BHAGWANT UNIVERSITY
B. Tech CIVIL

III SEMESTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD	CREDITS		
		L	T	P	
03BCE101	STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – I	3	0	0	3
03BCE102	BUILDING MATERIAL & CONSTRUCTION	3	0	0	3
03BCE103	ENGINEERING GEOLOGY	3	0	0	3
03BCE104	COMPUTER APPLICATIONS IN CIVIL ENGINEERING	3	0	0	3
03BCE105	FLUID MECHANICS	3	0	0	3
03BCE106	ENGINEERING MATHEMATICS	3	0	0	3
03BCE201	ENGG. MECHANICS & EXPERIMENTAL TECHNIQUES LAB.	0	0	3	2
03BCE202	CIVIL ENGG. MATERIAL & GEOLOGY LAB.	0	0	3	2
03BCE203	COMPUTER PROGRAMMING LAB.	0	0	3	2
03BCE204	BUILDING PLANNING & DESIGN – I	0	0	3	2
03BCE205	FLUID MECHANICS LAB.	0	0	3	2
03BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
GRAND TOTAL	18	0	19	29	

IV SEMSTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD	CREDITS		
		L	T	P	
04BCE101	STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – II	3	0	0	3
04BCE102	CONCRETE & CONSTRUCTION TECHNOLOGY	3	0	0	3
04BCE103	HYDRAULICS & HYDRAULIC MACHINES	3	0	0	3
04BCE104	SURVEYING – I	3	0	0	3
04BCE105	BUILDING TECHNOLOGY	3	0	0	3
04BCE106.1 04BCE106.2 04BCE106.3	**ELECTIVE – I** ROCK MECHANICS OPTIMIZATION TECHNIQUES ADVANCED MATHEMATICS	3	0	0	3
04BCE201	MATERIAL TESTING LAB.	0	0	3	2
04BCE202	CONCRETE LAB.	0	0	3	2
04BCE203	HYDRAULIC LAB.	0	0	3	2
04BCE204	SURVEYING LAB. – I	0	0	3	2
04BCE205	BUILDING PLANNING & DESIGN – II	0	0	3	2
04BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

V SEMESTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD	CREDITS		
		L	T	P	
05BCE101	THEORY OF STRUCTURES – I	3	0	0	3
05BCE102	CONCRETE STRUCTURES-I	3	0	0	3
05BCE103	STEEL STRUCTURES-I	3	0	0	3
05BCE104	SURVEYING-II	3	0	0	3
05BCE105	QUANTITY SURVEYING & VALUATION	3	0	0	3
05BCE106.1 05BCE106.2 05BCE106.3	**ELECTIVE II** MODERN CONCRETE TECHNOLOGY AND PRACTICE CONSTRUCTION EQUIPMENTS AND MATERIAL MANAGEMENT SOLID WASTE MANAGEMENT	3	0	0	3
05BCE201	DESIGN OF CONCRETE STRUCTURES I	0	0	3	2
05BCE202	DESIGN OF STEEL STRUCTURES I	0	0	3	2
05BCE203	SURVEYING LAB. II	0	0	3	2
05BCE204	STRUCTURAL ENGINEERING LAB	0	0	3	2
05BCE205	ENGG. ECONOMICS & MANAGEMENT	0	0	3	2
05BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

VI SEMESTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD	CREDITS		
		L	T	P	
06BCE101	THEORY OF STRUCTURES – II	3	0	0	3
06BCE102	CONCRETE STRUCTURES-II	3	0	0	3
06BCE103	STEEL STRUCTURES-II	3	0	0	3
06BCE104	ENVIRONMENTAL ENGINEERING– I	3	0	0	3
06BCE105	TRANSPORTATION ENGINEERING-I	3	0	0	3
06BCE106.1 06BCE106.2 06BCE106.3	**ELECTIVE – III** REPAIR AND REHABILITATION OF STRUCTURES REMOTE SENSING AND GIS DESIGN OF PRE-STRESSED CONCRETE STRUCTURES	3	0	0	3
06BCE201	MATRIX METHODS OF STRUCTURAL ANALYSIS	0	0	3	2
06BCE202	DESIGN OF CONCRETE STRUCTURES II	0	0	3	2
06BCE203	DESIGN OF STEEL STRUCTURES II	0	0	3	2
06BCE204	ENVIRONMENTAL ENGG. DESIGN & LAB.I	0	0	3	2
06BCE205	ROAD MATERIALS TESTING LAB	0	0	3	2
06BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

VII SEMESTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD		CREDITS	
		L	T	P	
07BCE101	GEOTECHNICAL ENGINEERING – I	3	0	0	3
07BCE102	WATER RESOURCES ENGINEERING - I	3	0	0	3
07BCE103	ENVIRONMENTAL ENGINEERING– II	3	0	0	3
07BCE104	BUILDING DESIGN	3	0	0	3
07BCE105	TRANSPORTATION ENGINEERING - II	3	0	0	3
07BCE106.1 07BCE106.2 07BCE106.3	**ELECTIVE IV** EARTHQUAKE RESISTANT DESIGN &CONSTRUCTION GROUND IMPROVEMENT TECHNIQUES RURAL WATER SUPPLY & SANITATION	3	0	0	3
07BCE201	GEOTECHNICAL ENGG. DESIGN & LAB.-I	0	0	3	2
07BCE202	WATER RESOURCES ENGINEERING DESIGN-I	0	0	3	2
07BCE203	ENVIRONMENTAL ENGG. DESIGN & LAB. II	0	0	3	2
07BCE204	COMPUTER AIDED BUILDING DESIGN	0	0	2	1
07BCE205	PRACTICAL TRAINING AND INDUSTRIAL VISIT	0	0	2	1
07BCE206	PROJECT-PART I	0	0	2	1
07BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	28

VIII SEMESTER.

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD	CREDITS		
		L	T	P	
08BCE101	GEOTECHNICAL ENGINEERING–II	3	1	0	4
08BCE102	WATER RESOURCES ENGINEERING-II	3	1	0	4
08BCE103	PROJECT PLANNING & CONSTRUCTION MANAGEMENT	3	1	0	4
08BCE104.1 08BCE104.2 08BCE104.3	**ELECTIVE – V** BRIDGE ENGINEERING ADVANCE D FOUNDATION ENGINEERING ADVANCED TRANSPORTATION ENGG.	3	1	0	4
08BCE201	GEOTECHNICAL ENGG. DESIGN & LAB.-II	0	0	3	2
08BCE202	WATER RESOURCES ENGINEERING DESIGN-II	0	0	3	2
08BCE203	PROFESSIONAL PRACTICE AND ESTIMATING	0	0	3	2
08BCE204	DESIGN OF FOUNDATIONS	0	0	3	2
08BCE205	SEMINAR	2	0	0	2
08BCE206	PROJECT-PART II	3	0	0	3
08BCE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		17	4	16	30

STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – I

Course/Paper: 03BCE-101
BCE Semester-III
.
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
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.

