

BHAGWANT UNIVERSITY
M Tech (Integrated) CIVIL

SEMESTER III

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
03ICE101	STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – I	3	0	0	3
03ICE102	BUILDING MATERIAL & CONSTRUCTION	3	0	0	3
03ICE103	ENGINEERING GEOLOGY	3	0	0	3
03ICE104	COMPUTER APPLICATIONS IN CIVIL ENGINEERING	3	0	0	3
03ICE105	FLUID MECHANICS	3	0	0	3
03ICE106	ENGINEERING MATHEMATICS	3	0	0	3
03ICE201	ENGG. MECHANICS & EXPERIMENTAL TECHNIQUES LAB.	0	0	3	2
03ICE202	CIVIL ENGG. MATERIAL & GEOLOGY LAB.	0	0	3	2
03ICE203	COMPUTER PROGRAMMING LAB.	0	0	3	2
03ICE204	BUILDING PLANNING & DESIGN – I	0	0	3	2
03ICE205	FLUID MECHANICS LAB.	0	0	3	2
03ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
GRAND TOTAL		18	0	19	29

SEMSTER IV

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
04ICE101	STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – II	3	0	0	3
04ICE102	CONCRETE & CONSTRUCTION TECHNOLOGY	3	0	0	3
04ICE103	HYDRAULICS & HYDRAULIC MACHINES	3	0	0	3
04ICE104	SURVEYING – I	3	0	0	3
04ICE105	BUILDING TECHNOLOGY	3	0	0	3
04ICE106.1 04ICE106.2 04ICE106.3	ELECTIVE – I ROCK MECHANICS OPTIMIZATION TECHNIQUES ADVANCED MATHEMATICS	3	0	0	3
04ICE201	MATERIAL TESTING LAB.	0	0	3	2
04ICE202	CONCRETE LAB.	0	0	3	2
04ICE203	HYDRAULIC LAB.	0	0	3	2
04ICE204	SURVEYING LAB. – I	0	0	3	2
04ICE205	BUILDING PLANNING & DESIGN – II	0	0	3	2
04ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

SEMESTER V

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
05ICE101	THEORY OF STRUCTURES – I	3	0	0	3
05ICE102	CONCRETE STRUCTURES-I	3	0	0	3
05ICE103	STEEL STRUCTURES-I	3	0	0	3
05ICE104	SURVEYING-II	3	0	0	3
05ICE105	QUANTITY SURVEYING & VALUATION	3	0	0	3
05ICE106.1 05ICE106.2 05ICE106.3	ELECTIVE II MODERN CONCRETE TECHNOLOGY AND PRACTICE CONSTRUCTION EQUIPMENTS AND MATERIAL MANAGEMENT SOLID WASTE MANAGEMENT	3	0	0	3
05ICE201	DESIGN OF CONCRETE STRUCTURES I	0	0	3	2
05ICE202	DESIGN OF STEEL STRUCTURES I	0	0	3	2
05ICE203	SURVEYING LAB. II	0	0	3	2
05ICE204	STRUCTURAL ENGINEERING LAB	0	0	3	2
05ICE205	ENGG. ECONOMICS & MANAGEMENT	0	0	3	2
05ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

SEMESTER VI

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
06ICE101	THEORY OF STRUCTURES – II	3	0	0	3
06ICE102	CONCRETE STRUCTURES-II	3	0	0	3
06ICE103	STEEL STRUCTURES-II	3	0	0	3
06ICE104	ENVIRONMENTAL ENGINEERING– I	3	0	0	3
06ICE105	TRANSPORTATION ENGINEERING-I	3	0	0	3
06ICE106.1 06ICE106.2 06ICE106.3	ELECTIVE – III REPAIR AND REHABILITATION OF STRUCTURES REMOTE SENSING AND GIS DESIGN OF PRE-STRESSED CONCRETE STRUCTURES	3	0	0	3
06ICE201	MATRIX METHODS OF STRUCTURAL ANALYSIS	0	0	3	2
06ICE202	DESIGN OF CONCRETE STRUCTURES II	0	0	3	2
06ICE203	DESIGN OF STEEL STRUCTURES II	0	0	3	2
06ICE204	ENVIRONMENTAL ENGG. DESIGN & LAB.I	0	0	3	2
06ICE205	ROAD MATERIALS TESTING LAB	0	0	3	2
06ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		18	0	19	29

SEMESTER VII

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
07ICE101	GEOTECHNICAL ENGINEERING – I	3	0	0	3
07ICE102	WATER RESOURCES ENGINEERING -I	3	0	0	3
07ICE103	ENVIRONMENTAL ENGINEERING– II	3	0	0	3
07ICE104	BUILDING DESIGN	3	0	0	3
07ICE105	TRANSPORTATION ENGINEERING - II	3	0	0	3
07ICE106.1	ELECTIVE IV EARTHQUAKE RESISTANT DESIGN &CONSTRUCTION GROUND IMPROVEMENT TECHNIQUES	3	0	0	3
07ICE106.2					
07ICE106.3	RURAL WATER SUPPLY & SANITATION	3	0	0	3
07MCE 107	CONSTRUCTION MANAGEMENT AND EQUIPMENT				
07MCE 108	CONCRETE CONSTRUCTION TECHNOLOGY	3	0	0	3
07ICE201	GEOTECHNICAL ENGG. DESIGN & LAB.-I	0	0	2	1
07ICE202	WATER RESOURCES ENGINEERING DESIGN-I	0	0	2	1
07ICE203	ENVIRONMENTAL ENGG. DESIGN & LAB. II	0	0	2	1
07ICE204	COMPUTER AIDED BUILDING DESIGN	0	0	2	1
07ICE205	PRACTICAL TRAINING & INDUSTRIAL VISIT	0	0	2	1
07ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		24	0	14	30

SEMESTER VIII

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
08ICE101	GEOTECHNICAL ENGINEERING-II	3	0	0	3
08ICE102	WATER RESOURCES ENGINEERING-II	3	0	0	3
08ICE103	PROJECT PLANNING & CONSTRUCTION MANAGEMENT	3	0	0	3
08ICE104.1 08ICE104.2 08ICE104.3	ELECTIVE – V BRIDGE ENGINEERING ADVANCED FOUNDATION ENGINEERING ADVANCED TRANSPORTATION ENGG.	3	0	0	3
08MCE 105	COMPUTATIONAL TECHNIQUES	3	0	0	3
08MCE 106	BUILDING PLANNING AND DESIGN	3	0	0	3
08MCE 107	FOUNDATION DESIGN AND CONSTRUCTION	3	0	0	3
08MCE 108	MAINTENANCE OF BUILDING STRUCTURES	3	0	0	3
08ICE201	GEOTECHNICAL ENGG. DESIGN & LAB.-II	0	0	2	1
08ICE202	WATER RESOURCES ENGINEERING DESIGN-II	0	0	2	1
08ICE203	PROFESSIONAL PRACTICE AND ESTIMATING	0	0	2	1
08ICE204	DESIGN OF FOUNDATIONS	0	0	2	1
08ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		24	0	12	29

