CE-201E STRUCTURAL ANALYSIS-I

L T P/D Total   Max. Marks: 150
3 2   -   5   Theory: 100
                                                    Sessional: 50
                                                    Duration: 3 hrs.

UNIT-I

Analysis of stresses and strains:
Analysis of simple states of stresses and strains, elastic constraints, bending stresses, theory of simple bending, flexure formula, combined stresses in beams, shear stresses, Mohr's circle, Principle stresses and strains, torsion in shafts and closed thin walled sections, stresses and strains in cylindrical shells and spheres under internal pressure.

Theory of Columns:
Slenderness ratio, end connections, short columns, Euler's critical buckling loads, eccentrically loaded short columns, cylinder columns subjected to axial and eccentric loading.

UNIT-II

Bending moment and shear force in determinate beams and frames:
Definitions and sign conventions, axial force, shear force and bending moment diagrams.

Three hinged arches:
horizontal thrust, shear force and bending moment diagrams.

UNIT-III

Deflections in beams:
Introduction, slope and deflections in beams by differential equations, moment area method and conjugate beam method, unit load method, principle of virtual work, Maxwell's Law of Reciprocal Deflections, Williot's Mohr diagram

UNIT-IV

Analysis of statically determinate trusses:
Introduction, various types, stability, analysis of plane trusses by method of joints and method of sections, analysis of space trusses using tension coefficient method.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Strength of Materials Part-I, S.Timoshenko, Affiliated East-West Press, New . Delhi
2   Mechanics of Solids, Prasad, V. S. Gakgotia Pub., New Delhi.
3   Elementary Structural Analysis, Jain, A. K., Nem Chand & Bros, Roorkee.
4   Elementary Structural Analysis, Wibur & Nooris, McGraw Hill Book Co., Newyork.
5   Structural Analysis, Bhavikatti S.S.,Vikas Pub.House, N.Delhi.

B. Tech. III Semester (Civil)

CE-203E BUILDING CONSTRUCTION, MATERIALS & DRAWING

L T P/D Total   Max. Marks: 150
4 - 2   6   Theory: 100 marks
                                               Sessional: 50 marks
                                               Duration: 3 hrs.

A. CONSTRUCTION

UNIT-I

Masonry Construction:
Introduction, various terms used, stone masonry-Dressing of stones, Classifications of stone masonry, safe permissible loads, Brick masonry-bonds in brick work, laying brick work, structural brick work-cavity and hollow walls, reinforced brick work, Defects in brick masonry, composite stone and brick masonry, glass block masonry.

Cavity and Partition Walls:
Advantages, position of cavity, types of non-bearing partitions, constructional details and precautions, construction of masonry cavity wall.

Foundation:
Functions, types of shallow foundations, sub-surface investigations, geophysical methods, general feature of shallow foundation, foundations in water logged areas, design of masonry wall foundation, introduction to deep foundations i.e. pile and pier foundations.

UNIT-II

Damp-Proofing and Water-Proofing:
Defects and causes of dampness, prevention of dampness, materials used, damp-proofing treatment in buildings, water proofing treatment of roofs including pitched roofs.

Roofs and Floors:
Types of roofs, various terms used, roof trusses-king post truss, queen post truss etc.
Floor structures, ground, basement and upper floors, various types of floorings.

Doors and Windows:
Locations, sizes, types of doors and windows, fixures and fastners for doors and windows.

Acoustics, Sound Insulation and Fire Protection:
Classification, measurement and transmission of sound, sound absorber, classification of absorbers, sound insulation of buildings, wall construction and accoustical design of auditorium, fire-resisting properties of materials, fire resistant construction and fire protection requirements for buildings.

B. MATERIALS

UNIT-III

Stones:
Classification, requirements of good structural stone, quarrying, blasting and sorting out of stones, dressing, sawing and polishing, prevention and seasoning of stone.

Brick and Tiles:
Classification of bricks, constituents of good brick earth, harmful ingredients, manufacturing of bricks, testing of bricks.

Tiles: Terra-cotta, manufacturing of tiles and terra-cotta, types of terra-cotta, uses of terra-cotta.

Limes, Cement and Mortars:
Classification of lime, manufacturing, artificial hydraulic lime, pozzolona, testing of lime, storage of lime, cements composition, types of cement, manufacturing of ordinary Portland cement, testing of cement, special types of cement, storage of cement.
Mortars: Definition, proportions of lime and cement mortars, mortars for masonry and plastering.

UNIT-IV
Timber:
Classification of timber, structure of timber, seasoning of timber, defects in timber, fire proofing of timber, plywood, fiberboard, masonite and its manufacturing, important Indian timbers.

Ferrous and Non-Ferrous Metals:
Definitions, manufacturing of cast iron, manufacturing of steel from pig iron, types of steel, marketable form of steel, manufacturing of aluminium and zinc.

Paints and Varnishes:
Basic constituents of paints, types of paints, painting of wood, constituents of varnishes, characteristics and types of varnishes.

Plastic:
Definition, classification of plastics, composition and raw materials, manufacturing, characteristics and uses, polymerization, classification, special varieties.

C. DRAWINGS
1. **Typical drawings of:**
a)   Cavity Wall
b)   Bonds in brick work
c)   Grillage foundation
2. **Preparation of building drawing mentioning its salient features including the following details:**
a)   Ground floor plan
b)   Two Sectional Elevations
c)   Front and Side Elevations
d)   Plan and Sectional Elevation of stair case, doors/ windows/ ventilators, floor and roof.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Building Construction, Sushil Kumar, Standard Pub., N. Delhi
2   Building Material, Rangawala
3   Construction Engineering, Y.S. Sane
4   Building Construction, Gurcharan Singh, Standard Pub., N. Delhi.

B. Tech. III Semester (Civil)
CE-205E FLUID MECHANICS-I

L T P/D Total   Max. Marks: 150
3 2 - 5   Theory: 100 marks
                                        Sessional: 50 marks
                                        Duration: 3 hrs.

UNIT-I

Introduction:
Fluid properties, mass density, specific weight, specific volume and specific volume and specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility viscosity, Newtonian and Non-newtonian fluids, real and ideal fluids.

Kinematics of Fluid Flow:
Stready & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three dimensional. flows, stream lines, streak lines and path lines, continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential, rotational and irrotational flows, graphical and experimental methods of drawing flownets.

UNIT-II

Fluid Statics:
Pressure-density-height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, center of pressure, Buoyancy, stability of immersed and floating bodies, determination of metacentric height, fluid masses subjected to uniform acceleration, free and forced vortex.

UNIT-III

Dynamic of Fluid Flow:
Euler's equation of motion along a streamline and its integration, limitation of Bernouli's equation, Pitot tubes, venturimeter, Orficemeter, flow through orifices & mouth pieces, sharp crested weirs and notches, aeration of nappe.

UNIT-IV

Boundary layer analysis:
Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation and its control.

Dimensional Analysis and Hydraulic Similude:
Dimensional analysis, Buckinghum theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, physical modeling, similar and distorted models.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
1   Hydraulic and Fluid Mechanic by P.N.Modi & S.M.Seth

2   Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald

3   Fluid Mechanics Through Problems by R.J.Garde

4   Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker

B. Tech. III Semester (Civil)
CE-207E SURVEYING-I

L   T   P/D   Total   Max. Marks: 150
3   1   -   4   Theory: 100 marks
                                                       Sessional: 50 marks
                                                       Duration: 3 hrs.

UNIT-I
Fundamental Principles of Surveying:
Definition, objects, classification, fundamental principles, methods of fixing stations.
Measurement of distances:
Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line, errors in chaining, tape corrections examples.
Compass and Chain Traversing:
Methods of traversing, instruments for measurement of angles-prismatic and surveyor's compass, bearing of lines, local attraction, examples.

UNIT-II
Leveling:
Definition of terms used in leveling, types of levels and staff, temporary adjustment of levels, principles of leveling, reduction of levels, booking of staff readings, examples, contouring, characteristics of contours lines, locating contours, interpolation of contours.
Plane Table Surveying:
Plane table, methods of plane table surveying, radiation, intersection, traversing and resection, two point and three point problems.

UNIT-III
Theodolite and Theodolite Traversing:
Theodolites, temporary adjustment of theodolite, measurement of angles, repetition and reiteration method, traverse surveying with theodolite, checks in traversing, adjustment of closed traverse, examples.
Tacheometry:
 Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying-stadia system fixed hair method, determination of tacheometric constants, tangential systems, examples.
UNIT-IV
Curves:
Classification of curves, elements of simple circular curve, location of tangent points-chain and tape methods, instrumental methods, examples of simple curves. Transition Curves-Length and types of transition curves, length of combined curve, examples.
Vertical Curves: Necessity and types of vertical curves.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.
Books:
1.   Surveying Vol.I & II by B.C.Punmia
2.   Surveying Vol.I by T.P.Kanitkar

B. Tech. III Semester (Civil)
CE-209E ENGINEERING GEOLOGY

L T P/D Total   Max. Marks: 150
3 1 -   4   Theory: 100 marks
                                                    Sessional: 50 marks
                                                    Duration.:   3 hrs.