Reference

1. Fenner, "Mechanics of Solids".
2. Case,Chilva,"Strength of Materials & Structures".
3. Punamia,B.C., "Strength of Materials & Mechanics of Structures".
4. Junarkar, "Mechanics of structures" Vol. I and II
5. Ryder G.N., "Strendgth of Materials"

BUILDING MATERIAL AND CONSTRUCTION

Course/Paper: 03BCE-102
BCE Semester-III
Stones : Classification, quarrying of stones, Dressing of stones, various standard test on building stores including compressive strength, water absorption, durability, impact value, tensile strength, identification, selection criteria and uses of common building stones.
Clay Products : Bricks such as water absorption, compressive strength, effloresces, dimension and tolerance test– Manufacture process, properties, Classification, standard tests as per IS code, Types of Tiles, standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing.
UNIT 2
Cement and Lime : Raw materials, constituents of cement and their role, type of cement, manufacture of OPC, Chemistry of setting and hardening, Various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength. Lime: Classification, Manufacture, properties, tests for lime.
Mortar and Plaster: Functions and types of sand, bulking of sand, tests for sand, classification, preparation

method, tests, uses and properties of mortar and plaster.

UNIT 3

Timber : Definitions of related terms, classifications and properties, conversion of wood, seasoning, preservation, fire proofing, Ply woods, fiber boards, defects in wood.

Plastics : Introduction, properties, classification, uses.

Miscellaneous: Properties and uses of glass, steel, aluminum, Asbestos, G.I., various types of paints and Varnishes, Prestressed and precast concrete.

UNIT 4

Building Requirements : Building components, their functions and requirements, classification, of building by occupancy and by types of construction, load bearing construction and framed structure construction.

Foundation : Purpose, types of foundation, bearing capacity of soil, depth of footing, foundation for black cotton soil, causes of failure of foundation and remedial measure.

UNIT 5

Brick and Stone Masonary : Basic principle of sound masonary work, different types of bonds, relative merits merit and demerits of English, single flemish and double flemish bond. Comparison between stone and brick masonary. General principles, classification of stone masonary.

Pointing & Plastering : Definition uses and Relative merits, types of panting, types of plastering.

Partition Wall : Types, purpose and use of partition wall.

Reference

1. Arora S.P. & Bindra S.P., "A Text Book of Building Construction"
2. Sushil Kumar,"Engineering Material"
3. Sharma & Kaul "Engineering Materials"
4. R.P.Roy Chodhary, "Engineering Materials"
5. National Building Code

ENGINEERING GEOLOGY

Course/Paper: 03BCE-103
BCE Semester-III
UNIT 1

General Geology : Subdivision of Geology; Importance of Geology in Civil Engg.; Internal Structure of the Earth; Physical properties of Minerals; Weathering and Work of Wind & River ; Geological Time Scale.

UNIT 2

Petrology : Origin, Classification, Texture & Structures of Igneous, Sedimentary and Metamorphic Rocks; Engineering Properties of Rocks.

UNIT 3

Structural Geology: Causes & Classification of Fold, Fault, Joints & Unconformities.

Geophysical Methods: Electrical resistivity & Seismic refraction method for civil engineering importance.

UNIT 4

Engineering Geology: Geological investigation for site selection of site for Dams, Tunnels, Reservoirs and Bridges. Site improvement for different engineering projects.

UNIT 5

Remote Sensing: Introduction and applications in Civil Engineering.

Reference

1. Parbin Singh, "Engineering and General Geology"
2. N. Chenna Kesavulu, "Textbook of Engineering Geology"
3. Leggot R.F., "Geology and Engineering"
4. Blyth, F.G.M. "A Geology for Engineers"
5. Krynine & Judd, "Engineering Geology and Geotechniques

COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Course/Paper: 03BCE-104
BCE Semester-III
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.

Reference
1. Computer Application in Civil Engg : Dr Sunil Joshi,-Ashirwad Publication Jaipur
2. Computer Oriented Numerical Methods : Dr Gokharoo, Dr anil –Unique BookPublication Ajmer
3. Shastry S.S., "Numerical Methods", Prentice Hall Inc, India 1998.
4. Noble Ben," Numerical Methods", New York International Publications, New York,1964.
5. Stanton Ralph G., "Numerical Methods for Engineering", Englewood Cliffs, N.J. Prentice Hall Inc., 1961.
6. Buchingham R.A., "Numerical Methods", Sir Isaac Pitman Sons, Ltd., London, 1957.
7. Bakhvalov N.S., "Numerical Methods", Mir. Pub., Moscow, 1977.
8. Steven C. Chapra Raymond P. Candale, "Numerical Methods for Engineers", Prentice Hall Inc.

FLUID MECHANICS

Course/Paper: 03BCE-105
BCE Semester-III

UNIT 1
Fluids: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.
Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.
UNIT 2
Hydrostatics : Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.
Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and metacentric height experimental and analytical determination of metacentric height.
UNIT 3
Equilibrium of Fluid particles and flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.
Hydro-kinematics : Types of Flows : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrational motions, free and forced vortex, circulation and voracity

velocity potential and stream function, elementary treatment of flow net. Euler's equations of motion and integration of Euler's equations, Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.

UNIT 4

Applications of Bernoulli's equation : Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.

Momentum Equation and its Application : Development of momentum equation by control volume concept, Momentum correction factor, applications – Boarda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.

UNIT 5

Flow through Pipes : Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow : Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcys and Mannings formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a by pass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.

Reference

1. Fluid Mechanics by HM Raghunath.
2. Hydraulics & Fluid Mechanics by PN Modi & SM Seth.
3. Fluid mechanics, Hydraulics & Hydraulic Machines by KA Arora.
4. Fluid Mechanics by Garde & Mirajgaokar
5. Hydraulics & Fluid Mechanics by PN Modi & SM Seth.

ENGINEERING MATHEMATICS

Course/Paper: 03BCE-106
BCE Semester-III
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 functiontheir 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 method.

Reference

Advance Engg Mathematics :Dr. Kantesh Gupta ,Anshul Mittal ,-Ashirwad Publication Jaipur

Advance Engg Mathematics Dr.Gokharoo Ashirwad Publication Jaipur

ENGINEERING MECHANICS & EXPERIMENTAL TECHNIQUES LAB.

Course/Paper: 03BCE-201
BCE Semester-III
1. Law of Parallelogram of Forces
2. Polygon Law of Forces
3. Support Reactions of a Simply Supported Beam
4. Coefficient of Static Friction
5. Efficiency of Compound Lever
6. Efficiency Bell Crank Lever
7. Efficiency of Worm and Worm Wheel
8. Theorem of Super Position
9. Efficiency of Screw Jack
10. Efficiency of Double Purchase Crab Winch
11. Efficiency of Differential Wheel & Axle
12. Study of System of Pulleys
13. Study of Behaviour of Struts

CIVIL ENGINEERING MATERIAL & GEOLOGY LABORATORY

Course/Paper: 03BCE-202
BCE Semester-III

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.)

COMPUTER PROGRAMMING LAB.

Course/Paper: 03BCE-203
BCE Semester-III

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).

BUILDING PLANNING AND DESIGN - I

Course/Paper: 03BCE-204
BCE Semester-III
Building Components –
1. Drawing of walls
i. Brick and Stone masonary
ii. Partition wall, cavity wall and cross section of external wall
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, cross section of Dog legged stairs
5. Roofs: Flat and Inclined (Steel)
6. Foundations for Masonry Structures and Framed Structures, Provision of Damp Proof Course
Building Planning –
1. Development of Front Elevation and Sectional Elevation from a given plan
2. Development of Plan, Front Elevation and Sectional Elevation from line diagram

FLUID MECHANICS LAB.

Course/Paper: 03BCE-205
BCE Semester-III
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.

Strength of Materials and Mechanics of Structures – II
Course/Paper: 04BCE-101
BCE Semester-IV

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.
Membrane Analysis : Stress and strain in thin cylindrical & spherical shells under internal pressures.
UNIT 4

Introduction to Energy Methods : Strain energy due to bending, shear and torsion; Castigleno's theorems, unit load method & their applications in analysis of redundant frames upto 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

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.

