13. To determine the area of a figure using a planimeter.

CE-409 CONCRETE & CONSTRUCTION TECHNOLOGY LAB.

1. To determine standard (Normal) consistency of cement.
2. To determine Initial & Final setting time of cement.
3. To determine specific gravity of cement.
4. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.
5. To determine the Compressive Strength of Cement.
6. To determine Soundness of cement by Le-chatelier apparatus.
7. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
8. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
9. To determine the fineness modulus of coarse aggregates and fine aggregates by sieve analysis.
10. To determine the workability of given concrete mix by slump test.
11. To determine the workability o given fresh concrete mix by compaction factor test.
12. To determine the workability of given concrete mix by Flow table test.
13. To design concrete mix in accordance with I S recommendations.

CE-410 TRAFFIC ENGINEERING LAB

1.Study of Rotary Intersection
2.Study of Island
3.Study of Trafffic volume
4.Study of Speed Studies
5.Study of Traffic Signals
6.Study of Traffic Markings, Signs, Signals
7. Study of Parking
8. Study of Road Safety
9 Detail drawing of Road layouts, grade separated intersection

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श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: III **Semester:V**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	CE-501	Theory of Structures-I	3	1	-	3	30/12	70/28	100/40
2	CE-502	Concrete Structures-I	3	1	-	3	30/12	70/28	100/40
3	CE-503	Steel Structures-I	3	1	-	3	30/12	70/28	100/40
4	CE-504	Surveying-II	3	1	-	3	30/12	70/28	100/40
5	CE-505	Estimation & Costing of Material	3	1	-	3	30/12	70/28	100/40
6	CE-506	Solid Waste Management	3	1	-	3	30/12	70/28	100/40
Practical's									
7	CE-507	Design of Concrete Structures lab	-	-	3	3	40/16	60/24	100/40
8	CE-508	Design of Steel Structures lab	-	-	3	3	40/16	60/24	100/40
9	CE-509	Surveying Lab	-	-	3	3	40/16	60/24	100/40
10	CE-510	Structural Analysis Lab	-	-	3	3	40/16	60/24	100/40
Total			**18**	**6**	**12**				**1000**
Total Teaching Load			**36**						

CE-501 THEORY OF STRUCTURES-I

Unit – I

Classification of Structures, stress resultants, degrees of freedom, Static indeterminacy Classification of Pin jointed determinate trusses, Analysis of determinate plane and space trusses (compound and complex)

Unit – II

Rolling loads, influence lines for beams and trusses, Absolute maximum bending moment, Muller-Breslau's principles & its application.

Unit – III

Analysis of Arches, Linear arch, Eddy's theorem, three hinged parabolic arch, two hinged arch, spandrel braced arch, moving load & influence lines.

Unit – IV

Equilibrium of light cable, General cable theorem, uniformly loaded cable, anchor cables, temperature stresses in suspension cables, three hinged stiffening girder, two hinged stiffening girder, temperature stresses in two hinged girder.

Unit – V

Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's first theorem, unit load & Conjugate beam methods.

References

1. Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
2. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
3. Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures. Vol. I & II Nem Chand.
4. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book
5. Ghali, A. & Neville, M., "Structural Analysis", Chapman & Hall Publications, 1974.
6. Jain, A.K. "Advanced Structural Analysis", Nem Chand & Bors, roorkee, India, 1996.
7. Jain, O.P. & Arya A.S., "Theory of Structure", Vol. II, Nem Chand Bros.,Roorkee , 1976.
8. Kinney, J.S., "Intermediate Structural Analysis", McGraw Hill Book Company, 1957.
9. Wang, C.K. "Intermediate Sstructural Analysis", McGraw Hill Book Company, 1983.

CE-502 CONCRETE STRUCTURE-I

UNIT – 1

Introduction to Various Design Philosophies, Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method.

UNIT – 2

Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method.

UNIT – 3

Behaviour of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent
Shear and Moments.

UNIT – 4

Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

UNIT – 5

Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts.
Note : All designs shall be conforming to IS : 456 – 2000.

Text Books

1. IS : 456 – 2000.
2. Reinforced Concrete – Limit State Design by A. K. Jain, Nem Chand & Bros.,
3. Reinforced Concrete Design by P. Dayaratnam.
1. Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem Chand & Bros.
2. Reinforced Concrete Structures by R. Park and Pauley.
3. Reinforced Concrete Design by S. Unnikrishna Pillai & D. Menon, Tata Mc-Graw Hill Book.

CE-503 STEEL STRUCTURES-I

UNIT – 1

Introduction to rolled steel sections, loads, factor of safety, permissible and working stresses. Riveted and welded connections, strength, efficiency and design of joints.

UNIT – 2

Compression members- Effective length, Slenderness ratio, Strength of Compression members, Design of Struts, Columns, Built-up Columns, Design of eccentrically loaded columns.

UNIT – 3

Tension members – Net and Gross sectional areas,Strength of members and their design. Design of slab and Gusset bases, Design of Grillage footing.

UNIT – 4

Beams – web crippling and web buckling, design of laterally supported beam, design of laterally unsupported beam, Purlins.

UNIT – 5

Design of Industrial Buildings – Detailed design of roof trusses.

Text Books

1. IS: 800 – 1984.
2. Design of Steel Structures by A. S. Arya & J. L. Ajmani, Nem Chand & Bros., Roorkee.

References

1. Design of Steel Structures by S. K. Duggal, Tata Mc-Graw-Hill Publishing Company.
2. Design of Steel Structures by Gaylord & Gaylord

CE-504 SURVEYING-II

Unit I

Triangulation and Trilateration

Necessity of Control Surveying, Principle of Triangulation and Trilateration classification of Triangulation Systems Station Marks, Towers and Signals, Satellite station, Intersected and Resected points, Reconnaissance, Intervisibility of stations, Angular Measurement, Base line measurement and its extension.