UNIT-I

Introduction:
Definition, object, scope and sub division of geology, geology around us. The interior of the earth. Importance of geology in Civil Engineering projects.

Physical Geology:
The external and internal geological forces causing changes, weathering and erosion of the surface of the earth. Geological work of ice, water and winds. Soil profile and its importance. Earthquakes and volcanoes.

UNIT-II

Mineralogy and Petrology:
Definition and mineral and rocks. Classification of important rock forming minerals, simple description based on physical properties of minerals. Rocks of earth surface, classification of rocks. Mineral composition, Textures, structure and origin of Igneous, Sedimentary and Metamorphic rocks. Aims and principles of stratigraphy. Standard geological/stratigraphical time scale with its sub division and a short description based on engineering uses of formation of India.

Structural Geology:
Forms and structures of rocks. Bedding plane and outcrops Dip and Strike.   Elementary ideas about fold, fault, joint and unconformity and recognition on outcrops. Importance of geological structures in Civil Engineering projects.

UNIT-III

Applied Geology:
Hydrogeology, water table, springs and Artesian well, aquifers, ground water in engineering projects. Artificial recharge of ground water, Elementary ideas of geological investigations. Remote sensing techniques for geological and hydrological survey and investigation. Uses of geological maps and interpretation of data, geological reports.

Suitability and stability of foundation sites and abutments:
Geological condition and their influence on the selection, location, type and design of dams, reservoirs, tunnels, highways, bridges etc. Landslides and Hill-slope stability.

UNIT-IV

Improvement of foundation rocks:
Precaution and treatment against faults, joints and ground water, retaining walls and other precautions.

Geology and environment of earth.

Note: The physical study of rock samples and minerals may be performed in the tutorials.
Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
1   A Text Book of Geology by P.K. Mukherjee

2   Physical and General Geology by S.K.Garg
3   Engineering and General Geology by Prabin Singh
4   Introduction of Physical Geology by A.Holmes.

MATHEMATICS – III
MATH-201 E

L	T	P
3	1	-

Theory	:	100
Sessional	:	50
Total	:	150
Duration of Exam		: 3 Hrs.

UNIT – I

Fourier Series :   Euler's Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

Fourier Transforms : Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Perseval's identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

UNIT-II

Functions of a Complex Variables : Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability and analyticity.

Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, Polar form of the Cauchy-Riemann equations, Harmonic functions, Application to flow problems, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

UNIT-III

Probability Distributions : Probability, Baye's theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

UNIT-IV

Linear Programming : Linear programming problems formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

Text Book
    1.   Higher Engg. Mathematics : B.S. Grewal
    2.   Advanced Engg. Mathematics : E. Kreyzig

Reference Book
    1.   Complex variables and Applications : R.V. Churchil; Mc. Graw Hill
    2.   Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.
    3.   Operation Research : H.A. Taha
    4.   Probability and statistics for Engineer : Johnson. PHI.

Note : Examiner will set eight question, taking two from each unit. Students will be required to attempt five questions taking at least one from each unit.

B. Tech III Semester (Civil)
CE-211E   STRUCTURAL MECHANICS-I (P)

L	T	P/D	Total		Max. Marks - 75
-	-	2	2		Viva-Voce - 25 marks
					Sessional - 50 marks
					Duration – 3 Hours

1. Verification of reciprocal theorem of deflection using a simply supported beam.
2. Verification of moment area theorem for slopes and deflections of the beam.
3. Deflections of a truss- horizontal deflection & vertical deflection of various joints of a pin- jointed truss.
4. Elastic displacements (vertical & horizontal) of curved members.
5. Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
6. Experimental and analytical study of behaviour of struts with various end conditions.
7. To determine elastic properties of a beam.
8. Uniaxial tension test for steel (plain & deformed bars)
9. Uniaxial compression test on concrete & bricks specimens.

L T P/D Total   Max.Marks:75
- -   2   2   Viva-voce:25 marks
                                                Sessionals: 50 marks
                                                Duration: 3 hours

1   To determine metacentric height of the ship model.
2   To verify the Bernoulli's theorem.
3   To determine coefficient of discharge for an Orificemeter.
4   To determine coefficient of discharge of a venturimeter.
5   To determine the various hydraulic coefficients of an Orifice (C_d, Cc, Cv).
6   To determine coefficient of discharge for an Orifice under variable head.
7   To calibrate a given notch.
8   To determine coefficient of discharge for a mouth piece.
9   Drawing of a flownet by Viscous Analogy Model and Sand Box Model.
10   To study development of boundary layer over a flat plate.
11   To study velocity distribution in a rectangular open channel.
12   Velocity measurements by current meter, float, double float (demonstration only).
13   Experiment on Vortex formation (demonstration only).

B.Tech.III Semester(Civil)
CE-215E SURVEYING-I(P)

L T P/D Total   Max.Marks:100
- - 3   3   Sessionals:50 marks
                                                      Viva-voce: 50 marks
                                                      Duration:3 hours

1   Chain surveying: Chaining and chain traversing.
2   Compass traversing.
3   Plane tabling: methods of plane table surveying, two point & three point
        problems.
4   Leveling: Profile leveling and plotting of longitudinal section and cross
        sections. y leveling. Permanent adjustment of level.
        Reciprocal leveling.
        Contouring and preparation contour map.
5   Use of tangent clinometer.

BASICS OF ECONOMICS AND MANAGEMENT
HUM – 201 E

L   T   P   3
1   -   Sessional   : 50 Marks
                            Theory   : 100 Marks
                            Total   : 150 Marks
                            Duration of Exam.:   3 Hrs.

UNIT-I

Meaning of Industrial Economic, Production Function, its types, Least Cost Combination, Law of Variable Proportion, Laws of Return – Increasing, Constant & Diminishing.

Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC Curve.

Price & Output Determination under Monopoly in short run & long run. Price Discrimination, Price Determination under Discriminating Monopoly. Comparison between Monopoly & Perfect Competition.

UNIT-II

Meaning of Management, Characteristics of Management, Management Vs. Administration, Management – Art, Science & Profession, Fayol's Principles of Management, Human relations approach, functions of management

UNIT-III

Planning & Organizing:
Planning, steps in planning, Planning premises, difference between planning policy & strategy, Authority & responsibility, centralization & decentralization.

UNIT-IV

Staffing, Directing & Controlling- Manpower, planning, Recruitment & section styles of leadership, communication process and barriers, control process and steps in controlling

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

TEXT BOOKS :
1. "Modern Economic Theory" Dewett, K.K., S. Chand & Co.
2. "Economic Analysis" K.P. Sundharam & E.N. Sundharam (Sultan Chand & Sons).
3. "Micro Economic Theory" M.L. Jhingan (Konark Publishers Pvt. Ltd.).
4. "Principles of Economics" M.L. Seth (Lakshmi Narain Aggarwal Educational Publishers – Agra).
5. "An Introduction to Sociology", D.R. Sachdeva & Vidya Bhusan.
6. "Society – An Introductory Analysis", R.M. Maclver Charles H. Page.
7. "Principles and Practices of Management : R.S. Gupta; B.D. Sharma; N.S. Bhalla; Kalyani.

REFERENCE BOOKS
1. "Organization and Management : R.D. Aggarwal, Tata McGraw Hill.
2. Business Organization and Management : M.C. Shukla

B. Tech. IV Semester (Civil)
CE-202E STRUCTURAL ANALYSIS-II

L T P/D Total   Max. Marks: 150
3 2 -   5   Theory: 100 marks
                                                           Sessionals: 50 marks
                                                           Duration: 3 hours

UNIT-I

Statically Indeterminate Structures:
Introduction, Static and Kinematic Indeterminacies, Castigliano's theorems, Strain energy method, Analysis of frames with one or two redundant members using Castigliano's 2nd theorem.

UNIT-II

Slope deflection and moment Distribution Methods:
Analysis of continuous beams & portal frames, Portal frames with inclined members.

UNIT-III

Column Analogy Method:
Elastic centre, Properties of analogous column, Applications to beam & frames.

Analysis of Two hinged Arches:
Parabolic and circular Arches, Bending Moment Diagram for various loadings, Temperature effects, Rib shortening, Axial thrust and Radial Shear force diagrams.

UNIT-IV

Unsymmetrical Bending
Introduction Centroidal principal axes of sections, Bending stresses in beam subjected to unsymmetrical bending, shear centre, shear centre for channel, Angles and Z sections.

Cable and suspension Bridges:
Introduction, uniformly loaded cables, Temperature stresses, three hinged stiffening Girder and two hinged stiffening Girder.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

BOOKS:

1. Statically Indeterminate Structures, C.K. Wang, McGraw Hill Book Co., New York.
2. Advanced Structural Analysis, A.K. Jain, Nem Chand & Bros., Roorkee.
3. Indeterminate Structures, R.L. Jindal, S. Chand & Co., New Delhi.
4. Theory of Structures, Vol. I, S.P. Gupta & G.S.Pandit, Tata McGraw Hill, New Delhi.