Reference

1. Fedinard L. Singer & Andrew Pytel, "Strength of Materials".
2. Fenner, "Mechanics of Solids".
3. Case, Chilva "Strength of Materials & Structures".
4. Punamia, B.C." Strength of Material & Mechanics of Structures".
5. Junarkar, "Mechanics of structures" Vpl I and II
6. Chopra, "Dynamics of Structures"
7. Mario Paz, "Structural Dynamics"
8. G.K. Grover, "Mechanical Vibration".

CONCRETE CONSTRUCTION TECHNOLOGY

Course/Paper: 04BCE-102
BCE Semester-IV

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 degin (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

Form work: Requirements, Indian standard on form work, loads on form work, type & method to provide centering and shuttering for Columns, beams, slabs, walls and staircase, slip and moving formwork.

Site Preparation and temporary Structures: Sequence of construction activity and co-ordination, site clearance, marking, foundation plan, earthwork in dry and loose soil, different methods and their suitability, dewatering, construction of temporary shed, types of shoring, methods of underpinning and types of scaffolding.

Damp Proofing: Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti termite treatment.

UNIT 4

Joints : Requirements, types and material used, construction details.

Arches and Lintels : Terms used, types of arches and their construction detail, types of lintels and constructions.

Stairs : Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, lifts and lamps.

Construction System : Prefabricated/precast construction; advantages & disadvantage of prefabrication. Precast R.C. plank flooring/roofing, Thin R.C. ribbed slab for floors & roofs, thin precast RCC lintels in

brickwalls, Modular co-ordination. Multi storied building frames, Concrete skeleton system, lift slab system, cast one house system, L-shaped panel system.

UNIT 5

Ground & Upper floors : Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits.

Roof and Roof Covering : Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs specially king port, queen port, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs.

Reference

1. Shetty M.S. "Concrete Technology"
2. PK Mehta & P.J.M. Monteriro, "Cncrete Microstructure, Properties and Matenals".
3. Neville A M. & Brooks J.J. "Concrete Technology"
4. Arcra S.P. & Bindra S.P. "A Text Books of Building Construction" K.P. Roy Choddhary, "Engineering Materials"

HYDRAULICS & HYDRAULIC MACHINES

Course/Paper: 04BCE-103
BCE Semester-IV
.
UNIT 1
Dimensional Analysis & Models : Dynamical Similarity and Dimensional Homegeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.

UNIT 2
Laminar Flow : Relation betweens shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.

Turbulent Flow in pipes : Theories of Turbulence, Nikuradse's Experiments. Hydrodynamically smooth & rough boundaries. Laminar, Sublayer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram.

UNIT 3
Flow through channels : Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Mannring and Bazin. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation. Specific emergy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation

UNIT 4
Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume.

Impact of free Jets : Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.

UNIT 5
Centrifugal pumps and turbines : Vulute and whirlpool chambers, Loses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.

Reference

1. Fluid Mechanics by HM Raghunath.
2. Hydraulics & Fluid Mechanics by PN Modi & SM Seth.
3. Fluid mechanics, Huydraulics & Hydraulic Machines by KA Arora.
4. Fluid Mechanics by Garde & Mirajgaokar

SURVEYING – I

Course/Paper: 04BCE-104
BCE Semester-IV
UNIT 1
Introduction : Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.
Measurement of Distances : Different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurement.
UNIT 2
Measurement of Angles & Direction : Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass. Vernier and micro-optic theodolite, temporary and permanent adjustment of vernier theodolite. Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems.
UNIT 3
Traversing : Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditch rule, graphical method, axis method. Gales traverse table.
UNIT 4
Leveling : Definitions of various terms in leveling. Different types of leveling, sources of errors in leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of levels. Profile leveling; L-Section and cross-sections.
UNIT 5
Plane Table Surveying : Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two point and three point problems.
Contouring : Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps.

Reference

1. Arora,K.R."Surveying" Volume I & II.
2. Punmia,B.C. "Surveying" Vol. I & II.
3. Principles and use of surveying instruments by Clendinning and oliver.
4. Kanitkar "Surveying"
5. Duggal S.K., "Text book-Surveying" Vol. I & II.

BUILDING TECHNOLOGY

Course/Paper: 04BCE-105
BCE Semester-IV
UNIT 1
Introduction: Types of buildings, criteria for location and site selection, site plan and its detail.
Sun Consideration : Different methods of drawing sun chart, sun shading devices, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.
UNIT 2
Climatic and comfort Consideration : Elements of climate, global climate, climatic zones of India, comfort conditions, biclimatic chart, climate modulating devices.
Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.
Building Bye Laws and NBC Regulations : Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.

UNIT 3

Principles of Planning : Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.

Vastu Shastra In Modern Building planning : Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.

UNIT 4

Functional design and Accommodation requirements

(A) **Residential Buildings :** Anthrometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing sequence of arrangement of area, plan, elevation, sectional elevation.

(B) **Non Residential Buildings :** viz-school buildings, rest house, primary health centres, post office, bank, college library, cinema theatres etc.

UNIT 5

Services in Buildings

(A) Lighting and ventilation, doors and windows.

(B) Acoustics, sound insulation and noise control.

Reference

1. Gurcharan Singh, "Building Planning Designing and Scheduling".
2. Bindra & Arora, "A Text Book of Building construction.
3. Donald E. Helper & P{aul I. wallach, "architecture Drafting and Design".
4. National Building Code, BIS
5. SP (S&T) 1987 - Handbook on functional requirements of buildings Part-I.

ROCK MECHANICS

Course/Paper: 04BCE-106.1
BCE Semester-IV
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UNIT: 1

ENGINEERING CLASSIFICATION OF ROCKS: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR, prediction of ground condition and support pressure. Effect of Tunnel size on support pressure.

UNIT: 2

ENGINEERING PROPERTIES AND LABORATORY TESTS ON ROCKS: Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability.
Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.

UNIT: 3

INSITU TESTS ON ROCKS: Necessity of Insitu test, Plate load test for deformability, Shear test, Test for internal stresses – flat Jack, pressure meter test.

JOINTED ROCKS: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.

UNIT: 4

STRENGTH OF ROCKS IN UNCONFINED CONDITION: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Hoek Criteria, Barton Methodology.

STRENGTH OF ROCKS IN CONFINED CONDITION: History of Hoek and Brown Failure Criterions and latest methodology, Parabolic Strength Criteria.

UNIT: 5

GROUTING AND ROCK BOLTING: Grouting materials, Grouting operations, methods of Grouting, Mechanism of Rock Bolting, Principal of design.

BEARING CAPACITY OF ROCKS: Bearing capacity of intact rocks, jointed rocks,IS Code methodology, Singh and Rao Method and latest methodologies

Reference

1. Parbin Singh, "Engineering and General Geology"

2. Blyth, F.G.M. "A Geology for Engineers"
3. Krynine & Judd, "Engineering Geology and Geotechniques
4. Arora S.P. & Bindra S.P., "A Text Book of Building Construction
5. Rangwala Building Material & construction

OPTIMIZATION TECHNIQUES

Course/Paper: 04BCE-106.2
BCE Semester-IV

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UNIT 1
Introduction: Historical development, Engineering application of optimization, Formulation of design problems as a mathematical programming problems, Classification of optimization problems.
UNIT 2
Linear Programming : Simplex methods, Revised simplex method, Duality in linear programming, post optimality analysis.
UNIT 3
Applications of Linear programming : Transportation and assignment problems.
UNIT 4
Non Linear Programming : Unconstrained optimization techniques, Direct search methods, Descent methods, Constrained optimization, Direct and Indirect methods.
UNIT 5
Dynamic Programming: Introduction, multi-decision processes, computational procedure.