SEMESTER IX

SUBJECT CODE	NAME OF SUBJECT	TEACHING PERIOD			CREDITS
		L	T	P	
09MCE 101.1 09MCE 101.2	Elective-1(Any one) Environment Engineering & Management Bridge Engineering	4	1	0	5
09MCE 102	Computer Aided Design	4	1	0	5
09MCE 103	Building Cost and Quality Management	4	1	0	5
09MCE 104.1 09MCE 104.2	Elective-II(Anyone) Rural Construction Technology Pavement Design, Construction and Maintenance	4	1	0	5
09ICE201	SEMINAR	0	0	3	2
09ICE202	PROJECT	0	0	3	2
08ICE301	DISCIPLINE AND EXTRA-CURRICULAR ACTIVITIES	0	0	4	1
TOTAL		16	4	12	25

SEMESTER X

Subject code	Name of Subject	TEACHING PERIODS			Credit Points
		L	T	P	
10ICE 201	DISSERTATION a) Continuous Evaluation b) Project Report c) Viva Voice	5 6 6	0	0	5 6 6
10ICE 301	DISCIPLINE & EXTRA CURRICULAR ACTIVITIES	0	0	4	1
	Total	17	0	4	18

STRENGTH OF MATERIALS AND MECHANICS OF STRUCTURES – I

Course/Paper: 03ICE-101
ICE 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 & its 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 to 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., "Strength of Materials"

BUILDING MATERIAL AND CONSTRUCTION

Course/Paper: 03ICE-102
ICE Semester-III

Stones : Classification, quarrying of stones, Dressing of stones, various standard test on building stones 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 Masonry : Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single flemish and double flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry.

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: 03ICE-103

ICE 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: 03ICE-104
ICE 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, Runge-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: 03ICE-105
ICE 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 irrotational motions, free and forced vortex, circulation and vorticity 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 – Borda'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 Moody's diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's 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: 03ICE-106

ICE 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 function their Laplace transforms, Inverse Laplace, transform – convolution theorem, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations.

UNIT 3

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

UNIT 4

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

UNIT 5

Numerical integration: Numerical integration of ordinary differential equations of first order, Picard's 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: 03ICE-201
ICE 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: 03ICE-202
ICE 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: 03ICE-203
ICE 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.
4. To develop computer programmes in C/C+ for solutions of differential equations by methods as covered in theory.
5. To develop computer programmes in C/C+ for Integration and area calculation by methods as

covered in theory.

6. To develop computer programmes in C/C+ for best fitting curves by methods as covered in theory.

7. Writing computer programmes for solving simple problems related to Engineering, (in general Civil Engineering).

BUILDING PLANNING AND DESIGN- I

Course/Paper: 03ICE-204

ICE Semester-III

Building Components –

1. Drawing of walls

i. Brick and Stone masonry

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: 03ICE-205

ICE Semester-III

1. To verify the Bernoulli's theorem.

2. To calibrate the Venturimeter.

3. To calibrate the Orificemeter.

4. To determine Metacentric Height.

5. To determine C_c , C_v , C_d of an orifice.

6. To determine C_d of a mouthpiece.

7. To determine C_d 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: 04ICE-101

ICE Semester-IV

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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; Castiglino'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'Alembert'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: 04ICE-102
ICE 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 deign (ACI, IS method), quality control for concrete. Properties of fresh concrete including workability, air content, flow ability, methods to determine and factors affecting. Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, standard tests on fresh and hardened concrete as per IS code. Aggregate, cement interface, maturity concept.

UNIT 2

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

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

UNIT 3

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

Shetty M.S. "Concrete Technology"

PK Mehta & P.J.M. Monteriro, "Concrete Microstructure, Properties and Materials".

Neville A M. & Brooks J.J. "Concrete Technology"

Arcra S.P. & Bindra S.P. "A Text Books of Building Construction" K.P. Roy Choddhary, "Engineering Materials"

HYDRAULICS & HYDRAULIC MACHINES

Course/Paper: 04ICE-103

ICE Semester-IV

UNIT 1

Dimensional Analysis & Models : Dynamical Similarity and Dimensional Homogeneity 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 between 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 energy 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 : Volute and whirlpool chambers, Losses 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: 04ICE-104
ICE 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

Arora,K.R."Surveying" Volume I & II.

Punmia,B.C. "Surveying" Vol. I & II.

Principles and use of surveying instruments by Clendinning and oliver.

Kanitkar "Surveying"

Duggal S.K., "Text book-Surveying" Vol. I & II.

BUILDING TECHNOLOGY

Course/Paper: 04ICE-105
ICE 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, bi-climatic 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** : Anthropometry, 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 & Paul 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: 04ICE-106.1

ICE Semester-IV

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 Criteria 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: 04ICE-106.2

ICE Semester-IV

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 programming technique"
4. S.S.Rao, "Optimization Theory and Application" , Wiley Eastern, New Delhi.

ADVANCED ENGINEERING MATHEMATICS

Course/Paper: 04ICE-106.3

ICE 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.

STRENGTH OF MATERIAL LAB. **MATERIAL TESTING LAB.**

Course/Paper: 04ICE-201

ICE 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: 04ICE-202

ICE 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 of 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: 04ICE-203

ICE 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: 04ICE-204

ICE 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: 04ICE-205
ICE 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: 05ICE-101
ICE 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: 05ICE-102
ICE 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. Serviceability 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., 'Reinforced 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 Structures, 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., 'Reinforced 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: 05ICE-103
ICE 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: 05ICE-104

ICE 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 value, 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 • Jordinate Systems. Relationships between different Co • Jordinate 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: 05ICE-105
ICE 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: 05ICE-106.1
ICE 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 Materials' by Mehta & Monterio.
2. 'Concrete Technology' by A.M. Neville
3. 'Concrete Technology' by Shetty

CONSTRUCTION EQUIPMENTS & MATERIALS MANAGEMENT

Course/Paper: 05ICE-106.2

ICE 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: 05ICE-106.3

ICE 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: 05ICE-201

ICE Semester-V

Design as per syllabus of theory.