B Tech IV semester (civil)
CE-204E DESIGN OF STEEL STRUCTURES-I

L T P/D Total   Max. Marks: 150
3 - 2   5   Theory :   100 Marks
                                                                    Sessional :   50 Marks
                                                                    Duration   3 Hours

UNIT-I

Introduction:
        Properties of structural steel. I.S.Rolled sections and I.S. specification.
Connections:
Importance, various types of connections, simple and moment resistant, riveted, bolted and welded connections.
Design of Tension Members:
Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices.

UNIT-II

Design of Compression Members:
Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, design of built up columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members.
Column Bases and Footings:
Introduction, types of column bases, design of slab base and gussested base, design of gussested base subjected to eccentrically loading, design of grillage foundations.

UNIT-III

Design of Beams:
Introduction, types of sections, general design criteria for beams, design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling.

UNIT-IV

Gantry Girders:
Introduction, various loads, specifications, design of gantry girder.
Plate Girder:
Introduction, elements of plate girder, design steps of a plate girder, necessity of stiffeners in plate girder, various types of stiffeners, web and flange splices (brief introduction), Curtailment of flange plates, design beam to column connections: Introduction, design of framed and seat connection.

DRAWINGS:
1. Structural drawings of various types of welded connections (simple and eccentric)
2. Beam to column connections (framed & seat connections)
3. Column bases- slab base, gussested base and grillage foundation.
4. Plate girder.
5. Roof truss.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Design of steel structures, A.S.Arya & J.L.Ajmani, Nem chand & Bros., Roorkee.
2. Design of steel structures, M.Raghupati, TMH Pub., New Delhi.
3. Design of steel structures, S.M.A.Kazmi & S.K.Jindal, Prentice Hall, New Delhi.
4. Design of steel structures, S.K.Duggal, TMH Pub., New Delhi.

B. Tech. IV Semester (Civil)
CE-206E FLUID MECHANICS-II

L T P/D Total
3 2   -   5

Max. Marks: 150
Theory: 100 marks
Sessionals: 50 marks
Duration: 3 hours

UNIT-I

Laminar Flow:
Navier Stoke's equation, Laminar flow between parallel plates, Couette flow, laminar flow through pipes-Hagen Poiseuille law, laminar flow around a sphere-Stokes'law.

Flow through pipes:
Types of flows-Reynold's experiment, shear stress on turbulent flow, boundary layer in pipes-Establishment of flow, velocity distribution for turbulent flow in smooth and rough pipes, resistance to flow of fluid in smooth and rough pipes, Stanton and Moody's diagram. Darcy's weisbach equation, other energy losses in pipes, loss due to sudden expansion, hydraulic gradient and total energy lines, pipes in series and in parallel, equivalent pipe, branched pipe, pipe networks, Hardy Cross method, water hammer.

UNIT-II

Drag and Lift:
Types of drag, drag on a sphere, flat plate, cylinder and airfoil, development of lift on immersed bodies like circular cylinder and airfoil.

Open Channel Flow:
Type of flow in open channels, geometric parameters of channel section, uniform flow, most economical section (rectangular and trapezoidal), specific energy and critical depth, momentum in open channel, specific force, critical flow in rectangular channel, applications of specific energy and discharge diagrams to channel transition, metering flumes, hydraulic jump in rectangular channel, surges in open channels, positive and negative surges, gradually varied flow equation and its integration, surface profiles.

UNIT-III

Compressible flow:
Basic relationship of thermodynamics continuity, momentum and energy equations, propagation of elastic waves due to compression of fluid, Mach number and its significance, subsonic and supersonic flows, propagation of elastic wave due to disturbance in fluid mach cone, stagnation pressure.

UNIT-IV

Pumps and Turbines:
Reciprocating pumps, their types, work done by single and double acting pumps. Centrifugal pumps, components and parts and working, types, heads of a pump-statics and manometric heads,. Force executed by fluid jet on stationary and moving flat vanes, Turbines-classifications of turbines based on head and specific speed, component and working of Pelton wheel and Francis turbines, cavitation and setting of turbines.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Hydraulics & Fluid Mechanics by P.N.Modi and S.M.Seth
2   Flow in Open Channels by S.Subraminayam
3   Introduction to Fluid Mechanics by Robert N.Fox & Alan T.Macnold

B. Tech. (Civil) IV Semester
CE-208E SOIL MECHANICS

L T P/D Total   Max. Marks: 150
3 2 -   5   Theory: 100 marks
                                                    Sessionals: 50 marks
                                                    Duration: 3 hours

UNIT-I

Soil Formation and Composition

Introduction, soil and rock, Soil Mechanics and Foundation Engineering, origin of soils, weathering, soil formation, major soil deposits of India, particle size, particle shape, interparticle forces, soil structure, principal clay minerals.

Basic Soil Properties

Introduction, three phase system, weight-volume relationships, soil grain properties, soil aggregate properties, grain size analysis, sieve analysis, sedimentation analysis, grain size distribution curves, consistency of soils, consistency limits and their determination, activity of clays, relative density of sands.

Classification of soils

Purpose of classification, classification on the basis of grain size, classification on the basis of plasticity, plasticity chart, Indian Standard Classification System.

Permeability of Soils

Introduction, Darcy's law and its validity, discharge velocity and seepage velocity, factors affecting permeability, laboratory determination of coefficient of permeability, determination of field permeability, permeability of stratified deposits.

UNIT-II

Effective Stress Concept

Principle of effective stress, effective stress under hydrostatic conditions, capillary rise in soils, effective stress in the zone of capillary rise, effective stress under steady state hydro-dynamic conditions, seepage force, quick condition, critical hydraulic gradient, two dimensional flow, Laplace's equation, properties and utilities of flownet, graphical method of construction of flownets, piping, protective filter.

Compaction

Introduction, role of moisture and compactive effect in compaction, laboratory determination of optimum moisture content, moisture density relationship, compaction in field, compaction of cohesionless soils, moderately cohesive soils and clays, field control of compaction.

UNIT-III

Vertical Stress below Applied Loads

Introduction, Boussinesq's equation, vertical stress distribution diagrams, vertical stress beneath loaded areas, Newmark's influence chart, approximate stress distribution methods for loaded areas, Westergaard's analysis, contact pressure.

Compressibility and Consolidation

Introduction, components of total settlement, consolidation process, one-dimensional consolidation test, typical void ratio-pressure relationships for sands and clays, normally consolidated and over consolidated clays, Casagrande's graphical method of estimating pre-consolidation pressure, Terzaghi's theory of one-dimensional primary consolidation, determination of coefficients of consolidation, consolidation settlement, Construction period settlement, secondary consolidation.

UNIT-IV

Shear Strength

Introduction, Mohr stress circle, Mohr-Coulomb failure-criterion, relationship between principal stresses at failure, shear tests, direct shear test, unconfined compression test, triaxial compression tests, drainage conditions and strength parameters, Vane shear test, shear strength characteristics of sands, normally consolidated clays, over-consolidated clays and partially saturated soils, sensitivity and thixotropy.

Earth Pressure

Introduction, earth pressure at rest, Rankine's active & passive states of plastic equilibrium, Rankine's earth pressure theory, Coulomb's earth pressure theory, Culmann's graphical construction, Rebhann's construction.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended

1. Basic and Applied Soil Mechanics by Gopal Ranjan, ASR Rao, New Age Intetrnational(P)Ltd.Pub.N.Delhi.
2. Soil Engg. in Theory and Practice, Vol .I, Fundamentals and General Principles by Alam Singh, CBS Pub.,N.Delhi.
3. Engg.Properties of Soils by S.K.Gulati, Tata-Mcgraw Hill,N.Delhi.
4. Geotechnical Engg. by P.Purshotam Raj,Tata Mcgraw Hill.
5. Principles of Geotechnical Engineering by B.M.Das,PWS KENT, Boston.

B. Tech IV Semester (Civil)
CE-210E SURVEYING -II

L T P/D Total   Max.Marks: 150
3 1 -   4   Theory: 100marks
                                Sessionals: 50 marks
                                Duration: 3 hrs.

UNIT-I
Trigonometrical Levelling:
Introduction, height and distances-base of the object accessible, base of object inaccessible, geodetical observation, refraction and curvature, axis signal correction, difference in elevation between two points.
Triangulation:
Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations, introduction to E.D.M. instruments.

UNIT-II
Survey Adjustment and Treatment of Observations:
Types of errors, definition of weight pf an observation, most probable values, law of accidental errors, law of weights, determination of probable error (different cases with examples) principle of least squares, adjustment of triangulation figures by method of least squares.

UNIT-III
Astronomy:
Definitions of astronomical terms, star at elongation, star at prime vertical star at horizon, star at culmination, celestial coordinate systems, Napier's rule of circular parts, various time systems: sidereal, apparent, solar and mean solar time, equation of time-its cause.