Reference

1. G. Haddley,"Linear Programming
2. R.L.Fox, "Optimization methods for Engineering design". Addison Wesley USA.
3. N.S. Kambo, "Mathematical progrmming technique"
4. S.S.Rao, "Optimization Theory and Application" , Wiley Eatern, New Delhi.

ADVANCED ENGINEERING MATHEMATICS

Course/Paper: 04BCE-106.3
BCE Semester-IV

UNIT 1
Elementary Statistics & Probability: Elementary theory of probability, Baye's Theorem with its simple applications, Theoretical probability distributions – Binomial, Poisson, Normal distribution.
UNIT 2
Advance Statistics: Chisquare test as test of goodness of fit. Line of regression, Coefficient of correlation and rank correlation.
UNIT 3
Tensor Analysis: Definition of a tensor, Transformation of co-ordinates, contra variant and co-variant vectors, addition and multiplication of tensors, contraction of tensors, inner product, fundamental tensors, Christoffel symbols, covariant differentiation.
UNIT 4
Bessel's Functions: Bessel functions of first and second kind, simple recurrence relations, orthogonal, property of Bessel's function.
UNIT 5
Legendre's function: Legendre's function, simple recurrence relations, Rodrigues formula, orthogonal property of Legendre's function, generating function.

MATERIAL TESTING LAB.

Course/Paper: 04BCE-201
BCE Semester-IV
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

CONCRETE LAB.

Course/Paper: 04BCE-202
BCE Semester-IV
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.

HYDRAULIC LAB.

Course/Paper: 04BCE-203
BCE Semester-IV
1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd 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.

SURVEYING LAB. – I

Course/Paper: 04BCE-204
BCE Semester-IV
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.

BUILDING PLANNING & DESIGN - II

Course/Paper: 04BCE-205
BCE Semester-IV
1- To design and draw working drawing of a Residential building with following detail.
(a) Site plan
(b) Foundation plan
(c) Plan
(d) Two sectional elevations
(e) Front elevation
(f) Furniture plan
(g) Water supply and sanitary plan
(h) Electric fitting plan
2- To design and draw a Primary Health Center
3- To design and draw a Primary School
4- To design and draw a Rest House
5- To design and draw a Post Office
6- To design and draw a Bank
7- To design and draw a College Library
8- To design and draw a Cinema Theatre

THEORY OF STRUCTURES –I

Course/Paper: 05BCE-101
BCE Semester-V
UNIT: 1
Introduction to Indeterminate structures, Degrees of freedom per node, Static and
Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.),
releases in structures Maxwell's reciprocal theorem and Betti's theorem. Analysis of
Indeterminate Structures using Moment Area method.
UNIT: 2
Analysis of Statically Indeterminate Structures using Slope •]deflection method and
Moment •]distribution methods.
UNIT: 3
Column Analogy method for indeterminate structures, determination of carry over
factor for non •]prismatic section. Conjugate beam method for analysis of indeterminate
structures
UNIT: 4
Energy methods and related theorems, solution of determinate & indeterminate
structures using energy methods (i.e. determination of deflection and forces in
structures)
UNIT: 5
Approximate methods for lateral loads: Analysis of multistory frames by portal
method, cantilever method & factor method. Analysis of determinate space trusses by
tension coefficient method.

Reference

1. Junarkar,'Mechanics of Structures Vol.II'
2. Punmia,B.C., 'Strength of materials and Theory of structures, Vol.II'
3. Vazirani & Ratwani,'Analysis of Structures Vol.II'.
4. Theory of structure, Ramamrutham
5. Theory of structure, Khurmi.

CONCRETE STRUCTURES - I

Course/Paper: 05BCE-102
BCE Semester-V
UNIT: 1
Design Philosophies: Working stress, ultimate strength and limit states of design.
Introduction to working stress method. Analysis and Design of prismatic Sections in
flexure using limit state methods: singly and doubly reinforced prismatic sections and
lintels.
UNIT: 2
Design of one way slabs. Shear and Bond: Behavior of beams in shear and bond, design
for shear, anchorage, curtailment and splicing of reinforcement, detailing of
reinforcement. erviceability Conditions: Limit states of deflection and cracking,
calculation of deflections & crack width as per codal provisions.
UNIT: 3
Design of two way slabs and flat slabs by direct design method.
UNIT: 4
Design of Columns: Short and long rectangular and circular columns, eccentrically
loaded columns.
UNIT: 5
Design of Column Footings: Isolated and combined column footings and circular raft foundations.

Reference

1. Dayaratnam P., "Reinforced Concrete Structures' Oxford and IBH Publishing Co., 1980.
2. Sinha S.N., 'Reingorced Concrete Design', Tata McGraw Hill Pub. Co., New Delhi., 1990.
3. Krishna J. and Jain O.P., 'Plain and Reinforced Concrete, Vol. I. New Chand & Bros. Roorkee,1990.
4. Jain A.K., 'Reinforced Concrete-Limit State Design', Nem Chand & Dros. Roorkee,1993.
5. Syal I. C. and Ummat R.K., 'Analysis and Design of Reinforced Concrete Elements. Wheeler and Co. Ltd. Allahabad,1992.
6. Ram Chandra,Design of Concrete Strutures,Vol 1 Standard Book House,New Delhi,1995.
7. Nilson A. II and George Winter, 'Design of Concrete Structures' McGraw Hill Book Co 10th Ed. 1986.
8. Wang C.K. and Salmon,C.G., 'Remforced Concrete Design', International Text Book Co., 1985.
9. Park R and Pauley T., Reinforced Concrete Structures,' John Wiley and Sons,1975.
10. Design Aids for Reinforced Concrete-to I.S.-456-1978'. SP-16,1980. Bureau of Indian Standards, New Delhi.

STEEL STRUCTURES I

Course/Paper: 05BCE-103
BCE Semester-V
UNIT: 1
Introduction: Types of steels and their permissible stresses
Connections: Design of riveted, bolted and welded connections under axial and
eccentric loadings
UNIT: 2
Compression Member: Design of compression member; Axially and eccentrically
loaded compression members, built up columns, design of lacings and battens.

UNIT: 3
Beams: Design of beams; simple and compound sections, main and subsidiary beams and their connections, grillage foundation.
UNIT: 4
Tension Members: Design of axially and eccentrically loaded tension members.
Column Bases: Design of column bases, Slab base, gusseted base.
UNIT: 5
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.

Reference

1. Arya & Ajmani, 'Design of Steel Structures'
2. Duggal,S.K. 'Design of Steel Structures'
3. Punmia B.C., 'Design of Steel Structures'
4. Negi L.S., 'Design of steel Structures'
5. Ramchandra, 'Design of Steel Structures'
6. IS 800, 1984. , IS 800:2007
7. Steel Hand Book. SP 6

SURVEYING - II

Course/Paper: 05BCE-104
BCE Semester-V
UNIT: 1
Trigonometric Levelling: Methods of trigonometric levelling direct method and reciprocal method, axis Signal corrections. Determination of difference in elevations of points.
UNIT: 2
Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curves Methods of setting out circular and transition curves.
UNIT: 3
Triangulation: Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations. Intervisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line. Satellite station and base line extension.
UNIT: 4
Errors in Surveying: Classification of errors in surveying. The probability curve, its equation and properties, theory of least squares, weight, most probable valve, probable errors, standard errors. Normal equation correlates.
Adjustment of Triangulation Figures: Adjustment of levels. Adjustment of triangulations figures, Braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration.
UNIT: 5
Field Astronomy: Definitions of terminology used in Astronomy, Co •]ordinate Systems. Relationships between different Co]ordinate systems. Astronomical Triangle, Napier's Rule. Different methods of determination of Azimuth.
Electronic distance measurement and use of Total station.
Survey camp: (including exercise on triangulation, topographic, or project survey) with duration of maximum 10 days.