DESIGN of STEEL STRUCTURES I

Course/Paper: 05ICE-202

ICE Semester-V

Design as per syllabus of theory.

SURVEY LAB. II

Course/Paper: 05ICE-203

ICE 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 ex • Jmeridian observations of Sun.
9. Survey Camp

STRUCTURAL ENGINEERING LAB

Course/Paper: 05ICE-204

ICE Semester-V

1. Deflection of a truss
2. Clark • JMaxwell 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: 05ICE-205
ICE 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: 06ICE-101
ICE 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: 06ICE-102
ICE 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: 06ICE-103
ICE 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"

ENVIRONMENTAL ENGINEERING-I

Course/Paper: 06ICE-104

ICE 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: 06ICE-105

ICE 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: 06ICE-106.1

ICE 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: 06ICE-106.2
ICE 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 multiband 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: 06ICE-106.3
ICE 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 • Jstressed 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: 06ICE-201
ICE 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: 06ICE-202
ICE Semester-VI

Design as per syllabus of theory.

DESIGN of STEEL STRUCTURES II

Course/Paper: 06ICE-203
ICE Semester-VI

Design as per syllabus of theory

ENVIRONMENTAL ENGINEERING DESIGN & LAB. I

Course/Paper: 06ICE-204
ICE 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: 06ICE-205
ICE Semester-VI

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. Marshall stability test
13. Float

GEOTECHNICAL ENGINEERING – I

**Course/Paper: 07ICE-101
ICE 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: 07ICE-102

ICE 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: 07ICE-103

ICE 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: 07ICE-104
ICE 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 Architecture'. 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 masonry Design & construction BIS publication.

TRANSPORTATION ENGINEERING – II

Course/Paper: 07ICE-105
ICE 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: 07ICE-106.1
ICE 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: 07ICE-106.2

ICE 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: 07ICE-106.3
ICE 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,'Municipal & 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.

CONSTRUCTION MANAGEMENT AND EQUIPMENT

Course/Paper: 07MCE107
MCE Semester-VII

Engineering economy: Principle of Engineering Economy, Minimum cost point analysis, Break even point analysis, Depreciation and depletion.

Safety in construction: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: For storage and handling of building materials. Construction of elements of a building In demolition of buildings Safety lacuna in Indian scenario.

construction planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control.

general management: Introduction and characteristics of management, Principle and function of management, Scientific management.

Materials management: Scope, Objective and functions of material management, Procurement and store management, Materials handling management, Inventory control and management. Disposal of Surplus Materials

Earth moving equipment: Crawler and wheel tractors their functions, types and specifications; Gradability Bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade on rolling resistance on the output of tractor pulled scrapers Earth loaders; Placing and compacting earth fills. Power shovels- functions, selection, sizes, shovel dimension and clearances, output, Drag lines functions , types sizes, output clam shells ;Safe lifting capacities and working ranges cranes; Hoes, Trenching machine types and production rate calculation of production rates of equipment; examples.

Hauling equipment : Trucks; Bottom dump wagons ;capacities of trucks and wagons Balancing the capacities of hauling units with the size excavator; effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment; balancing excavating hauling equipment examples.

drilling ,blasting and tunneling equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors.

Pile driving equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.

Reference:

1. Construction equipment and its planning and application Dr. Mahesh Verma.
2. Construction Planning equipment and Methods by RL Peuripo Tata McGraw Hill.
3. Heavy construction planning equipment and methods -Jagman Singh Oxford and IBH.
4. Rock Engineering-Ry John A Franklin and Maurice B Dusseault, Tata McGraw Hill.
5. Management Machines and Methods in Civil Engineering-John, Christan, John Wiley and Sons.
6. Modern Construction Equipment and Methods. Frankharris John Wiley and Sons.

CONCRETE CONSTRUCTION TECHNOLOGY

Course/Paper: 07ICE108

MCE Semester-VII

Introduction of Concrete materials, Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability.

Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards. Concreting Operations-Practices and Equipment, Batching; Mixing; Transporting; Placing and Compacting; curing.

Properties and technique of construction for concrete, Fiber reinforced concrete, light weight concrete, Heavy weight concrete, Foam concrete, High performance Concrete.

Special concrete operations shot Crete, grouting, Grunting, underwater concreting, hot and cold weather concrete, pump able concrete.

Construction techniques for reinforced concrete elements-materials, Principles and procedures for beams, slabs, columns, Foundations, walls and tanks, design and fabrication of form work for R.C.C elements.

Pre stressed concrete construction-Principle, methods, materials, Tools and equipment for the construction of a pre stressed bridge.

Inspection and Quality Control of Concrete Construction-Stages, Principles, Checklist, Statistical Controls, procedures.

Practical Exercises:

Testing of aggregates-fine and coarse as per BIS procedure.

Testing of cement with reference to IS specifications and Cement Grade.

Concrete Mix Design for desired grade from given materials.

Design and testing of workability of concrete for a given C.C. proportion.

Design and determination of Cube Strength with given materials and proportions.

Design of Concrete Mix proportions.

Study of effect of compaction of strength of concrete.

Study of effect of plasticizers on workability of concrete.

Study of permeability of concrete.

Conduct chemical analysis of hardened concrete to determine the cement content. Inspection of a concrete construction site and preparation of report showing correct and incorrect practices.

Reference:

Concrete Technology by M.L. Gambhir
Concrete Technology, by Neville and Brooks
Properties of Concrete by Neville.
Concrete Microstructure, Properties and Materials P.K. Mehta and PJM Monteiro
Concrete Technology M.S. Shetty.
Concrete Technology M.S. Shetty.

GEOTECHNICAL ENGG. DESIGN AND LABORATORY. I

**Course/Paper: 07ICE-201
ICE 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- ϕ values by Direct Shear Test Apparatus
12. Determination of unconfined compressive strength by unconfined compression Test Apparatus

WATER RESOURCES ENGINEERING DESIGN – I

**Course/Paper: 07ICE-202
ICE Semester-VII**

Syllabus as per theory.

ENVIRONMENTAL ENGINEERING LAB. & DESIGN – II

**Course/Paper: 07ICE-203
ICE 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: 07ICE-204
ICE 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 & INDUSTRIAL VISIT

Course/Paper 07ICE 205
ICE semester VII

Industrial visit (20 marks) is for the duration of 10 days at the end of V semester and Practical Training (80 marks) is for the duration of 30 days at the end of VI semester. Both will be evaluated during the VII semester and graded accordingly

GEOTECHNICAL ENGINEERING – II

Course/Paper: 08ICE-101
ICE 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, Fenski'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 Terzaghi's 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 Meyerhoff'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: 08ICE-102
ICE 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, super passage 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: 08ICE-103
ICE 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: 08ICE-104.1
ICE 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: 08ICE-104.2
ICE 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, Deeb'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.