UNIT-IV
Elements of Photogrammetry:
Introduction: types of photographs, types of aerial photographs, aerial camera and height displacements in vertical photographs, stereoscopic vision and stereoscopies, height determination from parallax measurement, flight planning,
Introduction of remote sensing and its systems:
Concept of G.I.S and G.P.S. -Basic Components, data input, storage & output.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended

1   Surveying Vol.2 by B.C.Punmia
2   Surveying Vol.3 by B.C.Punmia
3   Surveying Vol2 by T.P.Kanitkar
4   Higher Surveying by A M Chandra

B. Tech IV Semester (Civil)
CE-212E FLUID MECHANICS-II (P)

L T P/D Total   Max. Marks:75
-   -   2   2   Sessionals: 50 mark
                                                              Viva-voce: 25 marks
                                                              Duration: 3 hrs.

1   To determine the coefficient of drag by Stoke's law for spherical bodies.
2   To study the phenomenon of cavitation in pipe flow.
3   To determine the critical Reynold's number for flow through commercial pipes.
4   To determine the coefficient of discharge for flow over a broad crested weir.
5   To study the characteristics of a hydraulic jump on a horizontal floor and sloping
         glacis including friction blocks.
6   To study the scouring phenomenon around a bridge pier model.
7   To study the scouring phenomenon for flow past a spur.
8   To determine the characteristics of a centrifugal pump.
9   To study the momentum characteristics of a given jet.
10   To determine head loss due to various pipe fittings.

CE-214E SOIL MECHANICS (P)

L T P/D Total   Max.Marks:75
                                                    Sessional:50 marks
-   -   2   2   Pract./ Viva-Voce:25 marks
                                                    Duration:3 hrs.

1.   Visual Soil Classification and water content determination.
2.   Determination of specific gravity of soil solids.
3.   Grain size analysis-sieve analysis.
4.   Liquid limit and plastic limit determination.
5.   Field density by:
        i) Sand replacement method
        ii) Core cutter method
6.   Proctor's compaction test.
7.   Coefficient of permeability of soils.
8.   Unconfined compressive strength test.
9.   Direct shear test on granular soil sample.
10.   Unconsolidated undrained (UU) triaxial shear test of fine grained soil sample.

BOOKS

1   Soil Testing for Engineers by S.Prakash, PK Jain, Nem Chand & Bros.,Roorkee.
2   Engineering Soil Testing by Lambi, Wiley Eastern.
3   Engineering Properties of Soils and their Measurement by J.P.Bowles, McGraw Hill.
4   Soil Engineering in Theory and Practice, Vol.II, Geotechnical Testing and Instrumentation by Alam Singh, CBS Pub.

B. Tech. IV Semester(Civil)
CE-216E SURVEYING-II(P)

L   T   P/D   Total   Max. Marks: 75
-   -   2   2   Sessionals: 50 marks
                                                             Viva-voce: 25 marks
                                                             Duration: 3 hrs.

1.   Theodilite:
Study of theodolite, measurement of horizontal angle, measurement of vertical angle, Permanent adjustment.

2   Tacheometry:
Tacheometric constants, calculating horizontal distance and elevations with the help of tacheometer.

3   Curves:
Setting of simple circular curves by off set method, off set from chord produced, off set from long chord and by deflection angleethod.

4   Trirangulation:
An exercise of triangulation including base line measurement.

CE-301E STRUCTURAL ANALYSIS-III

L T P/D Total

Max.Marks:150

3 2   -   5

Theory:100 marks
Sessionals:50 marks
Duration:3 hrs.

UNIT-I

Influence lines:
Introduction, influence lines for three hinged and two hinged arches, load position for Max.S.F. and B.M. at a section in the span.
Influence Line for statically indeterminate Beams:
Muller-Breslau Principle, I.L. for B.M. & S.F. for continuous Beams.

UNIT-II

Fixed Arches:
Expression for H and B.M. at a section, Elastic centre.
Rolling Loads:
Introduction, Single concentrated load, uniformly distributed load longer than span, shorter than span , two point loads, several point loads, Max.B.M. and S.F.Absolute, Max.B.M.

UNIT-III

Kani's Method:
Analysis of continuous beams and simple frames, analysis of frames with different column lengths and end conditions of the bottom storey.

UNIT-IV

Approximate Analysis of frames:
(i) for vertical loads, (ii) for lateral loads by Portal method & Cantilever method.
Matrix Methods
Introduction, Stiffness Coefficients, Flexibility Coefficients, Development of flexibility & stiffness matrices for plane frame, Global axis and local axis, analysis of plane frame, pin jointed and rigid jointed.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended:
1.   Indeterminate structures, R.L.Jindal S.Chand & Co.,N.Delhi.
1.   Advanced Structural Analysis-A.K.Jain, NemChand & Bros.,Roorkee.
2.   Structural Analysis-A Unified Approach, D.S.Prakash Rao,, University Press, Hyderabad.
3.   Structural Analysis-A unified classical & Matrix Approach, A.Ghali & A.M.Neville,Chapman & Hall London.
4.   Theory of Strucutres,- Vol. I&II,- S.P.Gupta & G.S.Pandit, Tata McGraw Hill, N.Delhi.
5.   Basic Structural Analysis – C.S. Reddy, Tata McGraw Hill, New Delhi.

B. Tech. V Semester (Civil)
CE-303E DESIGN OF CONCRETE STRUCTURES-I

L T P/D Total   Max.Marks:150
4 2   -   6   Theory:100 marks
                                                      Sessional:50 marks
                                                      Duration:4 hrs.

UNIT-I
Elementary treatment of concrete technology:
Physical requirements of cement, aggregate, admixture and reinforcement, Strength and durability, shrinkage and creep. Design of concrete mixes, Acceptability criterion, I.S.Specifications,

Design Philosophies in Reinforced Concrete:
Working stress and limit state methods, Limit state v/s working stress method, Building code, Normal distribution curve, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads, stress -strain relationship for concrete and steel.

UNIT-II
Working Stress Method:
Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, steel beam theory, inverted flanged beams, design examples.

Limit State Method:
Basic assumptions, Analysis and design of singly and doubly reinforced rectangular flanged beams, minimum and maximum reinforcement requirement, design examples.

UNIT-III
Analysis and Design of Sections in shear bond and torsion:
Diagonal tension, shear reinforcement, development length, Anchorage and flexural bond, Torsional, stiffness, equivalent shear, Torsional reinforcement, Design examples.

Columns and Footings:
Effective length, Minimum eccentricity, short columns under axial compression, Uniaxial and biaxial bending, slender columns, Isolated and wall footings, Design examples.

Serviceability Limit State:
Control of deflection, cracking, slenderness and vibrations, deflection and moment relationship for limiting values of span to depth, limit state of crack width, Design examples.

UNIT-IV
Concrete Reinforcement and Detailing:
Requirements of good detailing cover to reinforcement, spacing of reinforcement, reinforcement splicing, Anchoring reinforcing bars in flexure and shear, curtailment of reinforcement.

One way and Two Ways Slabs:
General considerations, Design of one way and two ways slabs for distributed and concentrated loads, Non-rectangular slabs, openings in slabs, Design examples.

Retaining Walls:
Classification, Forces on retaining walls, design criteria, stability requirements, Proportioning of cantilever retaining walls, counterfort retaining walls, criteria for design of counteforts, design examples.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
1. Design of Reinforced Concrete Structures,P.Dayaratnam,Oxford & IBH Pub.,N.Delhi.
2. Reinforced Concrete-Limit State Design, A.K.Jain, Nem Chand & Bros.,Roorkee.
3. Reinforced Concrete, I.C.Syal & A,K,Goel, A.H,Wheeler & Co.Delhi.
4. Reinforced Concrfete Design, S.N.Sinha, TMH Pub.,N.Delhi.
5. SP-16(S&T)-1980, 'Design Aids for Reinforced Concrete to IS:456, BIS, N.Delhi.
6. SP-34(S&T)-1987 'Handbook on Concrete Reinforcement and Detailing', BIS, N.Delhi.
7. Reinforced Concrete Design – Pillai and Menon, TMH, New Delhi.

B. Tech. V Semester (Civil)
CE- 305E HYDROLOGY

L T P/D Total   Max Marks: 150
3 2 -   5   Theory: 100 Marks
                                                    Sessional: 50 Marks
                                                    Duration: 3 hrs.

UNIT-I

Introduction:
Hydrologic cycle, scope and application of hydrology to engineering problems, drainage basins and its characteristics, stream geometry, hypsometric curves.

Precipitation:
Forms and types of precipitation, characteristics of precipitation in India, measurement of preciptation, recording and non recording raingages, raingage station, raingage network, estimation of missing data, presentation of rainfall data, mean precipitation, depth -area - duration relationship, frequency of point rainfall, intensity -duration- frequency curves, probable max. precipitation.

UNIT-II

Evaporation & Transpiration:
Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapotranspiration and its measurement, Penman's equation and potential evapotranspiration.