Reference

1. Arora,K.R."Surveying" Volume I & II.
2. Punmia,B.C. "Surveying" Vol. I & II.

3. Principles and use of surveying instruments by Clendinning and oliver.
4. Kanitkar "Surveying"
5. Duggal S.K., "Text book-Surveying" Vol. I & II.

QUANTITY SURVEYING & VALUATION

Course/Paper: 05BCE-105
BCE Semester-V
Unit: 1
Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.
Unit: 2
Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)
Unit: 3
Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.
Unit: 4
Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.
Unit: 5
Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings**.**

Reference
1. Estimating and quantity survey, B.N.Dutta
2. Estimation, Costing and Valuation, S.C.Rangwala
3. Estimating and Costing by G.S. Birdie
4. Estimating and Costing by Chakaraborty

MODERN CONCRETE TECHNOLOGY AND PRACTICE

Course/Paper: 05BCE-106.1
BCE Semester-V
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.

Reference

1. 'Concrete-Microstructure,Properties and Materialls by Mehta & Monterio.
2. 'Concrete Technology'by A.M. Neville
3. 'Concrete Technology'by Shetty

CONSTRUCTION EQUIPMENTS & MATERIALS MANAGEMENT

Course/Paper: 05BCE-106.2
BCE Semester-V
UNIT – I: 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 – II: Equipment Management
Planning of construction equipments, Forecasting equipment requirement, Operation & Utilisation, Equipment replacement, Manpower planning & Maintenance of equipments.
UNIT – III: Economics of Construction Equipments
Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment.
UNIT-IV: Materials Management
Scope, objectives & importance of materials management, Selective control techniques, Disposal of surplus material.
UNIT – V: Inventory Control & Spare Part Management
Need, function, steps in inventory control. Advantages, Economic order quantity, Inspection & procurement of spares, stores & stock management.

SOLID WASTE MANAGEMENT

Course/Paper: 05BCE-106.3
BCE Semester-V
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.

Reference

1. G. Techobanogious, H. Theisen & R. Blassen, 'Solid Waste Engineering, Principles and Management Issues, 'McGraw Hills, Book Co. New York' 77.
2. C.L. Mentell, 'Solid Waste Management,'John Whely, New York, 1975.
3. Bhide & Sundrashen, 'Solid Waste Management in Developing Countries'.

DESIGN of CONCRETE STRUCTURES - I

Course/Paper: 05BCE-201
BCE Semester-V
Design as per syllabus of theory.

DESIGN of STEEL STRUCTURES - I

Course/Paper: 05BCE-202
BCE Semester-V
Design as per syllabus of theory.

SURVEY LAB. II

Course/Paper: 05BCE-203
BCE Semester-V
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 exmeridian observations of Sun.
9. Survey Camp

STRUCTURAL ENGINEERING LAB

Course/Paper: 05BCE-204
BCE Semester-V
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

ENGINEERING ECONOMICS & MANAGEMENT

Course/Paper: 05BCE-205
BCE Semester-V

1. **Microeconomics**: Law of demand and supply, utility approach and indifference curves, elasticity of demand & supply and applications, consumer surplus, Law of returns to factors and return to scale.
2. **Macroeconomics**: concepts relating to National product National income and its measurement, Simple Keynesian theory, simple multiplier, money and banking. Meaning and concept of international trade, determination of exchange rate, balance of payment.
3. **Project Evaluation**: Meaning, Capital and OMR cost, Project life, Stages, Methods of Evaluations with their limitations.
4. **India**: Brief history of Indian Constitution, framing features, fundamental rights, duties, directive principles of state. History of Indian National Movement. Socioeconomic growth after independence.
5. **Management**: Principles of management, functions planning, organization, staffing, directing, controlling, coordination , decision making.

THEORY OF STRUCTURES –II

Course/Paper: 06BCE-101
BCE Semester-VI

UNIT: 1
Influence line diagram & Rolling load: ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.
UNIT: 2
Arches: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.
UNIT: 3
Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder.
UNIT: 4
Kani's Method: Analysis of beams and frames with & without sway by Kani's method.
UNIT: 5
Unsymmetrical bending: Definition, location of NA, computation of stresses and deflection, shear center and its location.
Composite Sections: Flexural analysis of composite sections.

Reference

1. Junarkar,'Mechanics of Structures Vol.II'
2. Punmia,B.C., 'Strength of materials and Theory of structures, Vol.II'
3. Vazirani & Ratwani,'Analysis of Structures Vol.II'.
4. Theory of structure, Ramamrutham
5. Theory of structure, Khurmi.

CONCRETE STRUCTURES-II

Course/Paper: 06BCE-102
BCE Semester-VI

UNIT: 1
Elements of Pre-stressed Concrete: Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of sections for flexure and shear, Introduction to continuous beams.
UNIT: 2
Torsion: Design of beams for torsion.
Continuous and Curved Beams: Design of continuous R.C. beams, moment redistribution, beams curved in plan.
UNIT: 3
Circular Domes: Circular domes with u.d.l. & concentrated load at crown.
Yield Line Theory: Application of Y.L.T. to slabs with simple support conditions.
UNIT: 4
Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.
UNIT: 5
Culverts and Bridges: Design of slab culverts for I.R.C. loading.
Cantilever Retaining Walls: Design of cantilever type retaining walls & introduction and stability analysis of counter-fort and buttress type retaining walls.

Reference

1. Krishna,Jai and Jain O.P., 'Plain and Reinforced Concrete', Vol. II, Nem Chand & Bros.Roorkee,1998.
2. Chandra Ram,'Design of Concrete Structures', Vol.II, Standard Book House,New Delhi, 1986.
3. Gray W.S. and Mannings G.L. 'Reinforced Concrete Water Towers,Bunkers, Silos & Grantries', Concrete Publication Limited,1973.
4. Reynolds,C.E. and Steadman, J.C., 'Reinforced Concrete Design Hand Book', Cement and Concrete Association,London,1976.
5. Punamiya B.C. , Concrete structure.

STEEL STRUCTURES–II

Course/Paper: 06BCE-103
BCE Semester-VI

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.
UNIT: 4
Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

Reference

1. Arya & Ajmani,'Design of Steel Structure'.

2. B.C. Punmia,'Design of Steel Structure'.
3. Ramchandra,'Design of Steel Structure'.
4. K. Subramaniyan, OXFORD, "Design of steel structure"
5. A.K.Singh, "Steel Structure'

ENVIRONMENTAL ENGINEERING-I

Course/Paper: 06BCE-104
BCE Semester-VI
UNIT: 1
General: Environment and its components, Importance of water, Role of an Environmental
Engineer, Historical overview.
Water Demand: Design flow, design periods, design population, factors affecting water
consumption, variation in water demand, design capacities for various water supply components.
UNIT: 2
Source of water and collection works: Alternative sources i.e. rain, surface and ground water,
Assessment of yield and development of the source.
Quality of water: The hydrological cycle and water quality, physical, chemical and biological
water quality parameters, water quality requirements, Indian Standards.
UNIT: 3
Transmission of water: Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps
station.
Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes
(theory and application): aeration, solids separation, settling operations, coagulation, softening,
UNIT: 4
Advanced Treatment of Water: filtration, disinfection, other treatment processes, dissolved solids
removal, treatment plant design, preparation of hydraulic profiles.
UNIT: 5
Distribution of water: Method of distributing water, distribution reservoirs, distribution system,
distribution system components, capacity and pressure requirements, design of distribution systems,
hydraulic analysis of distribution systems, pumping required for water supply system.
Plumbing of Building for water supply: Service connections, fixture units, simultaneous flow, design of
plumbing system.