Expansive 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 Engineering'.
4. Swami Saran, 'Analysis and design of Substructures'.

ADVANCE TRANSPORTATION ENGINEERING

Course/Paper: 08ICE-104.3

ICE 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'.

COMPUTATIONAL TECHNIQUES

Course/Paper: 08MCE105 MCE Semester-VIII

Equations: Rots of Algebraic, Transcendental equations, Solution of linear simultaneous Equations by different methods using - Elimination, Inversion, Gauss - Jordan methods. Homogeneous Problems and Eigen Value Problems. Non linear Equations, Interpolation.

Finite Difference Technique : Initial and Bunday Value Problems of Ordinary and Partial differential equations, Solution of Various types of Plates.

New Marks Method: Solution of determinate and indeterminate Structures by using New Mark's Procedure.

Statistical Methods: Method of Correlation and Regression Analysis.

Initial Value Problems: Galerkin's Method of Least Square, Initial Value problem by Collocation points, Runga Kutta Method.

Newmark's Implicit and Explicit Solutions for Non Linear Problems and Convergence Criteria.

Reference:

Numerical Methods, Problems, and Solutions by M.K. Jain,
S.R.K.Iyenger, R.K. Jain

Numerical Methods by Dahlquist, G. and Bjorck, A.

Numerical Receipes in Fortran by W.H. Press, S.A. Tenkolsky, W.T. Vellerling, B.P. Flannery.

Computer Programming & Numerical Analysis, by Syal & Gupta

BUILDING PLANNING AND DESIGN

Course/Paper: 08MCE106 MCE Semester-VIII

The final paper shall be set out covering 20% marks from Section A, 40% marks from Section B and 40 % marks from Section C

Section A-Architecture

Land Acquisition Act 1894 (short titles, extent & definitions ONLY)

Municipality act 1911 (short titles, extent & definitions only, Power of committee for making bylaws, for punishment ,to sanction)

Architectural Planning and Layout: Principles of planning a building, Factors affecting selection of site for building, Sun & the building

Section B-SOIL

Soil formation, particle size analysis, Indian Standard Soil Classification, time-settlement curve, Proctor test, compaction of sand, factors affecting compaction, field compaction methods, calculation of Bearing Capacity of soil by Standard Penetration Test, soil investigation report, types of shear failures, effect of water *table* on B.C., Settlement cases, calculation of B.C. by Plate Load Test. Note: IS : 6403 is allowed in Exam

Section C Structure

Earthquake: Hazardous effects on structures & Ground, General guidelines for earthquake resistance buildings. Liquefaction, factors affecting liquefaction & prevention,

Various Loading Conditions and Analysis of Multi storied Complex (Kani's Method for vertical loads and Portal Method for Lateral loads)

Structural Design of Beams, Columns, Slabs, Foundations and Stairs. Structural Drawings

Reference:

1. Soil Mechanics and Foundation Engg Dr K R Arora Standard Publishers.
2. Building planning designing and scheduling Gurcharan Singh
3. Construction equipment and its planning and application Dr. Mahesh Verma.
4. Construction Planning equipment and Methods by RL Peurify Tata McGraw Hill.

5. IS-1888(1978):Plate Load Test IS 6403 (1981): Bearing capacity of shallow Foundation.

FOUNDATION DESIGN AND CONSTRUCTION

Course/Paper: 08MCE107

MCE Semester-VIII

General Principle of foundation Design. Functions of foundations, Essential requirements of a good foundation, Types of foundations, Principal modes of failure, Estimation of allowable bearing pressures, calculation of ultimate bearing capacity by theoretical and empirical methods : Terzaghi's Method, Skempton's analysis for clays, Mayerhof's analysis BIS Method (IS:6403) settlement of foundations, Factors to be considered in foundation design; Environmental considerations.

Shallow Foundations : Introduction, Essential requirements Type and depth of footings, contact Pressure below footing strip footing, Isolated footing or Pad footing, Eccentrically loaded footings, Grillage foundations; Design features and construction details of combined footing, Strap footing or Cantilever footing Problem of frost heave, its causes and prevention effect of ground water Raft footing.

Pile Foundations: Purpose/Uses of pile foundations, Classification of piles based on different criteria, Details of Timber, Concrete, Steel Piles their advantages and dis advantages selection of Pile Type, Pile action behaviour of pile and pile groups under load. Definition of failure load. Estimation of carrying capacity: Single driven pile in cohesion less soils-methods based of on SPT and CPT, ultimate load on Driven and cast-in-place piles and Bored and cast-in place piles in cohesion less soils. Factors affecting pile capacity. Ultimate capacity of single pile driven in cohesive soils. Modification for driven and cast- in place piles and Bored and Cast-in-place piles. Carrying capacity of piles on rocks. Piles in fills- negative skin friction. Carrying capacity of Pile groups in cohesive soil and cohesion less soils, efficiency of pile group. piles subjected to horizontal or inclined loads.

Soil Stability. Retaining walls-Types Elements for design, construction of cantilever and counter for retaining walls. Un braced excavations, Braced excavations. Sheet Piles and Bulkheads-Types and design of cantilever and Anchored sheet piles; Anchors and Tie backs. Shorting and Underpinning-Necessity and methods.

Improvement of Foundation Soils. Purpose:

Improvement of Granular Soils : Terms used to describe degree of compactness-Relative Density, Density Ratio and Degree of Compaction ; Methods- Vibration at ground surface, factors influencing, roller compaction; Dep Dynamic Compaction, Vibro compaction, Impact at depth.

Improvement of Cohesive soils: Preloading or Dewatering, Methods of installing sand drains, drain wicks, Electrical and Thermal methods.

Grouting: Purpose, Functions Types of grouts; Soil Bentonite-cement mix, cement mix, emulsions, solutions: Grout Injection method

Geosynthetics : Types, Functions, Manufacturing of geo textiles, Classification of geotextiles. Specific **Applications:** Bearing capacity improvement, Reinforcement, Retaining walls, Embankment etc. Testing of geo synthetics usage in India and a case study.

Special Considerations in Foundation Design and construction: Elementary Principles of design and construction of foundations subjected to earth quake or dynamic loads Special measures for foundations constructed under water.