Unit II

Adjustment Computations

Treatment of random errors, Normal law of errors, Most Probable Value, Weight of observations, Propagation of errors and variances, Principle of Least Squares, Observations and correlative Normal Equations, Adjustment of triangulation figures and level nets.

Unit III

Curves

Classification of curves, Elements of Simple Circular, Transition and Vertical curves, Theory and methods of setting out circular, transition and vertical curves, special field problems.

Unit IV

Project Surveys

General requirements and specifications for Engineering project surveys, Reconaissance, Preliminary and Location surveys for highways, railways and canals, Correlation of surface and underground surveys in case of culverts, Bridges and Tunnels; Principles and practice of hydrographic surveys, Layout of culverts, canals, bridges and buildings.

Field Astronomy

Astronomical terms, co-ordinate systems, Spherical trigonometry, Astronomical triangle,

Relationship between coordinates.

Unit V

Photogrammetry and Remote Sensing

Photogrammetry-Introduction, Scale of photograph, Tilt and height displacement, Stereoscopic vision and stereoscopes, Techniques of photo-interpretation, Principles of remote sensing, Electro Magnetic Radiation (EMR), energy interaction with atmosphere and earth features, spectral signatures, Remote sensing satellites and their data products, methods of interpretation of remotely sensed data.

GPS and GIS

Global Positioning System (GPS)-Introduction, principle, and applications of GPS in different fields of Surveying, Geographic Information System (GIS) – Introduction, Geographical concepts and terminology, Applications of GIS

References

1. Punmia, B.C., "Surveying", Vol.II & III Laxmi Publications,New Delhi.
2. Duggal S.K., Surveying Vol. I & II TMH
3. Basak, Surveying TMH.
4. Kanetkar, Surveying
5. Chandra, A.M. "Plane Surveying", New Age International Publisher, Delhi

CE-505 ESTIMATION & COSTING OF MATERIAL

UNIT – 1

Importance of estimation, different types of estimates, specifications : general and detailed. Methods of estimation, Estimates of RC works, Estimates of Buildings.

UNIT – 2

Analysis of rates, Prime cost, Work charge establishment, Quantity of materials per unit of work for major Civil Engineering items, Resource planning through analysis of rates, market rates, P.W.D. schedule of rates and cost indices for building material and labour. Introduction to Valuation.

UNIT – 3

Project cycle, Organisation, Planning, Scheduling, Monitoring, Updating and Management System in Construction. Bar Chart, Milestone charts, Work down structure and preparation of networks. Application of network, Techniques like PERT, GERT, CPM, AON and AOA techniques.

UNIT – 4

Project monitoring, cost planning, resources allocation through network techniques. Time value of money, Present economy studies, Equivalence concept, financing of projects, economic comparison, present worth method, equivalent annual cost method, discounted cash flow method, Depreciation and break even cost analysis.

UNIT – 5

Legal aspects of contracts, their relative advantages and disadvantages, Different types of contracts, their relative advantages and disadvantages, Elements of tender preparation, process of tendering, pre-qualification of contracts, Evaluation of tender preparation, process of tendering, Evaluation of tender, Contract negotiation and award of work.

Text Books

1. Estimating and Costing by B. N. Dutta.
2. PERT and CPM Principles and Applications by L. S. Shrinath.

References

1. Estimating, Costing and Valuation in Civil Engineering by M. Chakraborty.
2. Construction, Planning, Equipment and Methods by R. L. Peurify
3. Network Analysis Techniques by S. K. Bhatnagar.
4. Construction Planning and Management by U. K. Srivastava.

CE-506 SOLID WASTE MANAGEMENT

UNIT: 1

General: Problems associated with Solid Waste Disposal.

Generation of Solid Waste: Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste.

UNIT: 2

Onsite Handling, Storage and Processing: Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods.

UNIT: 3

Solid Waste Collections, Transfer and Transport: Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems.

UNIT: 4

Processing and Disposal Methods: Processing Techniques and Methods of Disposal, Sanitary land filling, Composting and Incineration, Bioremediation.

UNIT: 5

Recovery of Resources, Conversion, Products and Energy: Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry.

Industrial Solid Waste: Nature, Treatment and Disposal Methods.

PRACTICAL AND SESSIONALS

CE-507 DESIGN OF CONCRETE STRUCTURES LAB

Design as per syllabus of theory.

CE-508 DESIGN OF STEEL STRUCTURES LAB

Design as per syllabus of theory.

CE-509 SURVEY LAB

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometrical leveling (single plane method).
3. To determine the Height of an object by trigonometrical leveling (two plane method).
4. To shift the R.L. of known point by double leveling.
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare a contour map by indirect contouring.
7. To prepare the map of given area by plane tabling.
8. To determine the Azimuth of a given line by ex-meridian observations of Sun.
9. Survey Camp

CE-510 STRUCTURAL ANALYSIS LAB

1. Deflection of a truss
2. Clark-Maxwell reciprocal theorem with truss
3. Funicular polygon for flexible cable
4. Analysis of redundant frame
5. Deflection of curved members
6. Buckling of columns
7. Clark-Maxwell reciprocal theorem with simply supported beam
8. ILD for deflection in a steel beam using unit load method
9. ILD for support reaction using Muller-Breslau Principle
10. Unsymmetrical bending

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INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: III **Semester: VI**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	CE-601	Theory of Structures-II	3	1	-	3	30/12	70/28	100/40
2	CE-602	Concrete Structures-II	3	1	-	3	30/12	70/28	100/40
3	CE-603	Geotechnical Engineering-I	3	1	-	3	30/12	70/28	100/40
4	CE-604	Transportation Engineering-I	3	1	-	3	30/12	70/28	100/40
5	CE-605	Earthquake Resistant Design o Buildings	3	1	-	3	30/12	70/28	100/40
6	CE-606	Environmental Engineering-I	3	1	-	3	30/12	70/28	100/40
Practical's									
7	CE-607	Structure Detailing lab	-	-	3	3	40/16	60/24	100/40
8	CE-608	Transportation Engineering lab	-	-	3	3	40/16	60/24	100/40
9	CE-609	Environmental Engineering lab-I	-	-	3	3	40/16	60/24	100/40
10	CE-610	Seminar	-	-	3	3	40/16	60/24	100/40
		Total	**18**	**6**	**12**				**1000**
		Total Teaching Load	**36**						

CE-601 THEORY OF STRUCTURES II

UNIT – 1

Analysis of fixed beams, Continuous beams and simple frames with and without Translation of joint, Method of Consistent Deformation, Slope-Deflection method, Moment Distribution method, Strain Energy method.