Reference

1. Peavy, H.S.Rowe, D.R.and Techobanoglous, G., 'Environmental Engineering'. McGraw Hills Book
   Company, 1985.
2. Fair, G.M.Geyer, J.C. and Okum, D.A.'Water and Waste water Engineering' John Wiley and Sons inc.,
   1966.
3. Standard Methods for the examination of water and waste water 19th edition prepared and published
   jointly by ALPHA, AWWA, WEF, 1985.
4. Manual on Water Supply and Water treatment, Minsitry of Urban Development.Govt of India, New
   Delhi.
5. B.C.Punamia, 'Environmental Engineering I'. Laxmi publishers. Jodhpur.

TRANSPORTATION ENGINEERING–I

Course/Paper: 06BCE-105
BCE Semester-VI
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 Planning: 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

Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study. Importance and types of Traffic Signs, Signals, Road Markings and Road Intersections.

UNIT: 5

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.

Reference

1. Khanna and Justo, 'Highway Engineering'.
2. L.R. Kadiyali, 'Highway Engineering'.
3. L.R. 'Kadiyali, 'Traffic Engineering and Transportation Planning'.
4. IRC coders.

REPAIR AND REHABILITATION OF STRUCTURES

Course/Paper: 06BCE-106.1
BCE Semester-VI
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.

UNIT: 4

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

UNIT: 5

Investigation for structures: Distress, observation and preliminary test methods.

Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion

damaged structures.

Reference

1. Allen & Edward,The repair of concrete structures'.
2. Bungey,'Testing of concrete structures'.
3. Mehta and Monteriro, 'Concrete'.
4. Neville,'Properties of Concrete'.

REMOTE SENSING AND GIS

Course/Paper: 06BCE-106.2
BCE Semester-VI
UNIT: 1
Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.
UNIT: 2
Remote Sensing: Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.
UNIT: 3
Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.
UNIT: 4
Image Interpretation: Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth – collection and verification, advantages of multidate and multiband images. Digital Image Processing concept.
UNIT: 5
Geographic Information System (GIS) : Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.

Reference

1. Campbell, J.B., 'Introduction to Remote Sensing', The Guilderd Press, London,1986.
2. Curran, P.J. 'Principles of Remote Sensing', Longman, London, 1985.
3. Kennie, T.J.M. and Petrie, G, 'Engineering Surveying Technology' Blackie & Sons, London, 1990.
4. Wolf, P.R., 'Elements of Photogrammetry', Tata McGraw Hill Book co, New Delhi, 1986.
5. Legg, C.A., 'Remote Sensing & G.I.S.', Ellis Horwood. London,1992.
6. Baurrough, P.A.,'Principles of Geographic information Systems for Land Resources Assessment', Oxford University Press, 1986.

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

Course/Paper: 06BCE-106.3
BCE Semester-VI
UNIT 1:
Introduction: Systems of pre stressing in detail, pre stressing techniques, transfer of Pre stress, types of commercially available jacks, computation of losses of pre stress.
Anchorage Zone: end block stresses, design
UNIT 2:
Cable profiles: Concordant and non concordant cable profile and associated factors in continuous members. Modern cable laying: materials & practices, precautions etc.
Computation of deflection in pre stressed concrete members.

UNIT 3:
Design of Pre •]stressed Concrete Sections: Flexural, shear and torsion resistance of members, preliminary and final design of sections, design of pre and post tensioned flexural members; simply supported and continuous members.
UNIT 4:
Pre •]stressed Slab: Design of slabs, tendon layout, precast slab, production and their applications.
Partial Prestressing: Principles and advantages, methods, practices and design.
UNIT 5:
Design of circular pipes and circular water retaining structures etc.
Case study of one bridge girder with design and constructional features.
Reference

1. LIN T.Y.'Design of Pre-stress concrete structures'.
2. Ramamurtham, 'Prestress concrete'.
3. Edward Nawy, 'Prestressed Concrete Structures'

MATRIX METHODS of STRUCTURAL ANALYSIS

Course/Paper: 06BCE-201
BCE Semester-VI
Introduction to matrix methods; Stiffness (Deflection) and Flexibility (Force) matrices for bar, plate, and beam elements w.r.t. local axes and global axes, for entire structure w.r.t. global axes (Direct method and by assembly method. Introduction of Finite Element Methods.

DESIGN of CONCRETE STRUCTURES II

Course/Paper: 06BCE-202
BCE Semester-VI
Design as per syllabus of theory.

DESIGN of STEEL STRUCTURES II

Course/Paper: 06BCE-203
BCE Semester-VI
Max. Marks: 20
Design as per syllabus of theory

ENVIRONMENTAL ENGINEERING DESIGN & Lab. I

Course/Paper: 06BCE-204
BCE Semester-VI
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 find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

ROAD MATERIAL TESTING LAB

Course/Paper: 06BCE-205
BCE Semester-VI
Max. Marks: 30
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

GEOTECHNICAL ENGINEERING – I

Course/Paper: 07BCE-101
BCE Semester-VII
Unit 1
Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.
Unit 2
Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics. Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.
Unit 3
Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon. Seepage and Seepage Pressure, Laplace's equation for seepage. Flow net and its construction. Uplift pressure, piping, principle of drainage by electro Osmosis, phriatic line, Flow net through earth dam.
Unit 4
Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Triaxial and unconfined compression test apparatuses. Typical stress-stain curves for soils. Typical failure envelopes for cohesion less soils and normally consolidated clay soils.
Unit 5
Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction. Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.

Reference

1. Dr. K.R. Arora,'Soil Mechanics & Foundation Engineering'.
2. Dr. Alam Singh, 'Soil Mechanics & Foundation Engineering'.

3. Ranjan and Rao,'Basic and Applied Soil Mechanics'
4. B.C.Punamia, ' Foundation and engineering mechan

WATER RESOURCES ENGINEERING – I

Course/Paper: 07BCE-102
BCE Semester-VII
UNIT: 1
Introduction: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements, multiple cropping, hybrid crops, water harvesting and conservation.
UNIT: 2
Canal Irrigation: Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.
Water Distribution System: Rotational delivery (Warabandi, Jama Bandi, Khasra Bandi, Sajra Sheets), continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures.
UNIT: 3
Distribution of Canal Water: System of regulation and control, outlets, assessment of canal revenue.
Hydraulics of Alluvial Rivers : Critical tractive force, regimes of flow, resistance relationship for natural streams, bed load, suspended load and total equations, different stages of rivers, meandering, aggradations, and degradation, river training & bank protection works.
UNIT: 4
Water Logging: Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands, types of channels lining and design of lined channel.
Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water.
UNIT: 5
Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of run off.