Infiltration:
Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices.

UNIT-III

Runoff:
Factor affecting run-off, estimation of runoff, rainfall-run off relationships, measurement of stage-staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

Hydrograph:
Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of UH, triangular UH, Snyder's synthetic UH, floods, rational methods, empirical formulae, UH method, flood frequency methods, Gumbel's method, graphical method, design flood.

UNIT-IV

Ground Water:
Occurrence, types of aquifers, compressibility of aquifers, water table and its effects on fluctuations , wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility.

Well Hydraulics:
Steady state flow to wells in unconfined and confined aquifers.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Engineering Hydrology by K.Subramanya, TMH, New Delhi
2   Hydrology by H.M.Raghunath.
3   Hydrology for Engineers by Linsely, Kohler, Paulhus.
4   Elementary Hydrology by V.P.Singh.

B. Tech. V Semester (Civil)
CE-307E GEOTECHNOLOGY-I

L T P/D Total   Max.Marks: 150
3 2 -   5   Theory: 100 marks
                                                                          Sessionals: 50 marks
                                                                          Duration: 3 hrs

UNIT-I

Sub-Surface Exploration

Purpose, stages in soil exploration, depth and lateral extent of exploration, guidelines for various types of structures, ground water observations, excavation and boring methods, soil sampling and disturbance, major types of samplers, sounding methods-SCPT, DCPT, SPT and interpretation, geophysical methods, pressure-meter test, exploration logs.

Drainage & Dewatering

Introduction, ditches and sumps, well point systems, shallow well system, deep well drainage, vacuum method, Electro-osmosis, consolidation by sand piles.

UNIT-II

Shallow Foundations-I

Design criteria for structural safety of foundation(i) location of footing,(ii) shear failure criterion, (iii) settlement criterion, ultimate bearing capacity, modes of shear failure, Rankine's analysis Tergazi's theory, Skempton's formula, effect of fluctuation of G.W.T. , effect of eccentricity on bearing capacity, inclined load, I.S Code recommendations, factors affecting bearing capacity, methods of improving bearing capacity.

Shallow Foundations-II

Various causes of settlement of foundation, allowable bearing pressure based on settlement, settlement calculation, elastic and consolidation settlement, allowable settlement according to I.S.Code. Plate load test and its interpretation, bearing capacity from penetration tests, design bearing capacity.

Shallow Foundations-III

Situation suitable for the shallow foundations, types of shallow foundations and their relative merits, depth of foundation, footing on slopes, uplift of footings, conventional procedure of proportioning of footings, combined footings, raft foundations, bearing capacity of raft in sands and clays, various methods of designing rafts, floating foundations.

UNIT-III

Pile Foundations-I

Introduction, necessity of pile foundations, classification of piles, load capacity, static analysis, analysis of pile capacity in sands and clays, dynamic analysis, pile load tests, negative skin friction, batter piles, lateral load capacity, uplift capacity of single pile, under-reamed pile.

Pile Foundations-II

Group action in piles, pile spacing, pile group capacity, stress on lower strata, settlement analysis, design of pile caps, negative skin friction of pile group, uplift resistance of pile group, lateral resistance, batter pile group.

UNIT-IV

Drilled Piers and Caisson Foundations

Drilled piers-types, uses, bearing capacity, settlement, construction procedure.
Caissons-Types, bearing capacity and settlement, construction procedure.

well foundations-shapes, depth of well foundations, components, factors affecting well foundation design lateral stability, construction procedure, sinking of wells, rectification of tilts and shifts, recommended values of tilts & shifts as per I.S.3955.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended

1   Basic And Applied Soil Mechanics by Gopal Ranjan & ASR Rao. New Age Int.(P)Ltd..
2   Analysis and Design of Sub-Structures by Swamisaran, IBH & Oxford.
3   Principles of Foundation Enginering By B.M.das, PWS Kent, Boston.
4   Foundation Analysis & Design by J.E.Bowles, McGraw Hills.
5   Design Aids in Soil Mechanics & Foundation Engineering by S.R.Kaniraj, McGraw Hills.
6   Foundation Design by Teng, Prentice Hall, India.

B. Tech. V Semester (Civil)
CE-309E PROJECT PLANNING & MANAGEMENT

L T P/D Total   Max.Marks:150
3 1 - 4   Theory: 100 marks
                            Sessionals: 50 marks
                            Duration: 3 hrs.

UNIT-I

Construction Management
Significance, objectives and functions of construction management, types of constructions, resources for construction industry, stages for construction, construction team, engineering drawings.

Construction Contracts & Specifications
Introduction, types of contracts, contract document, specifications, important conditions of contract, arbitration.

UNIT-II

Construction Planning
Introduction, work breakdown structure, stages in planning-pre-tender stages, contract stage, scheduling, scheduling by bar charts, preparation of material, equipment, labour and finance schedule, limitation of bar charts, milestone charts.

Construction Organization
Principles of Organization, communication, leadership and human relations, types of Organizations, Organization for construction firm, site organization, temporary services, job layout.

UNIT-III

Network Techniques in Construction Management-I:CPM
Introduction, network techniques, work break down, classification of activities, rules for developing networks, network development-logic of network, allocation of time to various activities, Fulkerson's rule for numbering events, network analysis , determination of project schedules, critical path, ladder construction, float in activities, shared float, updating, resources allocation, resources smoothing and resources leveling.

Network Techniques in Construction Management-II-PERT
Probability concept in network, optimistic time, pessimistic time, most likely time, lapsed time, deviation, variance, standard deviation, slack critical path, probability of achieving completion time, central limit theorem.

UNIT-IV

Cost-Time Analysis
Cost versus time, direct cost, indirect cost, total project cost and optimum duration, contracting the network for cost optimisation, steps in time cost optimisation, illustrative examples.

Inspection & Quality Control
Introduction, principles of inspection, enforcement of specifications, stages in inspection and quality control, testing of structures, statistical analysis.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended
1 Construction Planning & Management by P.S.Gehlot & B.M.Dhir, Wiley Eastern Ltd.
2 PERT & CPM -Principles & Applications by L.S.Srinath. Affiliated East-west Press(P)Ltd.

3 Project Planning & Control with PERT & CPM by B.C.Punmia &
   K.K.Khandelwal,Lakshmi Pub. Delhi
4 Construction Management & Planning by B.sengupta & H.Guha, Tata McGraw
   -Hills.

B.TECH 5TH SEMESTER
FUNDAMENTALS OF MANAGEMENT
HUT-302E

L   T   Total   Theory   : 100 Marks
3   1   4   Sessionals : 50 Marks
                                                 Total   : 150 Marks
                                                 Time   : 3 hours

UNIT-I   **Financial Management**
                   Introduction of Financial Management, Objectives of Financial Decisions,
                   Status and duties of Financial Executives. Financial Planning – Tools of
                   financial planning. Management of working capital, Factors affecting
                   requirements of working capital. Capital structure decisions. Features of
                   appropriate capital structure. Sources of finance.

UNIT-II   **Personnel Management**
                   Personnel Management – Meaning, Nature and Importance; Functions of
                   Personnel Management – (a) Managerial Functions and (b) Operative
                   functions.   Job Analysis: Meaning and Importance; Process of Job
                   Analysis; Job Description and Job specification.   Human Resource
                   Development-Meaning and concept.

UNIT-III   **Production Management**
                   Production Management : Definition and Objectives
                   Plant location: Ideal plant location. Factors affecting plant location.
                   Plant Layout : Ideal plant layout, factors affecting plant layout.
                   Work Measurement : Meaning, Objectives and Essentials of work
                                     measurement.
                   Production Control : Meaning and importance of production control and
                                     steps involved in production control.

UNIT-IV   **Marketing Management**
                   Nature, scope and importance of marketing management.   Modern
                   Marketing concepts. Role of marketing in economic development.
                   Marketing Mix. Marketing Information System. Meaning, nature and
                   scope of International Marketing.

NOTE :

The question paper shall have eight questions in all organized into four sections, each
section having two questions from each of the four units. The candidate shall have to
attempt five questions in all , selecting at least one question from each unit.

Suggested Books:

1.   Business Environment – Francis Charurilam (Himalaya Publishing House).
2.   Management – Harold, Koontz and Cyrilo' Donell (Mc Graw Hill)
3.   Principles of Personnel Management – Edwin B. Flippo (Mc Graw Hill)
4.   Personnel Management and Industrial Relations – D.C. Sharma and R.C. Sharma)
                                                      (SJ Publications, Meerut)
5.   Basic Marketing – Cundiff and Still (PHI, India)

6. Marketing Management – S.A. Sherlekar (Himalaya Publishing House Bombay)
7. Principles and Practice of Management – L.M. Prasad
8. Financial Management – I.M. Pandey (Vikas Publishing House, New Delhi)
9. International Marketing – Vorn terpestre and Ravi Sasathy.
10. Production Management – E.S. Buffa & W. H. Tausart, Richand D. Irwin, Homewood, Illionis.
11. Personnel Management – C.B. Mamoria, (Himalaya Publishing House)

CE-311E STRUCTURAL MECHANICS -II(P)

L T P/D Total   Max. Marks-75
-   -   2   2   Viva-Voce-50
                                                                       Sessional- 25
                                                                       Duration: 3 hrs.