Practical Exercises :

Conduct of standard Penetration Test and estimation of bearing capacity.

Determination of shear strength characteristics by field tests like insitu vane shear test, pocket penetrometer etc.

Computation of bearing capacity and settlement for given conditions of soil depth and type of foundation and loading.

Recommend a field investigation program to obtain design data.

Design of a shallow foundations.

Recommend suitable dimensions. depth and spacing of pile/pile group for given loading conditions.

References.

1. Tomlinson Mj. Foundation Design and Construction, ELBS Longman,6, 1996.
2. Bowles Joseph E, Foundation Analysis and Design, McGraw Hill, 4 e,1988.
3. Brahma, SP Foundation Engineering, Tata McGraw Hill 1985.
4. Koerner, Robert M, Construction and Geotechnical Methods in Foundation Engineering McGraw Hill, 1985.

5. Dinesh Mohan, Pile foundations, oxford & IBH,1998.
6. Kurian, N.P .Modern Foundations, Tata McGraw Hill, 1982.
7. Fang H.Y. Foundation Engineering Handbook, Van Nostrand Reinhold,2e,1991.
8. Kaniraj Shenbaga R, Design Aids in Soil Mechanics and Foundation Engineering, Tata McGraw Hill,1988.
9. Fleming etal, Pilling Engineering, Surrey Univ. Press/John Wiley and Sons,1985.
10. Chellis, RobertD, Pile Foundations, Mc Graw Hill, 1961.
11. Tomlinson MJ, Pile Design and Construction Practice, a view point Publication, 3e,1981.
12. Peck, Hanson, Thornburn, Foundation Engineering, wiley Eastern Ltd. 2e,1980.
13. Powers J Patrick, Construction Dewatering, John Wiley,1981.
14. CBRI Roorkee, Application Potential of Geo synthetics in Civil Engineering ,Proceedings of Workshop Jan. 4-6,1989 Tata McGraw Hill.
15. Alam Singh &G.R. Chowdhry, Soil Engineering in Theory and practice, CBS Publishers, 2e, 1990.
16. Ramanaet-al-soil sampling and Testing, TTTI, Chandigarh. **LISTOF B.I.S. CODES**

Title.S.No.

Code of practice for design and 2911(Part-1-Section 1979 construction of pile foundations : Part 1 Concrete Piles, Section Driven cast in-situ concrete piles (first revision)(WithAmendmentNo.2)

Code of practice for design and 2911(Part 1-Section 1979) construction of pile foundations : Part 1 concrete piles, Section 2 Bored cast-in-situ piles (first revision) (WithAmendmentNo.3)

Code of practice for design and 2911(Part 1-Section 1979) construction of pile foundations : Part-1 concrete piles, Section 3 Driven pre cast concrete piles. (first revision)(WithAmendmentNo.3)

Code of practice for design and 2911(Part 1-Section 1984) construction of pile foundations: Part-1 concrete piles, Section 4 bored recast concrete pile(With Amendment No.-1)

Code of practice for design and 2911 (Part 4) 1985 construction of pile foundations: Part-4 Load test of piles (first revision) (With Amendment No.1)

Code of practice for design and 2911(Part-2) 1980 construction of pile foundations: Part-2 Timber piles (first revision (With Amendment No.-1)

Guide for lateral dynamic load 9716:1981 test on piles

Guidelines for selection of ground 13094:199213094:1992 improvement techniques for foundation in weed soils.

Glossary of terms for geo synthetics: 13321 (Part 1): 1992 Part 1 Terms used in materials and properties

Method of test for the determination 13325:1992 of tensile properties of extruded polymer geo grids using the wide strip.

Method of test for the evaluation 13326(Part 1) :1992 of interface friction between geo synthetics and soil

Part 1 modified direct shear technique 12.Code of practice for design and construction 1080:1986 of foundations for transmission line towers and poles (first revision)

Code of practice for design and 1904:1986 construction of foundations in soils: general requirements (third revision)

Code of practice for determination 6403:1981 of bearing capacity of shallow foundations (first revision) (With Amendment No.1)

Code of practice for calculation 8009(Part 1) ;1976 of settlement of foundations: Part 1

MAINTENANCE OF BUILDING STRUCTURES

Course/Paper: 08MCE108

MCE Semester-VIII

UNIT-I

Principles of Maintenance: Importance of Maintenance, Deterioration and durability, Factors affecting decision to carryout maintenance, Maintenance and GNPA gencies causing deterioration, effect of deterioration agencies on materials.

Design and economic consideration in Maintenance: Factors to reduce maintenance at design stage, Consideration of maintenance aspects in preparing tender document and specifications, Sources of error in design which enhances maintenance, Importance of working drawings and schedules Provision of access for maintenance and its importance at design stage. Economic consideration in Maintenance: Physical life, Functional life, Economic life of different types of buildings, discounting technique for assessment of economic life.

Maintenance Management : Definition, Organisation structure, work force for Maintenance, Communication needs, Building inspections, Maintenance budget and estimates, Property inspections and reports, Specification for maintenance jobs, Health and safety in maintenance, Quality in Maintenance, maintenance Manual and their importance.

Materials for maintenance: Compatibility of repair materials, Durability and maintenance. Types of materials, their specification and application, Criteria for selection of material, Use of Commercial available materials in maintenance.

Investigation and diagnosis for Repair of structures: Basic Approach to investigations, Physical inspection, Material Tests, Non destructive testing for diagnosis, Estimation of actual, loads and environmental effects, Study of design and construction practices used in original construction, Retrospective analysis, and Confirmation of repair steps.

Building Defects and Remedial Measures:

6.1 Nature, types of problems, their causes, remedial measures and special treatment for building elements.

Foundation,

Basements

D.P.C.

Walls

Wall finishes

Chimney, stacks and shafts

Columns and beams

Roof and roof terraces

Floor and floor finishes

Joinery work

Decorative/decorative finishes

Services

Materials

Dampness

Unit-II

Acoustics : Basic problems criteria and terminology, Transmission of sources in rooms, speech privacy between offices, co-efficient of source absorption, noise reduction co-efficient, classification selection of acoustical materials, design and installation of acoustical Treatment for of auditorium, schools religion buildings.

Air Conditioning Heating and Ventilation : Different types of heating equipment viz radiation converters, electric radiant panel heaters, requirements comfort conditions, temperature control, humidity control Mechanical ventilation plenum system, exhaust system fans, air filters of different types, air conditioning plants layout of ducts for cinema auditoriums and offices etc.