Reference

1. Asawa,G.L.,'Irrigation Engineering', 2nd Ed. New Age International Publisher. New Delhi,1996.
2. Bharat Singh,'Fundamental of Irrigation Engineering', 7th Ed, Nem Chand & Bros. Roorkee, 1983.
3. Varshney,R.S., S.C. Gupta and R.L. Gupta,'Theory and Design of Irrigation Structures'. Nem Chand and Bros. Roorkee,1982.
4. K.R.Arora,' Irrigation Water Power and Water Resources Engineering', Standard Publishers Distributors.

ENVIRONMENTAL ENGINEERING – II

Course/Paper: 07BCE-103
BCE Semester-VII
UNIT: 1
General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview.

Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.

UNIT: 2

Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer, Hydraulic design of sewers: diameter self cleansing velocity and slopes, construction and testing of sewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system.

UNIT: 3

Sewage Treatment: Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal.

UNIT: 4

Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse.

Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage.

UNIT: 5

Air and Noise Pollution: Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, green house effect, acid rain etc, Introduction to noise pollution and its effects on human health
.

Reference

1. Peavy, H.S.Rowe, D.R.and Techobanoglous, G., 'Environmental Engineering'. McGraw Hills Book Company, 1985.
2. Fair, G.M.Geyer, J.C. and Okum, D.A.'Water and Waste water Engineering' John Wiley and Sons inc., 1966.
3. Standard Methods for the examination of water and waste water 19th edition prepared and published jointly by ALPHA, AWWA, WEF, 1985.
4. Manual on Water Supply and Water treatment, Minsitry of Urban Development.Govt of India, New Delhi.
5. B.C.Punamia, 'Environmental Engineering I'. Laxmi publishers. Jodhpur.

BUILDING DESIGN

Course/Paper: 07BCE-104
BCE Semester-VII
UNIT 1
Design Loads: Design loads for different types of buildings. (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components.
Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations..
UNIT 2
Lateral loads: Wind loads & calculation of wind load on structures (IS: 875-Part 3).
UNIT 3
Lateral loads: Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures. (IS: 1893 – Part 1).
UNIT 4
Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.
UNIT 5

Mass Housing: Prefabricated construction for mass housing.
Special Roofs: Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.

Reference

1. Schueller W., 'High Rise Building Structures', John Wiley & Sons,1977.
2. Salvadori M and Levy M., 'Structural Design in Archtecture'. Prencice Hall Inc.N.J. Second Ed.1981.
3. Krishna,Jai and Jain,O.P. 'Plain and Reinforced Concrete;, Vol II.Nem Chand and Bros. Roorkee,1997.
4. Sidney D States bury,'Structural concepts & Systems for Architectures & Engineers'. Van Nostrand Reinhold company.
5. Jain,A.K.'Reinforced Concrete-Limit State Design', Nem Chand & Bros. Roorkee,1997.
6. Hand book on masonary Design & construction BIS publication.

TRANSPORTATION ENGINEERING – II

Course/Paper: 07BCE-105
BCE Semester-VII
UNIT: 1
Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings.
Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards and Sidings, Turn-Table, Signaling.
UNIT: 2
Points and Crossings: Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Design calculations of turnouts.
Railway Systems Specific to Urban Movements: Surface railways (sub urban railway system of Mumbai, Chennai and Delhi), Underground system (Metro of Kolkata/ Delhi), Elevated Systems (as Proposed for Jaipur, Delhi, Mumbai), Light Rail System (MRTS, Thane). Recent Developments in Railway Networking.
UNIT: 3
Geometric Design: Gradient and Grade Compensation, Super elevation and cant, cant deficiency, Types of Curves, Transition curves, their designs, Widening of Gauges.
UNIT: 4
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.
UNIT: 5
Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements.

Reference

1. Saxena,SC and Arora, SP,A Text Book of Railway Engineering'.
2. MM Agarwal, 'Railway Engineering'.
3. JS Mundrey,'Railway Track Eengineering'.
4. Track Manuals of Indian Railways.
5. Khanna and Arora,'Airport Engineering'.
6. Rangwala,'Airport Engineering'.

EARTHQUAKE RESISTANT DESIGN & CONSTRUCTION

Course/Paper: 07BCE-106.1
BCE Semester-VII
UNIT-1
Introductory Seismology: Various terminology related with earthquake, Causes of earthquake, plate tectonics, Tsunami. Seismic wave propagation. Magnitude, intensity & energy of earthquake, magnitude & intensity scales, classifications of earthquakes, Seismic zoning case histories of earthquakes. Seismic hazards, induced hazards.
UNIT-2
Earthquake recording, Seismic instruments, Seismographs & Seismograms.
Basic concept of liquefaction and isolation. Introduction to various IS related codes.
Structural systems, Effects of earthquake on buildings in general, structural and nonstructural failures.
Dynamic characteristics of buildings, natural period of vibration, damping, stiffness etc.
Seismic performance of traditionally built masonry constructions, typical failure mechanism of masonry buildings under earthquakes.
UNIT-3
IS 4326: 1993: Planning consideration & architectural concept, provisions for earthquake resistant construction/ seismic strengthening of masonry constructions.
UNIT-4
Seismic performance of reinforced concrete buildings. Plan, elevation & stiffness irregularities & their effects.
Typical earthquake damages of RC constructions, short column effect, soft storey effect, strong column-weak beam analogy.
IS 13920: 1993: Ductile detailing of reinforced concrete buildings and shear wall concept.
UNIT 5
Seismic design philosophy, IS 1893 (part I):2002 codal provisions : Load combinations, Design lateral loads, response reduction factors, structural modeling of building frames, equivalent load method for earthquake analysis of multistory frames.

Reference

1. Clough & Penzien,'Structural Dynamics'.
2. Anil K. Chopra, 'Structural Dynamics'.
3. Mario Paz,'Structural Dynamics'.
4. Arya, 'Timber & Masonary structures induding Earthquake resistant design'.
5. Is. 1893.

GROUND IMPROVEMENT TECHNIQUES

Course/Paper: 07BCE-106.2
BCE Semester-VII
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

Reference

1. P.Purushotham Raj,'Ground improvement Techniques'.
2. C. Venkaramiah,' Ground Improvement'.
3. M.R.Madhav,'Development in Reinforcement of Ground and Slopes'

RURAL WATER SUPPLY AND SANITATION

Course/Paper: 07BCE-106.3
BCE Semester-VII

Unit 1
General: Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects.
Sources of water: Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.
Unit 2
Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, standards of water quality.
Communicable Diseases: Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.
Unit 3
Water Treatment: Slow sand filter, horizontal roughing filter and their combination.
Disinfection of rural water sources, Fluoride and its removal.
Schemes of Rural water supply: Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.
Unit 4
Milk and Food sanitation: Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism.
Fly and Mosquito control: Life cycle of flies and mosquitoes, various methods of flies and mosquito control.
Unit 5
Rural Sanitation: Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes.
Community Awareness and user participation: Planning of communication support in rural supply and sanitation projects
.
Reference

1. A.N. Mathur, Rathore,'Bio gas Production, Maintenance & Utilization'.
2. E.W. Steel,'Municiple & Rural Sanitation.
3. Reports of Rajeev Gandhi National Drinking Water Mission.
4. Manual of Water supply and Treatment, Ministry of Urban Development. Government of India.

GEOTECHNICAL ENGG. DESIGN AND LABORATORY. I

Course/Paper: 07BCE-201
BCE Semester-VII
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

WATER RESOURCES ENGINEERING DESIGN – I

Course/Paper: 07BCE-202
BCE Semester-VII

Syllabus as per theory.

ENVIRONMENTAL ENGINEERING LAB. & DESIGN – II

Course/Paper: 07BCE-203
BCE Semester-VII

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.