UNIT – 2

Muller-Breslau's Principle and its applications for drawing influence lines for Indeterminate beams, Analysis of two hinged arches, Influence line diagrams for Maximum bending moment, Shear force and thrust.

UNIT – 3

Suspension Bridges, Analysis of cables with concentrated and continuous loadings, Basics of two and three hinged stiffening girders, Influence line diagrams for maximum Bending moment and shear force for stiffening girders.

UNIT – 4

Basics of Force and Displacement Matrix methods for beams and trusses.

UNIT – 5

Basics of Plastic Analysis, Applications of Static and Kinematic theorem for Plastic Analysis of Beams and Frames.

Text Books

1. Advanced Structural Analysis by A. K. Jain, Nem Chand & Bros., Roorkee.
2. Structural Analysis by C. S. Reddy, Tata Mc Graw Hill Publishing Company Limited, New

References

1. Theory and Analysis of Structures, Vol. I & II by O. P. Jain & B. K. Jain, Nem Chand & Bros.,
2. Theory of Structures by S. P. Timoshenko and D. Young, Mc-Graw Hill Book Publishing
3. Analysis of Statically Indeterminate Structures by P. Dayaratnam, Affiliated East- West Press.
4. Indterminate Structural Analysis by C. K. Wang.
5. Introduction to Matrix Methods of Structural Analysis by H. C. Martin, Mc-Graw Hill Book
6. Matrix Analysis of Framed Structures by Weaver and Gere.
7. Theory of Structures Vol. II by Vazirani & Ratwani.
8. Influence Line Diagrams by Dhavilkar.

CE-602 CONCRETE STRUCTURE II

UNIT – 1

Nature of Stresses in flat slabs with and without drops, coefficient for design of flat slabs, Reinforcement in flat slabs. (IS Code Method).

UNIT – 2

Analysis and design of beam curved in plan. Structural behaviour of footings, design of footing for a wall and a single column, Combined rectangular and trapezoidal footings, Design of strap footing.

UNIT – 3

Structural behaviour of retaining wall, stability of retaining wall against overturning and Sliding, Design of T-shaped retaining wall, Concept of Counter fort retaining wall. Loads, forces and I.R.C. bridge loadings, Design of R.C. slab culvert.

UNIT – 4

Design criteria, material specifications and permissible stresses for tanks, design concept of circular and rectangular tanks situated on the ground / underground, design of overhead tanks.

UNIT – 5

Advantages of prestressing, methods of prestressing, losses in prestress, analysis of Simple prestressed rectangular and T-section.

Text Books

1. IS : 456 – 2000.
2. Reinforced Concrete – Limit State Design by A. K. Jain, Nem Chand & Bros.,

References

1. Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem Chand & Bros.
2. Reinforced Concrete Structures by R. Park and Pauley.
3. Reinforced Concrete Design by P. dayaratnam.

CE-603 GEOTECHNICAL ENGINEERING-I

UNIT – 1

Preview of Geotechnical field problems in Civil Engineering, Soil formation, transport and deposit, Soil composition, Basic definitions, Clay minerals, Index properties, Particle size analysis, Soil classification.

UNIT – 2

Soil-water systems, capillarity-flow, Darcy's law, permeability, field and lab tests, piping, quick sand condition, seepage, flow nets, flow through dams, filters. Soil compaction, water content – dry unit weight relationships, OMC, field compaction control, Proctor needle method.

UNIT – 3

Effective stress principle, Stresses due to applied loads, Boussinesq and Westergaard equations.
Compressibility and consolidation characteristics, Rate of consolidation, Terzaghi's one dimensional theory of consolidation and its applications, Over Consolidation Ratio,determination of coefficient of consolidation and secondary consolidation (creep), consolidation under construction loading.

UNIT – 4

Shear strength - direct & triaxial shear tests, Mohr – Coulomb strength criterion, drained,consolidated, undrained and unconsolidated tests, strength of loose and dense sands,

Normally Consolidated and Over Consolidated soils, dilation, pore pressure, Skempton's coefficient.

UNIT – 5

Stability of slopes with or without pore pressure, limit equilibrium methods, methods of slices and simplified Bishop method, factor of safety. Soil stabilization, Introduction to geosynthetics, classification, functions and its field application.

Text Books

1. V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)
2. K.R. Arora – Soil Mechanics and Foundation Engineering
1. Alam Singh – Modern Geotechnical Engineering
2. Brij Mohan Das – Geotechnical Engineering
3. I.H. Khan – Text Book of Geotechnical Engineering
4. C. Venkataramaiah – geotechnical Engineering
5. Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics
6. G.V. Rao & G.V.S.S. Raju – Engineering with Geosynthetics

CE-604 TRANSPORTATION ENGINEERING-I

UNIT: 1

Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison.

Highway Planing: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.

UNIT: 2

Highway Materials and Construction: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash. Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, Bituminous roads and Concrete roads. Specific features of rural roads.

UNIT: 3

Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves.

UNIT: 4

Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergard and modified methods. (As per guidelines of IRC) Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of

Hill roads. Road side Arboriculture and Landscaping. Recent Developments in Urban Roads and their role in economic developments.

UNIT: 5

Airport Engineering:-

Introduction: Requirements to Airport Planning, Airport Classifications,
Factors in Airport Site Selection, Airport Size, Obstructions, Zoning.

Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers.

Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements

Text Books

1. Highway Engineering by S. K. Khanna & C.E.G.Justo.
2. Airport Planning & Design by S. K. Khanna, M. G. Arora & S. S. Jain.

References

1. Transportation Engineering by L. R. Kadiyali.
2. Highway Engineering by S. K. Sharma
3. Principles of Transportation Engineering by P. Chakraborty & A. Das.

CE-605 EARTHQUAKE RESISTANT DESIGN OF BUILDINGS

Unit-1

Introduction - Origin of Earthquakes, magnitude, intensity, ground motions, sensors, Strong motion characteristics. Concepts of Earthquake Resistant Design of Reinforced Concrete Buildings – Earthquake and vibration effects on structure, identification of seismic damages in R.C. buildings,Effect of structural irregularities on the performance of R.C. buildings during earthquake sand seismoresistant building architecture.

Unit – 2

S.D.O.F. Systems- Equation of motion, free and forced vibrations, damping, Response spectrum 8

Unit – 3

M.D.O.F Systems.- Two degree and multi-degree freedom systems

Unit – 4

Seismic Analysis and Modeling of R.C. Buildings- Codal procedure for determination of design lateral loads, in-fill walls, seismic analysis of R.C. building as per IS: 1893 (Part1)

Unit – 5

Earthquake Resistant Design of Buildings- Ductility considerations, E.R.D. of R.C. building, Design of load bearing buildings, Design of shear wall

Text Books

1. Earthquake Resistant Design of Structures by P. Agarwal & M. Shrikhande
2. Structural Dynamics – Theory & Computation by Mario Paz

3. Dynamics of Structures Theory and Applications to Earthquake Engineering by Anil K. Chopra

References

1. Introduction to Structural Dynamics by J.M. Biggs
2. Elements of Earthquake Engineering by Jai Krishna and A.R.Chandrasekharan
3. Fundamental of Earthquake Engineering by N.M. Neumarks and E. Rosenblueth
4. Engineering Vibrations byL.S. Jacobsen & R.S. Ayre
5. Structural Dynamics by R. Roy Craig Jr.
6. Dynamics of Structures by R.W. Clough & J. Penjien

I.S. Codes

1. IS: 1893 (Part –1) – 2002
2. IS: 1893 (Part –4) – 2005
3. IS: 13920 – 1993

CE-606 ENVIRONMENTAL ENGINEERING-I

UNIT-1

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basicneeds and factors affecting consumption; design period.Sources of water: Kinds of water sources and their characteristics, collection of surfaceand ground water; quality of surface and ground waters; factors governing the selectionof a source of water supply; intakes and their design for lakes, streams and rivers,impounding reservoir and canal; determination of the capacity of impounding reservoir.

UNIT-2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of watersupply pipelines; pipe materials,joints, appurtenances and valves; leakages and control;water hammer and its control measures.

UNIT-3

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply.

UNIT-4

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows. Storm water: Collection and estimation of storm water by different formulae. Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines; small bore sewer systems. Planning of sewerage systems Institutional and industrial wastewater management.

UNIT-5

Air pollution: Composition and structure of atmosphere; units of measurement, sources of pollutants, classification of pollutants and their effects, air quality monitoring and standards. Brief introduction to Control devices for particulate contaminants – gravitational settling chambers, centrifugal collectors, wet collectors, fabric filters and electrostatic precipitators; control devices for gaseous contaminants; automotive emission control, concept of clean and biofuels.

Noise pollution: Definition of decibel, sound power level, sound intensity level and sound pressure level; measurement of noise level; basic concept of community noise, transportation noise and industrial noise; acceptable outdoor and indoor noise levels; effects of noise and control measures.

Introduction to Solid waste management and environmental impact assessment.

Text books:

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
4. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).

References:

1. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
2. Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
3. Steel and McGhee: Water Supply and Sewerage
7. Raju: Water Supply and Wastewater Engineering
10. Rao: Textbook of Environmental Engineering
11. Davis and Cornwell: Introduction to Environmental Engineering
13. Punmia: Water Supply and Wastewater Engineering Vol. I and II

PRACTICAL AND SESSIONALS

CE-607 STRUCTURE DETAILING LAB

Design as per syllabus of theory

CE-608 TRANSPORTATION ENGINEERING LAB

1. Aggregate impact test
2. Angularity number test
3. To determine fineness modulus of a given sample of coarse aggregate.
4. Los angles abrasion test
5. Aggregate crushing value test
6. Standard tar viscometer test
7. Specific gravity and water absorption test

8. To determine the elongation index for given sample of aggregate.
9. To determine the flakiness index of given sample of aggregate.
10. Ductility test
11. To determine the softening point for give sample of bitumen.
12. Marshell stability test
13. Float test

CE-609 ENVIRONMENTAL ENGINEERING LAB-I

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To determine hardness of the given water sample.
6. To find out chloride of the given water sample.
7. To determine alkalinity of the given water sample.
8. To find out acidity of the given water sample.
9. To study various water supply Fittings.

CE-610 SEMINAR

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INSTITUTE OF ENGINEERING
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Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: IV **Semester: VII**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	**CE-701**	Environmental Engineering– II	3	1	-	3	30/12	70/28	100/40
2	**CE-702**	Transportation Engineering - II	3	1	-	3	30/12	70/28	100/40
3	**CE-703**	Geo Technical Engineering – II	3	1	-	3	30/12	70/28	100/40
4	**CE-704**	Non-Conventional Energy Resources	3	1	-	3	30/12	70/28	100/40
5	**CE-705**	Water Resources Engineering –I	3	1	-	3	30/12	70/28	100/40
6	**CE-706**	Steel Structures–II	3	1	-	3	30/12	70/28	100/40
Practical's									
7	**CE-707**	Geo Technical Engineering lab	-	-	3	3	40/16	60/24	100/40
8	**CE-708**	Environmental Engineering lab-II	-	-	3	3	40/16	60/24	100/40
9	**CE-709**	Minor Project	-	-	3	3	40/16	60/24	100/40
10	**CE-710**	Practical Training & Industrial Visit Report	-	-	3	3	40/16	60/24	100/40
		Total	**18**	**6**	**12**				**1000**
		Total Teaching Load	**36**						

CE-701 ENVIRONMENTAL ENGINEERING-II

UNIT-1

Introduction: Beneficial uses of water and quality requirements, standards. Concepts of water and wastewater quality: physical, chemical and bacteriological examination of water and wastewater.Water borne diseases and their control. Wastewater characteristics: Temperature, pH, colour and odour, solids, nitrogen and phosphorus, chlorides, toxic metals and compounds, BOD, COD etc.