1.   Experiment on a two hinged arch for horizontal thrust & influence line for

       Horizontal thrust

2.   Experimental and analytical study of a 3-bar pin-jointed Truss.

3.   Experimental and analytical study of deflections for unsymmetrical bending of a

       Cantilever beam.

4.   Begg's deformeter- verification of Muller Breslau principle.

5.   Experimental and analytical study of an elastically coupled beam.

6.   Sway in portal frames - demonstration.

7.   To study the cable geometry and statics for different loading conditions.

8.   To plot stress-strain curve for concrete.

B. Tech. V Semester (Civil)
CE-313E CONCRETE LAB(P)

L T P/D Total   Max. Marks: 75
-   -   2   2   Sessionals: 50 marks
                                          Viva-voce: 25 marks
                                          Duration : 3 hrs.

Tests on Cement

1   Standard consistency of cement using Vicat's apparatus.
2   Fineness of cement by Sieve analysis and Blaine's air permeability method.
3   Soundness of cement by Le-Chatelier's apparatus.
4   Setting time of cement, initial and final.
5   Compressive strength of cement.
6   Measurement of specific gravity of cement.
7   Measurement of Heat of Hydration of cement.

Tests on Aggregate

1   Moisture content and bulking of fine aggregate.
2   Fineness modulus of coarse and fine aggregates.

Tests on Concrete

1   Workability of cement concrete by (a) Slump test, (b) Compaction factor test, (c)
        Flow table test,.
2   Compressive strength of concrete by (a) Cube test, (b)Cylinder test
3   Indirect tensile strength of concrete-split cylinder test.
4   Modulus of rupture of Concrete by flexure test
5   Bond strength between steel bar and concrete by pull-out test
6   Non-destructive testing of concrete

Books Recommended:

1   Concrete Manual-M.L.Gambhir, Dhanpat Rai & Sons, N.Delhi.
2   Concrete Technology-M.L.Gambhir, Tata McGeraw Hill, N.Delhi.
3   Concrete Technology – Nevellie, Pearson Education.

CE-315E GEOTECHNOLOGY (P)

L T P/D Total   Max.Marks: 75
- - 2   2   Pract/Viva-Voce: 50 marks
                                              Sessional: 25 marks
                                              Duration: 3 hrs.

1. Grain Size Analysis-Hydrometer method.

2. Shrinkage Limit Determination.

3. Relative Density of Granular Soils.

4. Consolidated Drained (CD) Triaxial Test.

5. Consolidated Undrained (CU) Triaxial Test with Pore Water Pressure

   measurement.

6. Consolidation Test.

7. Undisturbed Sampling.

8. Standard Penetration Test.

9. Dynamic Cone Penetration Test.

10. Model Plate Load Test.

Books:

1. Soil Testing for Engineers by S.Prakash & P.K.Jain, Nem Chand & Bros., Roorkee.
2. Engineering Soil Testing by Lambi, Wiley-Eastern.
3. Engineering Properties of Soils & Their Measurement by JE Bowles, McGraw -Hill.
4. Soil Engineering in Theory & Practice by Alam Singh, Vol.II, Geotechnical Testing & Instrumentation, CBS Pub.

6th SEM

B. Tech. VI Semester (Civil)
CE-302E DESIGN OF STEEL STRUCTURES-II

L   T   P/D   Total   Max.Marks: 150
3   -   2   5   Theory: 100 marks
                                                     Sessional: 50 marks
                                                     Duration: 3 hrs,

UNIT-I
Elementary Plastic Analysis and Design:
Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

UNIT-II
Design of Water Tanks:
Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.
Design of Steel Stacks:
Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

UNIT-III
Towers:
Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.
Cold Formed Sections:
Introduction and brief description of various types of cold formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

UNIT-IV
Industrial Buildings:
Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1.   Design of Steel Structures, A.S.Arya & J.L.Ajmani, Nem Chand & Bros., Roorkee.
2.   Design of Steel Structures, P.Dayartnam, Wheeler Pub. Allahabad.

3. Design of Steel Structures, Gaylord & Gaylord, McGraw Hill, Newyork/International Students Edn., Toyo Kogakusha, Tokyo.
4. IS:800-1984, Indian Standard Code of Practice for General Construction in Steel.
5. IS-801-1975, Indian Standard Code of Practice for Use of Cold formed light gauge steel structural members in general building construction.

B. Tech. VI Semester (Civil)
CE-304E IRRIGATION ENGINEERING-I

L T P/D Total   Max.Marks:150
3 2   -   5   Theory: 100 marks
                                                    Sessionals: 50 marks
                                                    Duration: 3 hrs.

UNIT-I

Introduction:
Irrigation-necessity, advantages, disadvantages, impact of irrigation on human environment , need and development of irrigation in India, crops and crop seasons, ideal cropping pattern and high yielding varieties of crops.

Soil-water relationship and irrigation methods:
Soil-water relationship, root zone soil water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, GCA, CCA, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation, favorable conditions, sprinkler systems, hydraulics of sprinkler irrigation, planning, design and maintenance of sprinkler systems, drip irrigation-components parts, advantages and limitations, suitability of drip irrigation.

UNIT-II

Canal irrigation:
Component of canal distribution system, alignment of channels, losses in irrigation channels, design discharge, silt theories and design of alluvial channels, comparison of Kennedy's and Lacey's theories, canal section and design procedure, Garrets and Lacey's diagrams.

UNIT-III

Water logging and land reclamation:
Water logging-effects, causes and measures of prevention, lining of irrigation channels, types of lining, design of lined channel land drainage, open drains, design considerations, advantages of tile drains, depth of tile drains, layout of closed drains, discharge and spacing of closed drains, diameter of tile drain, outlets for tile drains, maintenance of tile drains, purpose of land reclamation and methods of land reclamation.

UNIT-IV

River Training:
Classification of rivers, river training and its objectives, classification of river training works, methods of river training, marginal embankments, guidebanks, spurs, cutoffs, bank pitching and launching apron.

Canal outlets:
Classification, requirements of a good outlet, design of pipe, APM and open flume outlet, flexibility proportionality, setting and sensitivity of outlet.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1.   Irrigation, Water Resources and Water Power Engg. by P.N.Modi.
2.   Fundamentals on Irrigation Engg. by Bharat Singh.
3.   Irrigation Engg & Hydraulic Structures by S.K.Garg.
4.   Irrigation Engg. by S.K.Sharma.
5.   Irrigation-Theory & Practice by A.M. Michael.
6.   Irrigation – Theory & Practice by G.L. Asawa

B. Tech. VI Semester (Civil)
CE-306E WATER RESOURCES & SYSTEMS ENGINEERING

L T P/D Total   Max.Marks:150
3 2 -   5   Theory: 100 marks
                                                    Sessional: 50 marks
                                                    Duration: 3 hrs.

UNIT-I
Water Resources Planning:
Role of water in national development, assessment of water resources, planning process, environmental consideration in planning, system analysis in water planning, some common problems in project planning, functional requirements in multipurpose projects, multipurpose planning, basinwise planning, long term planning.
Reservoir planning-dependable yield, sedimentation in reservoir, reservoir capacity, empirical-area reduction method.

UNIT-II
Economic and Financial Analysis:
Meaning and nature of economic theory, micro and macro economics, the concept of equilibrium, equivalence of kind, equivalence of time and value, cost benefit, discounting factors and techniques, conditions for project optimality, cost benefit analysis, cost allocation, separable and non-separable cost, alternate justifiable and remaining benefit methods, profitability analysis.

UNIT-III
Water Resources Systems Engineering:
Concept of system's engineering, optimal policy analysis, simulation and simulation modeling, nature of water resources system, analog simulation, limitations of simulation, objective function, production function, optimality condition, linear, non-linear and dynamic programming, applications to real time operations of existing system, hydrologic modeling and applications of basic concepts.

UNIT-IV
Applications of System Approach in Water Resources:
Applications of system engineering in practical problems like hydrology, irrigation and drainage engineering, distribution network, mathematical models for forecasting and other water resources related problems.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
1   Water Resources Engineering by Linseley and Franzini
2   Economics of Water Resources Engineering by James and Lee.
3   Optimisation Theory and Applications by S.S.Roy
4   Water Resources Systems Planning & Economics by R.S.Varshney.
5   Operational Research-An Introduction by Hamdy A.Taha.

B. Tech. VI Semester (Civil)
CE-308E GEOTECHNOLOGY-II

L T P/D Total   Max.Marks:150
3 2 - 5   Theory: 100 marks
                                                           Sessionals: 50 marks
                                                           Duration: 3 hrs.