COMPUTER AIDED BUILDING DESIGN

Course/Paper: 07BCE-204
BCE Semester-VII

1. Introduction & different features of the CAD Software
2. 2-D Drafting

3. 3-D Modeling

4 Drawing of building components

PRACTICAL TRAINING AND INDUSTRIAL VISIT

Course/Paper: 07BCE-205
BCE Semester-VII

PROJECT Part I

Course/Paper: 07BCE-206
BCE Semester-VII

GEOTECHNICAL ENGINEERING – II

Course/Paper: 08BCE-101
BCE Semester-VIII
UNIT: 1
Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical
pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal
and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a
horizontal plane. Influence diagram. Vertical stresses at point under line load and strip load.
Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of
obtaining vertical pressure due to surface loading. Newmark's chart, Fensk's Chart. Pressure bulb
and its significance in Foundation exploration. Contact pressure below foundations.
UNIT: 2
Compressibility and Consolidation: Introduction to consolidation, comparison of compaction
and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of
consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation.
Preconsolidation pressure and its determination. Normally, over and under consolidated soils.
Methods of predicting Settlement and its rate. Total and differential Settlement.
UNIT: 3
Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability of
finite slopes by Swedish and Friction circle method. Taylor's stability number curves. Stability of
slopes of earthen embankments under sudden draw down, steady seepage and during
construction. Bishop's method of stability analysis.
Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration,
Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description
of procedures of sampling, Transportation and Storage of samples. Geophysical methods of
investigations
UNIT: 4
Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories.
Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined
back retaining walls, horizontal and inclined cohesion less back fill. Stability analysis of retaining
walls. Earth pressure on cantilever sheet piles, rigid bulk heads.
UNIT: 5
Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of
foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for
minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on
bearing capacity. IS code method, Plate load and penetration tests for determining bearing

capacity. Introduction to pile, well and machine Foundations.

Reference

1. Dr. K.R. Arora,'Soil Mechanics & Foundation Engineering'.
2. Dr. Alam Singh, 'Soil Mechanics & Foundation Engineering'.
3. Ranjan and Rao,'Basic and Applied Soil Mechanics'.
4. B.C.Punamia, ' Foundation and engineering mechanics'

WATER RESOURCES ENGINEERING II

Course/Paper: 08BCE-102
BCE Semester-VIII

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.
Reference

1. Asawa,G.L.,'Irrigation Engineering', 2nd Ed. New Age International Publisher. New Delhi,1996.
2. Bharat Singh,'Fundamental of Irrigation Engineering', 7th Ed, Nem Chand & Bros. Roorkee, 1983.
3. Varshney,R.S., S.C. Gupta and R.L. Gupta,'Theory and Design of Irrigation Structures'. Nem Chand and Bros. Roorkee,1982.
4. K.R.Arora,' Irrigation Water Power and Water Resources Engineering', Standard Publishers Distributors.

PROJECT PLANNING & CONSTRUCTION MANAGEMENT

Course/Paper: 08BCE-103
BCE Semester-VIII

UNIT-1
FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING: Capital

investment proposals, criterions to judge the worthwhileness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure.

Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.

UNIT-2

PROJECT SCHEDULING: Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.

UNIT-3

PROJECT COST AND TIME CONTROL: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.

UNIT-4

CONTRACT MANAGEMENT: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.

UNIT-5

SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.

Reference

1. Chitkara K.K.',Construction Project Management'.
2. Gupta & Gupta,'Construction Management & Accounts'.

BRIDGE ENGINEERING

Course/Paper: 08BCE-104.1
BCE Semester-VIII
.
UNIT 1

Introduction: Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. Steel bridges Design of through type & deck type steel bridges for IRC loading. Design of deck type & through type truss bridges for railway loadings.

UNIT 2

Reinforced concrete culverts & bridges:Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods. Design of balanced cantilever bridge.

UNIT 3

Prestressed Concrete bridges:Prestressed & Post stressed concrete bridges Design of deck slab & girder sections.

UNIT 4

Bearings: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).

UNIT 5

Joints: Expansion joints.

Reference

1. Victor,'Bridge Engineering

2. IRC-83 Part II.

ADVANCED FOUNDATION ENGINEERING

Course/Paper: 08BCE-104.2
BCE Semester-VIII

Unit 1
Shallow foundation: Methods of estimation of bearing capacity computation of bearing capacity factors, Effect of eccentric and inclined loads effect of water table on bearing capacity, Moyerhof's analysis, Bearing capacity of stratified soils, Methods of estimation of settlement of footings.

Unit 2
Limits of settlements for various structures, Indian Standard Code Provisions (IS: 1904, 6403, 8009). Determination of allowable bearing capacity as per IS code. Schemartman's method, Dee beer's and Mortin method of finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data.

Unit 3
Pile foundations: types of pile and their use, modes of failure. Bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae. Bearing Capacity factors. Pile group bearing capacity and settlement. Negative skin friction. Behavior of piles under lateral loading. Winkler's assumption. Pile resistance and deflection under lateral loads, elastic method, Brooms method.

Unit 4
Foundation on difficult Soils: Collapsible soil; identification, Collapse settlement: foundation design. Sanitary land fills settlement of sanitary land fill.
Expensive soils: Behaviour of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations.

Unit 5
Raft foundation: common types of raft, combined footing. Bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation.
Well foundations: design and construction. Bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods.

Reference

1. Bowles, 'Design and construction of foundation'.
2. Prakash,Ranajan & Saran,'Design of foundation and retaining structures'.
3. Tomlinson,'Foundation Enginnering'.
4. Swami Saran,'Analysis and design of Substructures'.

ADVANCE TRANSPORTATION ENGINEERING

Course/Paper: 08BCE-104.3
BCE Semester-VIII

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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
Statistical Methods for Traffic Engineering: Elementary concepts and Probability, Mean, Standard Deviation and variance, Poisson and Binomial Distribution, Normal distribution,

sampling Theory and Significance testing, Linear Regression and correlation.
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. L.R. Kadiyali, 'Traffic Engineering and Transportation Planning'.
2. FD Hobes, 'Traffic Planning and Engineering'.
3. Wohl and Martin,'Traffic System Analysis'.
4. Adolf D May,'Traffic Flow Fundamentals'.

GEOTECHNICAL ENGG. DESIGN AND LABORATORY. – II

Course/Paper: 08BCE-201
BCE Semester-VIII
1. To determine the differential free swell index of soil.
2. To determine the compressibility parameters of soil by consolidation test.
3. To determine the swelling pressure of soil.
4. To determine the shear strength parameters of soil by tri-axial test.
5. To determine the permeability of soil by constant and falling head methods.
6. To determine the CBR of soil.
7. To determine the grain size distribution of fine grained soil by Hydrometer.

WATER RESOURCES ENGINEERING DESIGN – II

Course/Paper: 08BCE-202
BCE Semester-VIII

Syllabus as per theory

PROFESSIONAL PRACTICES AND ESTIMATING

Course/Paper: 08BCE-203
BME Semester-VIII

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
6. Valuation of real estate.

DESIGN OF FOUNDATIONS

Course/Paper: 08BCE-204
BCE Semester-VIII

1. Design of isolated shallow footings, combined footings, raft foundations.
2. Design of pile foundations.
3. Design of wells and cassions.
4. Design of machine foundation.
5. Design of retaining structures etc.

SEMINAR

Course/Paper: 08BCE-205
BCE Semester-VIII

PROJECT Part II

Course/Paper: 08BCE-206
BCE Semester-VIII