Objectives of treatment: Water and wastewater treatment, unit operations and processes and flow sheets.

UNIT-2

Sedimentation: Determination of settling velocity, efficiency of ideal sedimentation tank, short circuiting; different classes of settling; design of primary and secondary settling tanks; removal efficiency for discrete and flocculent settling.

Coagulation: Mechanisms of coagulation, coagulants and their reactions, coagulant aids;
design of flocculators and clariflocculators.

UNIT-3

Filtration: Theory of filtration; hydraulics of filtration; Carmen - Kozeny and other equations; slow sand, rapid sand and pressure filters, backwashing; brief introduction to other filters; design of filters.

Disinfection: Requirements of an ideal disinfectant; kinetics of disinfection, various disinfectants, chlorination and practices of chlorination.

Water softening and ion exchange: calculation of dose of chemicals. Adsorption.

UNIT-4

Wastewater Treatment: Preliminary, primary, secondary and tertiary treatment processes. Primary Treatment: Screens, grit chamber and their design, sedimentation and chemical treatment to be given. Secondary Treatment: Theory of organic matter removal; activated sludge process, design of different units and modifications, extended aeration systems; trickling filters; aerated lagoons, waste stabilization ponds, oxidation ditches, R.B. C. etc.

UNIT-5

Anaerobic digestion of sludge: Design of low and high rate anaerobic digesters and septic tank. Basic concept of anaerobic contact process, anaerobic filter, anaerobic fixed film reactor, fluidized bed and expanded bed reactors and upflow anaerobic sludge blanket (UASB) reactor. Disposal of wastewater on land and in water bodies. Introduction to Duckweed pond, vermiculture and root zone technologies and other emerging technologies for wastewater treatment.

CE-702 TRANSPORTATION ENGINEERING-II

UNIT – 1

Indian railways: Development and organization of Indian Railways.

Permanent way : Sub-grade, formation, embankment and cutting, track drainage.

Rails : Rail gauges, types of rails, defects in rails, rail failure, creep of rail.

Rail Fastenings : Fish plates, spikes, chairs, keys, bearing plates.

Sleepers : Timber, steel, cast iron, concrete and prestressed concrete sleepers, manufacturing of concrete sleepers, sleeper density.

Ballast : Ballast materials, size of ballast, screeming of ballast, specification of ballast, tests on ballast.

UNIT – 2

Railway Track Geometry : Gradients, horizontal curves, super-elevation, safe speed on curves, cant deficiency, negative super elevation, compensation for curvature on gradients, track resistance and tractive power.

Points & Crossings : Elements of a simple turn-out, details of switch, details of crossings, number & angle of crossings, design of turn-out.

UNIT – 3

Stations & Yards : Site selection for a railway station, layout of different types of stations, classification of stations, types of railway yard, functions of Marshalling yards.

Signalling & Interlocking : Classification of signals, method of train working, absolute block system, mechanical interlocking of a two line railway station.

UNIT – 4

Introduction to Steel Bridges, Types of Steel Bridges, Economical Span, Loads, Permissible Stresses, Fluctuation of Stresses, Secondary stresses in trusses, Design of Plate Girder Bridges.

UNIT – 5

Design of Truss Bridges, General arrangement, Economic proportions, Types of Bridge trusses, Wind Forces on Lattice Girder Bridge, Top lateral bracing, Bottom lateral bracing, Brief introducation to Bearing.

CE-703 GEOTECHNICAL ENGINEERING-II

UNIT – 1

Review of principles of soil mechanics. Characterization of ground, site investigations, groundwater level, methods of drilling, sampling, in situ test, SPT, CPT, DCPT, pressure meter test, geophysical exploration brief description, resistivity, reflection and refraction methods, Sub-soil investigation report.

UNIT – 2

Earth pressure theories, Coulomb and Rankine approaches for c-φ soils, smooth and rough walls, inclined backfill, and depth of tension crack, graphical solutions, and types of retaining structures.

UNIT – 3

Types of foundations – shallow / deep, isolated, combined, mat, etc., Definitions, Bearing capacity of shallow foundations (Terzaghi analysis), general, local and punching shear failures, corrections for size, shape, depth, water table, Bearing capacity by consolidation method, insitu bearing capacity determination, Provisions of IS code of practice, selection of depth of footing, eccentrically loaded footings.

UNIT – 4

Classifications of piles, loading capacity of single pile in clay, silt and sand by static methods. Pile groups, under-reamed piles – their design and construction, negative skin friction, pile load test, well foundations – various parts, forces acting on well.

UNIT – 5

Machine foundations, classification, definitions, vibration analysis by mathematical model, design principles in brief. Ground improvement techniques, methods for difficult and problematic ground conditions-soft soils, loose sands, expansive soils, etc., preloading, vertical drains, stone columns, grouting methods.

CE-704 NON-CONVENTIONAL ENERGY RESOURCES

UNIT-1 Energy resources and their utilization :Indian and global energy sources, Energy exploited, Energy planning, Energy parameters (energy intensity, energy-GDP elasticity), Introduction to various sources of energy, Solar thermal, Photovoltaic, Water power, Wind energy, Biomass, Ocean thermal, Tidal and wave energy, Geothermal energy, Hydrogen energy systems, Fuel cells, Decentralized and dispersed generation.