UNIT-I
Earth Dams:
Introduction, types of sections, earth dam foundations, causes of failure and criteria for safe design, control of seepage through the embankment, control of seepage through the foundation, drainage of foundations, criterion for filter design. Introduction to rock fill dams.

Stability of slopes:
Causes of failure, factors of safety, stability analysis of slopes-total stress analysis, effective stress analysis, stability of infinite slopes types of failures of finite slopes, analysis of finite slopes-mass procedure, method of slices, effect of pore pressure, Fellinius method to locate center of most critical slip circle, friction circle method, Tayler's stability number, slope stability of earth dam during steady seepage, during sudden draw down and during and at the end of construction.

UNIT-II
Braced Cuts:
Depth of unsupported vertical cut, sheeting and bracing for deep excavation, movements associated with sheeting and bracing, modes of failure of braced cuts, pressure distribution behind sheeting.

Cofferdams:
Introduction, types of cofferdams, design and lateral stability of braced cofferdams, design data for Cellular cofferdams, stability analysis of cellular cofferdams on soil and rock, inter-lock stresses.

UNIT-III
Cantilever Sheet Piles:
Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method, simplified procedure, cantilever sheet pile, penetrating clay and limiting height of wall.

Anchored Bulkheads:
Methods of design, free earth support method in cohesionless and cohesive soils, fixed earth support method in cohesionless soils-Blum's equivalent beam method.

UNIT-IV
Soil Stabilization:
Soil improvement, shallow compaction, mechanical treatment, use of admixtures, lime stabilization, cement stabilization, lime fly ash stabilization, dynamic compaction and consolidation, Bituminous stabilization, chemical stabilization, pre-compression, lime pile and column, stone column, grouting, reinforced earth.

Basics of Machine Foundations:
Terminology, characteristics elements of a vibratory systems, analysis of vibratory motions of a single degree freedom system-undamped free vibrations, undamped forced

vibrations, criteria for satisfactory action of a machine foundation, degrees of a freedom of a block foundation, Barken's soil spring constant, Barken's method of a determining natural frequency of a block foundation subjected to vertical oscillations.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books Recommended:

1. Analysis and Design of Foundation and Retaining Structures by S. Prakash, Gopal Ranjan & S.Saran, Sarita Prakashan.

2. Analysis and Design of Sub Structures by Swami Saran, IBH Oxford

3. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Newage Int.Pub.

4. Soil Dynamic by Shamsher Prakash, McGraw Hill

5. Foundation Design by Teng, Prentice Hall

6. Soil Mechanics & Foundation Engineering by Bharat Singh, Shamsher Prakash, Nem Chand & Bros, Roorkee.

7. Soil Mechanics and Foundation Engineering by Alam Singh

CE-310E   TRANSPORTATION ENGINEERING -I

L T P/D Total   Max.Marks:150
3 1 -   4   Theory:100 marks
                                                     Sessional: 50 marks
                                                     Duration: 3 hrs.

UNIT-I

Introduction:
Transportation and its importance. Different modes of transportation. Brief review of history of road development in India and abroad: Roman, Tresagne, Telford and Macadam constructions. Road patterns. Classification of roads, Objectives of highway planning, Planning surveys. Saturation system of planning.

Highway Plans, Highway Alignment and Surveys:
Main features of 20 years road development plans in India. Requirements of an ideal highway alignment. Factors affecting alignment. Surveys for highway alignment.

UNIT-II

Cross Section Elements and Sight Distance Considerations:
Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values. Types of terrain Design speed. Sight distance, stopping sight distance, overtaking sight distance, overtaking zones, intermediate sight distance, sight distance at intersections, head light sight distance, set back distance. Critical locations for sight distance.

Design Of Horizontal and Vertical Alignment:
Effects of centrifugal force. Design of superelevation. Providing superelevation in the field. Radius of circular curves. Extra-widening. Type and length of transition curves. Gradient, types, values. Summit curves and valley curves, their design criterion. Grade compensation on curves.

UNIT-III

Traffic Characteristics And Traffic Surveys:
Road user and vehicular characteristics. Traffic studies such as volume, speed and O & D study. Parking and accident studies. Fundamental diagram of traffic flow. Level of service. PCU. Capacity for non-urban roads. Causes and preventive measures for road accidents.

Traffic Control Devices:
Traffic control devices: signs, signals, markings and islands. Types of signs. Types of signals. Design of an isolated fixed time signal by IRC method. Intersections at grade and grade separated intersections. Design of a rotary. Types of grade separated intersections.

UNIT-IV

Highway Materials:Soil And Aggregates:
Subgrade soil evaluation: CBR test, plate bearing test. Desirable properties of aggregates. Various tests, testing procedures and IRC/IS specification for suitability of aggregates. Proportioning of aggregates for road construction by trial and error and Routhfuch method.

Bituminous Materials and Bituminous Mixes:

Types of bituminous materials: bitumen, tar, cutback and emulsions. Various tests, testing procedures and IRS/IS specifications for suitability of bituminous materials in road construction. Bituminous mix, desirable properties. Marshall' method of mix design. Basic concept of use of polymers and rubber modified bitumen in bituminous mixes.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1.   Highway Engg. by S.K.Khanna & C.E.G.Justo, Nem Chand & Bros,Roorkee.

2.   Principles of Transportation and Highway Engg. by G.V.Rao,Tata McGraw Hill Pub., N.Delhi.

3.   Traffic Engg. And Transport Planning by L.R.Kadiyali,Khanna Pub.Delhi.

4.   Traffic Engg. by Matson, T.M.,Smith,W.S. and Hurd,P.W.McGraw Hill Book Co., New York.

B. Tech. (Civil) VI Semester
CE 312E WATER SUPPLY AND TREATMENT

L T P/D T   Max. Marks: 150
3 1 -   4   Theory: 100 marks
                                                        Sessional: 50 marks
                                                        Duration: 3 Hours

UNIT-I

Water Quantity:

Importance and necessity of water supply scheme. Water demands and its variations. Estimation of total quantity of water requirement. Population forecasting. Quality and quantity of surface and ground water sources. Selection of a source of water supply. Types of intakes.

UNIT-II

Water Quality:

Impurities in water and their sanitary significance. Physical, chemical and bacteriological analysis of water. Water quality standards.

UNIT-III

Water Treatment:

Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation – plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units. Filtration – mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects). Disinfection principles and aeration.

UNIT-IV

Water Distribution:

Distribution system – Gravity system, Pumping System, Dual system, Layout of Distribution System – Dead End System, Grid Iron System, Ring System, Radial System, their merits and demerits. Distribution Reservoir-functions & determination of storage capacity.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
1.   Water Supply and Sewerage: E.W. Steel.
2.   Water Supply Engineering: S.R. Kshirsagar.
3.   Water Supply Engineering: S.K. Garg.
4.   Water Supply Engineering: B.C. Punmia.
5.   Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.

B. Tech. VI Semester (Civil)
CE-314E TRANSPORTATION ENGINEERING-I (P)

L   T   P/D   Total   Max.Marks:75

-   -   2   2   Viva/Pract: 25 marks

Sessional: 50 marks

Duration: 3 hrs.

LIST OF EXPERIMENTS

1.   Aggregate Impact Test.

2.   Los-Angeles Abrasion Test on Aggregates.

3.   Dorry's Abrasion Test on Aggregates.

4.   Deval Attrition Test on Aggregates.

5.   .Crushing Strength Test on Aggregates.

6.   Penetration Test on Bitumen.

7.   Ductility Test on Bitumen.

8.   Viscosity Test on Bituminous Material

9.   Softening Point Test on Bitumen.

10.   .Flash and Fire Point Test on Bitumen.

L T P/D Total   Max.Marks:75
- -   2   2   Pract: 25 marks
                                                      Sessional: 50 marks
                                                      Duration: 3 hrs.

1.   To determine the pH value of a given sample of water waste water.
1.   To determine the turbidity in given water waste water sample.
2.   To determine the acidity of given sample of water waste water.
3.   To determine the alkalinity of given sample of water waste water.
4.   To determine temporary and permanent hardness in a given water sample.
5.   To determine the chlorine does required for a given water sample.
6.   To determine total suspended, suspended, dissolved settable solids in a sewage
       sample.
7.   To determine the chloride concentration in a given sample of waste water.
9.   To determine the sulphate concentration in given water sample.

B. Tech. VI Semester (Civil)
CE-318E COMPUTER APPLICATION-I (P)

L T P/D Total   Max.Marks:100
-   -   3 3   Pract : 50 marks
               Sessional: 50 marks
               Duration: 3 hrs.

1. Computation of a roots of a polynomial using.
   a) Bisection method, (b) Newton-Raphson method
2. Solution of linear simultaneous equation suing Gauss Elimination / Gauss Jordan / Triangulation factorization method.
3. Solution of system of non-linear equation using fixed point / Newton Raphson / modified Newton-Raphson method.
4. Analysis of multispan Beam and frames using stiffness matrix method.
5. Analysis of Plane frame and space Frame using automated software.
6. Analysis of a three storeyed and ten storeyed building using automated software.
7. Introduction to Auto CAD.