Fire Fighting: Fire regulations and requirements, cause of fire, fire resistance of materials, fire tests, fire resistance of elements, layout escape means for Multi storied buildings, Fire Training equipment different methods of fire fighting fire protection.

Electrical Services : General distribution of electric power : Sub-stations for small schemes and industrial units, meter-rooms, electrical installations in buildings, Fuses and Circuit breakers, various types of conduits, earthing, switches and outlet, lamp holder electrical wiring -different materials employed specifications, electrical appliances and electrical service bye-laws pertaining to electrical installations. Different types of artificial lighting systems, lighting systems for residential buildings, public buildings, hotels, cinemas, hospital exhibition, halls, libraries, schools, college, scientific laboratories etc.

Lifts and Escalators: Classification types of lifts, lift codes and rules. Traffic analysis and selection of lifts, Quantity of service, Quality service, Car speed. Provision form fire safety Angle Arrangements of lifts, Details of information to be given to manufacturers, Escalators, Types and their installation.

Reference:

1. IVOR H. Seeley, Building Technology Mac Millian.
2. Chudley , Building Finishes, fittings and domestic service longman, Scientific and Technical.
3. Fred Hall, Building Services & Equipment ,Longman Scientific and Technical.
4. Lee Smith, Harry Slecter, Plumbing Technology, Design and installation Delmar Publisher INC.
5. Fred Hall, Plumbing Cold water supplies, Drainage and Sanitation, Longman Scientific & Technical.
6. Roger Greeno, Building Services, Technology and Design, Longman.
7. Norbert Lechner, Heating Cooling, Lighting John Wiley & Sons.
8. Maintenance of Buildings A.C. Panchadari New age international (P) limited Publishers
9. Building finishes, fittings and domestic services R.Chudley.
10. Foundation Failures G. SZECHY, D.Sc. Concrete Publications limited 14 Dartmouth street London.
11. Building Construction materials and types of construction whitney clark huntington probert e. mickadeit allan hancock college.
12. Common Defects in Buildings H.J. Eidridge, Her Majesty's Stationery Office, London
13. Building Failures: Diagnosis and Avoidance W.H. Ransom
14. Housing defects reference Manual The Building Research Establishment E & F.N.SPON
15. Appraising building defects : Properties on stability and hygro-thermal performances, Geoffrey K.Cook Dr. A John Hinks Longman Scientific & Technical.
16. Repair of Concrete damaged by reinforcement Corrosion Report of working party. The concrete society

17. The maintenance and adoption of buildings R Chudley Longman Technical Services.
18. Common building defects - Diagnosis & Remedy Compiled by National Building Agency
19. Maintenance and Repair of Buildings and their internal environment, B.D. HUTCHINSON., J. Barton. N. Ellis.
20. Maintenance of Buildings, A.C. Panchdheri

GEOTECHNICAL ENGG. DESIGN AND LABORATORY. – II

Course/Paper: 08ICE-201
ICE 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: 08ICE-202
ICE Semester-VIII

Syllabus as per theory

PROFESSIONAL PRACTICES AND ESTIMATING

Course/Paper: 08ICE-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: 08ICE-204
ICE 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.

SEMESTER IX

ENVIRONMENTAL ENGINEERING & MANAGEMENT

Course/Paper: 09MCE101.1
MCE Semester-IX

1 Environment & Ecology : Definition and understanding of concepts. Ecosystem, Energy flow in ecosystem, water, carbon and nitrogen cycle community's inter-relationships in and ecosystem.

2 Type of Pollutants and Protection of Environment:

2.1 Environmental Protection: Importance of clean Environment, Control of Environment pollution w.r.t. air, land and water.

2.2. Water pollution : Sources, causes and measurement of water pollution surface water and underground water, water Quality criteria for various uses of fresh water, river basis studies for surface water pollution control biochemical oxygen demand, effect of oxygen demanding wastes on rivers.

2.3 Domestic and industrial wastes : Sources, standards for disposal of waste water Industrial effluents, Basic unit operation in control of waste water pollution, design features for treatment for disposal of sewage effluents ; guidelines of CPCB for abatement of industrial pollution technologies for control of water pollution from industries.

2.4 Air and Noise pollution: definition Principle materials causing pollution types of air contaminants. their sources and effects on living and nonliving materials permissible limits. Air pollution control Basis principles, natural self cleansing, pollution control methods and various engineering devices to control particulate and gaseous pollutants, controlling and pollution from automobiles. Noise Pollution : Definition ,sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, octave band and its importance; noise pollution control measures.

3 Land damage due to Mining: Open cast mining and its ill effects, Environmental protection practices in Mining and Environment Management Plans.

4 City and Housing Environment: Introduction, stage of Housing/city environment, Environmental consideration in town planning, Measures for improving city environment.

5 Current issues in Environmental Engineering: Global warming Ozone depletion, Acid Rain, Oil pollution, Radiation Hazard and control, Role of non-convention sources of energy in environment.

6 Acts/Legislation Provisions: Need for laws various acts, Rules and notifications. Salient features of various acts: The water (Prevention and Control of pollution) Act 1974. The water (prevention and Control of pollution) Cess Act, 1977. Air(Prevention and control of Pollution) Act 1981. The Environment (Protection)Act 1986,The Public liability insurance Act, 1991. The forest Act 1927, The wild life (Protection)Act 1927, The Forest (Conservation) Act,11980, various other Rules and notification for control of pollution.

7 Environmental Impact Assessment: Definition and its importance for Environment Management, Constituents of Environment Impact Assessment Report, Steps involved in preparing EIA,EIA methodologies Projects under EIA, Environment Impact Statement, Constraint in implementation of EIA. Impact prediction water, Resources Projects and other relevant case studies. Application of Biotechnology for Environmental Management: Basic concepts and techniques, Application for industrial effluent: Solid waste Management, Bio fertilizers and Bio-pesticides; Plant issue culture in forestry. Bio safty aspects, Bio-remedial.

Laboratory Work/Field Tasks:

Testing of water for various parameters such as pH,DO, conductivity.

Determination of BOD for Domestic Waste / Industrial Waste.

Determination of MPN of given sample.

Air sampling to particulate matter and other gaseous contaminants.

Determination of concentration of Metallic pollutants by using Atomic Absorption Spectrometer.

Monitoring of vehicular pollution emission.

Determination of noise levels for indoor and outdoor noise levels.

Visit and submission of Report for treatment of waste water plant of any industry.