UNIT-2 Solar energy: Solar thermal power and it's conversion, Solar collectors, Flat plate, Performance analysis of flat plate collector, Solar concentrating collectors, Types of concentrating collectors, Thermodynamic limits to concentration, Cylindrical collectors, Thermal analysis of solar collectors, Tracking CPC and solar swing . Solar thermal energy storage, Different systems, Solar pond. Applications, Water heating, Space heating & cooling, Solar distillation, solar pumping, solar cooking, Greenhouses, Solar power plants.

UNIT-3 Biogas: Photosynthesis, Bio gas production Aerobic and anaerobic bio-conversion process, Raw materials, Properties of bio gas, Producer gas, Transportation of bio gas, bio gas plant technology & status, Community biogas plants, Problems involved in bio gas production, Bio gas applications, Biomass conversion techniques, Biomass gasification, Energy recovery from urban waste, Power generation from liquid waste, Biomass cogeneration, Energy plantation, Fuel properties, Biomass resource development in India.

Wind energy: Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals, Types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Selection of a wind mill, Wind energy farms, Economic issues, Recent development.

UNIT-4 Electrochemical effects and fuel cells: Principle of operation of an acidic fuel cell, Reusable cells, Ideal fuel cells, Other types of fuel cells, Comparison between acidic and alkaline

hydrogen-oxygen fuel cells, Efficiency and EMF of fuel cells, Operating characteristics of fuel cells, Advantages of fuel cell power plants.

Tidal power: Tides and waves as sources of energy, Fundamentals of tidal power, Use of tidal energy Limitations of tidal energy conversion systems.

UNIT-5 Geothermal energy: Structure of earth's interior, Geothermal sites, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Site selection for geothermal power plants. Advanced concepts, Problems associated with geothermal conversion.

Books

1. Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
2. Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of India Pvt. Ltd.
3. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
4. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.

CE-705 WATER RESOURCES ENGINEERING-I

UNIT – I

Water Resources planning and management: Objectives, constraints and criteria based on technical, economical, social and political factors. Assessment of surface water resources of India, Intra and inter basin development concepts. Single and multipurpose projects.

Hydrology : Hydrologic Cycle. Water Budget Equation, Hydrologic system,

Precipitation : Types, measurements and analysis, error in estimation, missing data, consistency of rainfall records, Intensity during frequency (IDF) and probabic maximum Precipitation (PMP) curves.

Evaporation and consumptive use: Process affecting factors, estimation and measurement techniques.

Infiltration : Process affecting factors, measurement and estimation, Infiltration Indices.

UNIT – II

Surface Runoff: Components and factors affecting runoff, methods of estimation of runoff volume and peak runoff, rating curve, Rainfall – runoff relationshipsHydrograph analysis: components, factors affecting hydrographs, base flow separation, Direct Runoff Hydrograph, Unit Hydrograph: Theory and assumptions. Derivation of Unit Hydrograph, Synthetic Unit Hydrograph Introductiion to computer models for rainfall runoff analysis.

Irrigation: Developments in India, Necessityand types Advantages & disadvantages of irrigation. Functions of water in plant growth, Methods of Irrigation, Water requirement of crops. Irrigation frequency, Irrigation efficiencies, Principal crops and crop season, crop rotation.

Canal irrigation: Classes and alignment, Parts of a canal system, Commanded area,
curves in channels, channel losses.

UNIT – III

Sediment Transportation: Suspended and Bed load and its estimation Irrigation channels: Types: lined and unlined, silt theories: Kennedy's and Lacey's Design procedure for irrigation channels, Longitudinal cross section, Schedule of area statistics and channel dimensions, use of Garret's Diagrams in channel design, cross sections of an Irrigation channel, Computer programes for design of channels

Lining of Irrigation Canals: Advantages and types, factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining.

Water Logging: Definition, effects, causes and anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains.

UNIT – IV

Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects

Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion

River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.

UNIT – V

Ground Water Hydrology: Zones of underground water, Aquifers and their types, important terms, Determination of discharge through unconfined and confined aquiferswith steady flow conditions, Interference among wells, determination of aquifer constants, Well loss and specific capacity, efficiency of a well, types of water wells, bored and open wells, specific yield of a well, Relative merits of well and canal irrigation, type of tube wells, well surrounding and well development, Suitable site selection for a tube well, Types of open wells, Methods of lifting water. Infiltration.

CE-706 STEEL STRUCTURES–II

UNIT: 1

Design of gantry girder, Design of roof trusses

UNIT: 2

Design of plate girder: design of section, connections for flange plate to flange angles & flange angles to web, web and flange splicing. Vertical, Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates.

UNIT: 3

Bridges: Standard loading for railway bridges, design of Deck type plate-girder bridges, design of bracings and frames. Application of ILD to the design of bridges, design of through type truss bridges, design of members and joints, design of stringers, cross girder, lateral, sway and portal bracings.

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UNIT: 4 Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor, design of simply supported beams, fixed beams, continuous beams and single span rectangular frames.

UNIT: 5

Beams: Design of beams; simple and compound sections, main and subsidiary beams and their Connections.

PRACTICAL AND SESSIONALS

CE-707 GEOTECHNICAL ENGG. LAB

1. Grain size distribution by sieving.
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.
5. Determination of liquid limit by cone penetrometer.
6. Determination of plastic limit
7. Determination of shrinkage limit
8. Determination of field density by core-cutter
9. Determination of field density by sand replacement method
10. Determination of compaction properties by standard Proctor Test Apparatus
11. Determination of C-Ø values by Direct Shear Test Apparatus
12. Determination of unconfined compressive strength by unconfined compression Test Apparatus

CE-708 ENVIRONMENTAL ENGINEERING LAB-II

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.