Reference:

1. Peavy, Rowe, Techobanoglous, Environmental Engg. Mac Graw Hill.
2. Mackenzie L Davis, Environmental Engg. Tata Mac Graw Hill.
3. Baljeet Kapors Environmental Engg. An overview, Publishers.
4. Gilbert H.Msters, Environmental Engineering and Sc Prentice Hall of India Pvt. Ltd.
5. GN Panday, GC Carney Environmental Engineering Mac Graw Hill.
6. P.D. Sharma, Ecology and Environment Rastogi Publication.
7. RayP.A. Lcances Environmental Impact Assessment Hand National Environmental Protection Council, Manile.

BRIDGE ENGINEERING

Course/Paper: 09MCE101.2

MCE Semester-IX

Introduction: Definition and components of abridge, Classification of bridges, Choice of abridge type.

Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for River, Bridge, Linear waterway, Economical span, Vertical clearance, Scour depth, Afflux, Traffic projection.

Standard Specifications: for Road Bridges: Indian Road Congress Bridge Code, Width of carriageway, Clearances, Loads to be considered; Dead load, I.R.C. standard live loads, Impact effect, Application of Live load on decks, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.

Reinforced Concrete Bridges: General, Types of bridges; Balanced cantilever bridges, Continuous girder bridges, Rigid frame bridges, Portal Frame and Arch bridges. Detailed design of solid slab and T-beam bridges,

Steel Bridges: General, Type of Steel bridges; Plate girder bridges, Box girder bridges, Truss bridges, Cantilever bridges, Cable stayed bridges, and Suspension bridges.

Sub-structure and Foundation: Design of piers and abutments (Masonry & R.C.C.). Types of foundations; Shallow, Pile, and Well foundations including their construction details.

Bearings & Appurtenances: Different types of bearings, joints and handrails.

Construction and Maintenance of Bridges: Methods of construction of concrete bridges. Causes of Bridge failures, Inspection and maintenance. Instructions to the Examiner: Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

Reference:

1. Essentials of Bridge Engineering by Johnson Victor.
2. A text book of bridge Construction by Khadilkar.
3. Bridge Engg. by Rangwala.
4. Concrete Bridge Design SP-23 (ACI Publication)
5. Concrete bridges Handbook by Raina.
6. Bridge Engineering by S. Ponnuswamy
7. Bridge Engineering by Rakshit.

COMPUTER AIDED DESIGN METHODS

Course/Paper: 09MCE102

MCE Semester-IX

Introduction to CAD and its scope simple description of computer hardware.

- Micro, mini etc.
- memory, processor
- Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen digitizer.

Computer Graphics: introduction, point plotting techniques, line drawing displays, two-three dimensional transformation, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces, hidden surface elimination, shading. Graphic input devices. Graphic in put technique, input functions. Raster graphic fundamentals, interactive raster graphics, raster graphic systems.

Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages.

Matrix methods of structural analysis and associated computer programme assembly of matrices. Solution of equilibrium equations. Flow charts. Typical listing as illustrations. Introduction to interactive computer programme for the design detailing of simple structural elements: RCC's lab, beams, columns, isolated footings etc. Steel typical member sand connections.

Data base management, storing and retrieving of data

References:

1. Principles of interactive computer graphics by William M. Newman & Robert F. Sproul.
2. Programming in Finite Element by Hunton and owan
3. Principles of Computer Aided design by Joe Rooney & Philips Steadman
4. Computer Fundamentals-P.K.Sinha, BPB Publications
5. CAD/CAM-Mikell T. Groover.

BUILDING COST AND QUALITY MANAGEMENT

Course/Paper: 09MCE103

MCE Semester-IX

Estimation of quantities for R.C.C. multi storied complex viz. earthwork, concrete in foundation, D.P.C., R.C.C. work, flooring and roofing , plastering and pointing etc., wood work, white washing.

Analysis of rates for multi storied building works Brick working of undations and Super structure, cement concrete, R.C.C., Plastering, Flooring, Timber work etc.

Checking of construction quality various tests for bricks, cement, concrete, aggregates, and steel as per IS codes.

Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.

Estimation of building services viz. water supply works, electrification, sanitary fitting etc, and their cost analysis.

Completion report of the project; Checking of Plan, Details of various works, and issue of completion report of the project. Instructions to the Examiner: Total eight questions are to be set out of which the students are required to attempt any five questions.

Reference:

1. Estimating and Costing by B.N. Dutta
2. Estimating and Costing by G.S. Birdie
3. Estimating and Costing by Chakaraborty

RURAL CONSTRUCTION TECHNOLOGY

Course/Paper: 09MCE104.1

MCE Semester-IX

Rural Development Planning and Concept of Appropriate Technology. Scope, Development Plans; Various approaches to rural development planning Concept of Appropriate technology; Role of Civil Engineering in Rural Development; Organizational structures & management rural development programmers /projects.

Rural Housing : Low cost construction materials for housing low cost housing designs-architectural considerations for individual and group housing ; composite material-Ferro cement & flay ash, Autoclaved Calcium silicate bricks and soil-stabilized un burnt brick; Plinth protection of Mud Walls; Design Consideration and Construction of non erodable Mud Plaster, water-proof and fire-retardant roof treatment for thatch roofs, Pre cast stone Masonry Block walling scheme; rat-trap bond for walls; Prefab Brick Panels for roof, ferro cement flooring /roofing units, Thin R.C. Ribbed slab fon floors & roofs, Pre cast R.C. Channel Unit for flooring/roofing scheme, Pre cast R.C. cored unit for flooring/roofing scheme, Pre cast R.C. Plank flooring/roofing scheme, L-Pan roofing scheme; Glued Plywood Web Beams and Roof Panels; manual & Power Scaffold hoist, lifting device for prefab components; solar passive building design; Building economics and management.

Water Supply and Rural Sanitation: Epidemiology sources of water, BIS & WHO wate standards. Quality, Storage and distribution for rural water supply works; Basic Design principles of treatment-Low Cost water treatment technologies; Hand pumps-types, installation operation, and maintenance of Mark-II hand pump sp; Conservation of water; Rainwater, Harvesting; Drainage in rural areas, Design of low cost waste disposal systems; Design and constructions of low cost latrines: 2 pit pour flush wate seal VIP latrines, septic tank etc; Biogas technology: Low cost community & individual Garbage disposal systems, Recycling of organic/agricultural wastes: Development of village ponds; ferro cement water storage tanks & latrines. Cattle shed management; Sewage farming-standards for disposal and use for irrigation.

Low Cost Roads and Transport : Low cost pavement materials-testing suitability criteria processing materials; factors affecting pavement thickness & composition of various layers; CRR I Design for rural roads-Traffic Index, strength Index, CBR curve Intermediate Technology & Technology options for specify areas. Labour intensive techniques of road construction Mechanical stabilization; lime stabilization; water bou Macadam Construction; utilization of waste in rural construction one/two coat surface dressing; bitumen premix carpet; low cost improved transport system rural areas.

Low Cost irrigation : Design & Construction of Tube well, Drip & Sprink irrigation systems; Water logging Reclamation land watershed and catchments area development-problem and features of watershed Management Plans watershed structures and their basic design catchments treatment and Rehabilitation Plans ,types of M Hydel Plants, site selection, Advantages of Mini & Mi Hydel projects, structures required for plants.

Field visits to any 3-4 of the following to arranged and prepare the report of the visit.

CBRI Rookee UP.

CDC, Govt. Polytechnic, Sundernagar,HP.

CDC, Thapar Polytechnic, Patials,Pb.

Bunga villages and Sukhomajri Villages (HR).

Central Soil-water Management Research and Trail. Institute, Sector 27, Chandigarh. UT.

Central Road Research Institute (CRR I), Mathura Delhi, UT.

SERC, Gaziabad UP
Villages around Chandigarh.
Drawing and Design Exercises on the following to be done.
Rural Housing ;
Water supply project (Safe drinking water treatment, storage and distribution scheme).
Rural Latrines.
X-sections of Rural Roads.
Methods of Irrigation and water shed Projects.
Laboratories :
Testing of construction materials for Housing.
Testing of construction materials for Roads.
Testing of construction materials for Ferro cement.

Reference:

1. A.G. Madhov Rao, D.S. RamachandraMurthy, ApprorityTechnologiesforlowcostHousingoxfordandIBHPublishingCo. Pvt. Ltd.
2. CBRI, Roorkee Advances in building Materials Construction.
3. C. Satyanarayan Murthy, Design of Minor Irrigation and Canal Structures, Wiley Eastern Ltd.
4. K.Park Preventive and Social Medicine, M/s Banarsi Bhnnot.
5. yashPalBedi, AHnadBookofPreventiveandSocMedicine; AtamRam&Sons, Delhi.
6. DocumentonRuralRoadDevelopmentinIndiaVolumeCentralRoadResearchInstitute, NewDelhi.
7. SBWatt, FerrocementwatertanksandtheirconstructionIntermediateTechnologypublicationsLtd, London.
8. Ariane Van Bureu, A Chinese Biogas Manual Publications, London.
9. KCKhandelwalandSSMahdi, biogasTechnology-APracticeHandbook, Volume1+2. Tata Mc-Graw Hill Publishing Ltd., New Delhi Mc Graw Hill Publishing Com Ltd. New Delhi.
10. G B Rai, Non-Conventional Energy Sources, Khanna Publisher New Delhi.
11. Biogas Slurry utilization; Consortium on Rural Technology (CORT), NewDelhi.
12. SandyCahirncrossandRichardGFeachenEnvironmentalHeEngineeringinthetopics; John Wiley U Sons, NewYork.
13. Bindeshwas Pathak, Sulabh Shauchalays- Hand Flush Water Latrine; Sulabh Internationa, Patna.
14. Bindeshwas Pathak. Sulabh Shauchalaya-A study of Direct Chough: Sulabh International; Gandhi Marg, Patna.
15. Ettler+ Steel Muncipal & Rural Sanitation, Mc Graw Bookl nc. Company N.York.

PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE

Course/Paper: 09MCE104.2

MCE Semester-IX

Introduction: Types of pavement structure. Functions of pavement components, Factors affecting pavement design. Design wheel load, Strength characteristics of pavement materials.

Design of Flexible Pavements: General design considerations, Methods for design of flexible pavements; Group Index method, California Bearing Ratio (CBR) method, California Resistance Value method, Triaxial Test method, Burmister method, McLeod's method.

Design of Rigid Pavements: General design considerations, Methods for design of rigid pavements; Westergard's method, F.A.A. method, IRC recommendations for design of concrete pavements, method, Types of joints and their design in cement concrete pavements. Thickness design for Airport pavement, LC N system of pavement design, and design of airport pavement over lays.

Highway Construction: Types of highway construction and their selection, materials for construction, construction procedure of different highways: Earth roads, Gravel roads, WBM roads, Bituminous pavements, Cement concrete pavements, Low cost roads, Introduction to various equipment used for highway construction.

Highway Maintenance: Need for highway maintenance, Pavement failures their causes and remedial measures. Typical flexible and rigid pavement failures, Types of highway maintenance: Routine, periodic and special type, materials used for maintenance of different pavements, Strengthening of existing pavements, Maintenance management system.

Practical Exercises :

- Determination of CBR value of sub grade soils.
- Determination of Ductility of bituminous materials.
- Determination of stripping value of road aggregate.
- Determination of Marshall Stability value of bituminous mix.

Field visit for study of Batching and Mixing plant for bituminous construction of roads. Instructions to the Examiner: Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

Reference:

1. Principals of Pavement Design by E.J.Yoder
2. Highway Engineering by Khanna and Justo
3. Principles, Practice and Design of Highway Engineering by S.K. Sharma
4. Handbook of Road Technology by M.G. Lay
5. Pavement Analysis and Design by Yang and Huang
6. The Design and Performance of Road Pavements by D. Croney and P. Croney

SEMINAR

Course/Paper: 09ICE-201
ICE Semester-IX

OBJECTIVE

The students are to select one technical topic related its branch for Seminar. The student is to submit the synopsis for assessment and approval. Progress for preparation of the seminar topic would be continuously assessed from time to time. Two periods per week are to be allotted and students are expected to present the seminar Progress. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance.

Students have to give a final presentation for 15 minutes on his topic. Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews

PROJECT

Course/Paper: 09ICE-202
ICE Semester IX

OBJECTIVE

The objective of the project work is to enable the students in convenient groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution.

The student should select any one of the topics offered from the department or select one on his own duly approved from the department. Candidate is required to submit the detailed synopsis of the work that he would complete in the part-II

Each student shall finally produce a comprehensive report covering back ground information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

SEMESTER X

DISSERTATION

Course/Paper: 10ICE 201PT
IIE Semester X

The student will submit a synopsis at the beginning of the semester for the approval from the University project committee in a specified format. Synopsis must be submitted within a Two weeks. The first defense, for the dissertation work, should be held with in a one month. Dissertation Report must be submitted in a specified format to the University for Evaluation purpose.