9. To study various Sanitary Fittings.

CE-708 MINOR PROJECT

CE-710 PRACTICAL TRAINING AND INDUSTRIAL VISIT REPORT

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for B.Tech. (Civil Engineering)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: IV **Semester: VIII**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	CE-801	Water Resources Engineering-II	3	1	-	3	30/12	70/28	100/40
2	CE-802	Modern Concrete Technology And Practice	3	1	-	3	30/12	70/28	100/40
3	CE-803	Environmental Pollution Control	3	1	-	3	30/12	70/28	100/40
ELECTIVE SUBJECTS (Choose any one)									
4	CE-804	Ground Improvement Techniques	3	1	-	3	30/12	70/28	100/40
5	CE-805	Open Channel Flow	3	1	-	3	30/12	70/28	100/40
6	CE-806	Repair And Rehabilitation Of Structures	3	1	-	3	30/12	70/28	100/40
Practical's									
7	CE-807	Computer Aided Design & Drawing	-	-	3	3	40/16	60/24	100/40
8	CE-808	Water Resources Engineering Design	-	-	3	3	40/16	60/24	100/40
9	CE-809	Professional Practice and Estimating	-	-	3	3	40/16	60/24	100/40
10	CE-810	Major Project	-	-	3	3	100/40	200/80	300/180
Total			**12**	**4**	**12**				**1000**
Total Teaching Load			**28**						

CE-801 WATER RESOURCES ENGINEERING II

UNIT: 1

Regulation of works: Falls, Classification of falls, Design of falls, Distributory head regulator and cross-head regulator, Escape, bed bars.

Cross-Drainage Structure: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits, design of various types of cross-drainage structure-aqueducts, syphon aqueduct, superpassage syphon, level crossing and other types.

UNIT: 2

Diversion Head works: Design for surface and subsurface flows, Bligh's and Khosla's methods. Selection of site and layout, different parts of diversion headworks, types of weirs and barrages, design of weirs on permeable foundation, silt excluders and different types of silt ejectors. Energy dissipation.

UNIT: 3

Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams.

Gravity Dams: Force acting on a gravity dam, stability requirements, Instrumentation.

UNIT: 4

Spillways: Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways.

Hydro Power Plant: General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine, cavitations.

UNIT: 5

Reservoirs: Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and water shed management.

Optimization: Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design.

CE-802 MODERN CONCRETE TECHNOLOGY AND PRACTICE

UNIT: 1

Strength of Concrete: Strength- porosity relationship, factors affecting compressive strength, behaviour of concrete under uniaxial, biaxial and triaxial stress states, Split Tensile strength and modulus of rupture -test methods and empirical formulae for their estimation. Mineral and Chemical admixtures in Concrete: types and their uses.

UNIT: 2

Concrete Production: Vibrator compacted concrete in buildings, pavements and infrastructure projects etc., pumpable concrete, roller compacted concrete and Ready Mixed Concrete-methods, specific features and uses etc.

Rheology of Concrete: Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, methods of determination, related standards etc.

UNIT 3:

Elasticity, Creep and Shrinkage of Concrete: Elastic behaviour, Method of determination of Elastic modulus, factors affecting modulus of elasticity, early volume change in concrete due to plastic shrinkage, autogeneous shrinkage and drying shrinkage- factors affecting them, typical values and their methods of determination.
Creep of concrete- specific creep, typical values, creep recovery, factors affecting creep and its determination with available standard.

UNIT 4:
Microstructure of Concrete: Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), calcium hydroxide, presence of micro-cracks in concrete mass - their characteristics and significance on performance of concrete

Penetrability of Concrete: Permeability, sorptivity and diffusion in concrete- test methods and significance.
Durability of Concrete: Physical and chemical processes, recently employed methods of tests for ensuring longer and durable concrete structures- case studies.

UNIT 5:
Special Aggregates: Light weight, heavy weight- their characteristics and uses in concrete. Specific purpose Concretes and Cement based composites: Self Compacting Concrete, Fiber cements and fiber reinforced cement based composites, Mass Concrete and Polymer Concrete etc.- materials, production and application areas.
High performance concrete- performance characteristics in fresh and hardened states, production precautions - some case studies of specific tailored HPC in India .

CE-803 ENVIRONMENTAL POLLUTION CONTROL

UNIT – 1
Impact of man on environment: The biosphere, hydrological cycle, nutrient cycles, consequence of population growth, energy problem, pollution of air, water and land. Global environmental issues.
UNIT – 2
Air pollution: Sources and effects, meteorological aspects, air pollution sampling and measurement, control methods and equipments, control of specific air pollutants.

UNIT – 3
Water pollution: Sources and classification of water pollutants, wastewater sampling and analysis, control strategies, Eutrophication of lakes, self-purification capacity of streams.

UNIT – 4
Land pollution: Types of land pollution, solid waste management-generation, storage, collection, transport, processing and disposal.

UNIT – 5
Noise pollution: Sources, effects, preventive and control measures.Thermal pollution: Sources, effects and control measures.
Text books:
1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Mctcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Volo. – II).
4. Cunniff: Environmental Noise Pollution

CE-804 GROUND IMPROVEMENT TECHNIQUES

Unit 1

Introduction: Formation of soil, major soil types, collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements; objective, potential.

General principles of compaction**:** Mechanics, field procedure, quality control in field.

Unit 2

Ground Improvement in Granular soil: In-place densification by (a) Vibro floatation (b) Compaction piles in sand(c) Vibro compaction piles (d)Dynamic compaction (e) Blasting

Unit 3

Ground improvement in cohesive soil: Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques.

Stone column: Function, Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.

Unit 4

Ground Improvement by Grouting & Soil Reinforcement : Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods. Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforcement of soil beneath roads, foundation..

Unit 5

Soil Stabilization:

Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, lime columns, Design of foundation on lime column.

Cement stabilization-Mechanism, amount, Age and curing.

Fly ash-Lime stabilization.

Soil bitumen stabilization**.**

CE-805 OPEN CHANNEL FLOW

Unit – 1

Introduction: Basic concepts of free surface flows, velocity and pressure distribution, Mass, energy and momentum principle for prismatic and non-prismatic channels, Review of Uniform flow: Standard equations, hydraulically efficient channel sections, compound sections, Energy-depth relations: Concept of specific energy, specific force, critical flow, critical depth, hydraulic exponents, and channel transitions.

Unit – 2

Gradually Varied Flow (GVF): Equation of gradually varied flow and its limitations, flow classification and surface profiles, Control sections, Computation methods and analysis: Integration of varied flow equation by analytical, graphical and advanced numerical methods, Transitions of subcritical and supercritical flow, flow in curved channels.

Unit – 3

Rapidly Varied Flow (RVF): Characteristics of rapidly varied flow, Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Hydraulic jump in gradually and suddenly expanding channels, submerged hydraulic jump, rolling and sky jump, use of jump as an energy dissipater, Flow measurement: by sharp crested and broad crested weirs, critical depth flumes, sluice gate, Free overfall. Rapidly varied unsteady flow: Equation of motion for unsteady flow, "Celerity" of the gravity wave, deep and shallow water waves, open channel positive and negative surge,

Unit-4

Spatially Varied Flow (SVF): Basic principles, Differential SVF equations for increasing and decreasing discharge, Classifications and solutions, Numerical methods for profile computation, Flow over side-weir and Bottom-rack.

Unit – 5

Flow in channel of non-linear alignment and non-prismatic channel sections, Design considerations for sub critical and super critical flows, Design of culvert.

References:

1. Chow, V.T., Open channel Hydraulics, McGraw Hill International

2. Henderson, F.M., Open Channel Flow, McGraw Hill International

3. Subramanya, K., Flow in Open Channels, Tata McGraw Hill (Text book)

4. Ranga Raju, K.G., Flow through open channels, T.M.H.

5. M. Hanif Chaudhry, Open Channel Flow, PHI

CE-806 REPAIR AND REHABILITATION OF STRUCTURES

UNIT 1

Deterioration of concrete in structures: physical processes of deterioration like F & T abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures.
Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc.

UNIT 2

N.D.T.: Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc.
Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT: 3

Materials for repair: polymers and resins, self curing compound, FRP, Ferro cement etc; properties, selection criterion, bonding aspect.

Repair Techniques: grouting, jacketing, shotcrete, externally bonded plates and under water repair; materials, equipments, precautions process etc.

UNIT 4 Advance Construction Equipments

Different types of construction equipments viz. Earth moving equipments & their outputs, Dewatering equipments, Pumping equipments, Grouting equipments, Pile Driving equipments, Compaction equipments, Concreting equipments.

UNIT 5 Equipment Management

Planning of construction equipments, Forecasting equipment requirement, Operation & Utilisation, Equipment replacement, Manpower planning & Maintenance of equipments.

PRACTICAL AND SESSIONALS

CE-807 COMPUTER AIDED DESIGN & DRAWING

1. Getting Started – I

Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in AutoCAD – Drawing lines in AutoCAD – Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving adrawing: Save & Save As – Closing a drawing – Quitting AutoCAD

2. Getting Started – II

Opening an existing file – Concept of Object – Object selection methods: Pick by box, Window selection, Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO / REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles

3. Draw Commands

ARC command – RECTANG command – ELLIPSE command, elliptical arc – POLYGON command (regular polygon) – PLINE command – DONUT command – POINT command – Construction Line: XLINE command, RAY command – MULTILINE command

4. Editing Commands

MOVE command – COPY command – OFFSET command – ROTATE command – SCALE command – STRETCH command – LENGTHEN command –TRIM command – EXTEND command – BREAK command – CHAMFER command – FILLET command – ARRAY command – MIRROR command –MEASURE command – DIVIDE command – EXPLODE command – MATCHPROP command – Editing with grips: PEDIT

5. Drawing Aids

Layers – Layer Properties Manager dialog box – Object Properties: Object property toolbar, Properties Window – LTSCALE Factor – Auto Tracking – REDRAW command, REGEN command

6. Creating Text

Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style

7. Basic Dimensioning

Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units – Associative dimensions – Dimensioning methods – Drawing leader

1. Inquiry Commands

AREA – DIST – ID – LIST – DBLIST – STATUS – DWGPROPS

1. Editing Dimensions

Editing dimensions by stretching – Editing dimensions by trimming & extending – Editing dimensions: DIMEDIT command – Editing dimension text: DIMTEDIT command – Updating dimensions – Editing dimensions using the properties window – Creating and restoring Dimension styles: DIMSTYLE

1. Hatching

BHATCH, HATCH commands – Boundary Hatch Options: Quick tab, Advance tab – Hatching around Text, Traces, Attributes, Shapes and Solids – Editing Hatch Boundary – BOUNDARY command

2. Blocks

The concept of Blocks – Converting objects into a Block: BLOCK, _BLOCK commands – Nesting of Blocks – Inserting Blocks: INSERT, MINSERT commands – Creating drawing files: WBLOCK command – Defining Block Attributes – Inserting Blocks with Attributes – Editing Attributes

3. Plotting Drawings in AutoCAD

PLOT command – Plot Configuration – Pen Assignments – Paper Size & Orientation Area – Plot Rotation & Origin – Plotting Area – Scale

4. Draw working plan, elevation of the following.

4.1 Three bed room duplex bungalow with the given plot size

4.2 Detailed plan of above showing house drainage, water supply and electrical fittings as per BIS.

4.3 Hostel building

4.4 School building

CE-808 WATER RESOURCES ENGINEERING DESIGN – II

Design as per syllabus of theory

CE-809 PROFESSIONAL PRACTICES AND ESTIMATING

1. Estimates – Methods of building estimates, types; site plan, index plan, layout plan, plinth area, floor area; Technical sanction, Administrative approval; estimate of buildings, roads, earthwork and R.C.C. works.
2. Analysis of rates- for earthwork, concrete work, D.P.C., stone masonry,, plastering, pointing and roadwork.
3. Specifications- For different classes of building and Civil Engineering works.
4. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
5. Arbitration,Valuation of real estate.

CE-810 MAJOR PROJECT