   Students should be encouraged to write computer programs to solve different civil engineering problems.

7th SEM

B. Tech. VII Semester (Civil)

CE-401E DESIGN OF CONCRETE STRUCTUTRES-II

L T P/D Total   Max.Marks: 100
4 - -   4   Theory: 100 marks
                                          Duration: 4 hrs.

UNIT-I

Continuous Beams:
Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plan-analysis for torsion, redistribution of moments for single and multi-span beams, design examples.

Prestressed Concrete:
Basic principles, classification of prestressed members, various prestressing systgems, losses in prestress, initial and final stress conditions, analysis   and   design   of sections for flexure and shear, load balancing concept, I:S:Specifications .
End blocks-Analysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.

UNIT-II

Flat slabs and staircases:
Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design of various types of staircases, design examples.

Foundations:
Combined footings, raft foundation, design of pile cap and piles, under-reamed piles, design examples.

UNIT-III

Water Tanks, Silos and Bunkers:
Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples.
Silos and Bunkers-Various theories, Bunkers with sloping bottoms and with high side walls, battery of bunkers, design examples.

UNIT-IV

Building Frames:
Introduction, Member stiffnesses, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductility of beams, design and detailing for ductility, design examples.

Yield Line Theory:
Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1.   Plain and Reinforced Concrete, Vol.2, Jai Krishna & O.P.Jain, Nem Chand & Bros.,Roorkee.
2.   Pre-Stressed Concrete, N.Krishna Raju, TMH Pub.,N,.Delhi.
3.   Design of Prestressed Concrete Structures, T.Y.Lin, John Wiley & Sons., N.Delhi.
4.   Reinforced Concrete-Limit StaTge Design, A.K.Jain, Nem Chand & Bros., Roorkee.
5.   IS 1343-1980,IS Code of Practice for Prestressed Concrete.
6.   IS 3370-1976(Part I to IV), Indian Standard Code of Practice for Liquid Retaining Structures.
7.   IS 456-2000, Indian Standard of Practice for Plain and Reinforced Concrete, IS 1893, 4326 & 13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

CE-403 E IRRIGATION ENGINEERING-II

L T P/D Total   Max.Marks: 150
3 1   -   4   Theory: 100 marks
                                                    Sessionals: 50 marks
                                                    Duration: 3 hrs.

UNIT-I
Regulation works:
Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, and design of straight Glacis fall. Off-take alignment, cross-regulator and distributory, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.

UNIT-II
Cross drainage works:
Classification and their selection, hydraulic design aspects of aqueducts, syphon aqueducts, super passage, canal syphon and level crossing, design of transitions.
Diversion canal headworks:
Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

UNIT-III
Storage Headworks:
Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketchs, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

UNIT-IV
Spillways and Energy Dissipaters:
Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Irrigation, Water Resources and Water Power Engineering by P.N.Modi.
2   Fundamentals on Irrigation Engineering by Bharat Singh.
3   Irrigation Engineering and Hydraulic Structures by S.K.Garg.
4   Theory and Design of Irrigation Structures Vol.I & II by R.S.Varshney, Gupta & Gupta.

B. Tech. (Civil) VII Semester
CE - 405E Transportation Engineering - II

L T P/D Total   Max. Marks: 150
3   1   -   4   Theory: 100 Marks
                                                       Sessional: 50 Marks
                                                       Duration: 3 Hours

UNIT-I

Design of Flexible Pavements:
Types of pavements. Flexible and rigid pavements. Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method (including latest IRC guidelines), Triaxial method and Burmister's method.

Design Of Rigid Pavements:
Westergaard's theory, critical locations of loading, load and temperature stresses. Critical combination of stresses. IRC guidelines for determination of thickness of a rigid pavement. Joints: requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.

UNIT-II

Highway Construction : Non-Bituminous Pavements:
Brief introduction to earthwork machinery: shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM. WMM. Construction of cement concrete pavements. Slip-form pavers. Basic concepts of the following: soil stabilized roads, use of geo-synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements.

Construction of Bituminous Pavements:
Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for costruction of bituminous roads: bitumen boiler, sprayer, pressure distributer, hot-mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MOST specifications.

UNIT-III

Highway Maintenance:
Pavement failures. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Pavement evaluation. Benkleman beam. Introduction to various types of overlays.

Highway Drainage and Hill Roads:
Surface drainage: types, brief design. Types of sub-surface drainage. Special characteristics of hill roads: geometrics, hair pin bends, construction of hill roads, drainage of hill roads, maintenance problems of hill roads

UNIT-IV

Highway Economics and Finance
Need of economic evaluation. Highway user benefits and costs. Methods of economic evaluation: benefit cost ratio method, net present value method, internal rate of return method, comparison. Highway finance.

Tunnels
Sections of tunnels: advantages, limitations and suitability of each section. Shaft. Pilot tunnel. Driving tunnel in rocks: sequence of construction operations, full face method, heading and bench method, drift method. Driving tunnels in soft ground: sequence of construction operations, needle beam method, shield tunneling, compressed air tunneling.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Recommended Books

1.   Highway Engg *by* S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
2.   Principles and Practice of Highway Engg. *by* L.R.Kadiyali, Khanna Publishers, Delhi.
3.   Principles of Pavement Design *by* Yoder,E.J & Witczak,M.W., John Wiley and Sons, USA.
4.   Tunnel Engineering *by* S.C.Saxena, Dhanpat Rai Publications, N.Delhi.
5.   A text book of Tunnel, Bridges and Railway Engg. *by* S.P.Bindra, Dhanpat Rai Delhi.

B. Tech. (Civil) VII Semester
CE-407E SEWERAGE AND SEWAGE TREATMENT

L T P/D Total   Max. Marks: 150
2 1 -   3   Theory: 100 marks
                                                      Sessional: 2 marks
                                                      Duration: 3 hrs.

UNIT-I
Collection of sewage:
Importance of sanitation, Systems of sewerage – separate, combined and partially separate. Quantity of sanitary sewage and variations. Shapes of sewer – circular and egg shaped. Design of sewers, self-cleansing velocity and slopes, Construction and testing of sewer lines. Sewer materials. joints and appurtenances.

UNIT-II

Sewage Characterization:
Quality parameters- BOD, COD, Solids, D.O., Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land.

UNIT-III

Sewage Treatment:
Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment- activated sludge process & its modifications, Tricking filter, sludge digestion and drying beds.
Stabilization pond, aerated lagoon, UASB process , septic tank and Imhoff tank.

UNIT-IV

Disposal of Sewage:
Disposal of sewage by dilution – self-purification of streams. Sewage disposal by irrigation (sewage treatment).

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Recommended Books:

1.   Waste Water Engineering: Metcalf and Eddy.
2.   Sewage and Sewage Treatment: S.K. Garg.
3.   Sewage and Sewage Treatment: S.R. Krishansagar.
4.   Waste Water Engineering: B.C. Punmia.
5.   Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.

L   T   P/D   Total   Max. Marks: 75
-   -   3   3   Pract.: 25 marks
                                                       Sessional: 50 marks
                                                       Duration: 3 hrs.

Preparing drawing sheets showing reinforcement details in case of:

1.   Flat slabs

2.   Underground and Overhead Water Tanks.

3.   Combined Footings, Pile Foundations, Raft foundation.

4.   T-Beam Bridge.

5.   Silo/Bunker.

B. Tech. VII Semester (Civil)
CE-411E IRRIGATION ENGINEERING DESIGN & DRAWING

L T P/D Total   Max. Marks: 75
- - 3   3   Sessional: 50 marks
                                                     Viva-voce: 25 marks
                                                     Duration: 3 hrs.

Complete design and drawing of the following:

1   Design of weirs and barrages on permeable foundation for surface and sub surface flow conditions.

2   Design of Guide Banks.

3   Flood Routing using step by step method.

4   Design of Syphon Aqueduct.

5   Design of Sarda type fall & sloping glacis fall.

6   Seepage line in a homogeneous earth dams on impermeable foundation with horizontal drainage.

7   Design of Ogee Spillway and stilling basin.

Note: Emphasis would be given to the computer aided designs of some of above structures.

CE-402E Bridge Engineering

L T P/D Total   Max.Marks: 150
3 1 -   4   Theory: 100 marks
                                                     Sessionals: 50 marks
                                                     Duration: 3 hrs.

UNIT-I
Introduction:
Definition, components of bridge, classification of bridges, selection of site , economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges:
General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads and railway bridges, detailed explanation of IRC standard live loads.

UNIT-II
Design Consideration for R. C. C. Bridges:
Various types of R.C.C. bridges(brief description of each type) , design of R.C.C. culvert and T-beam bridges.

UNIT-III
Design Consideration for Steel Bridges:
Various types of steel bridges (brief description of each), design of truss and plate girder bridges.

UNIT-IV
Hydraulic & Structural Design:
Piers, abutments, wing-wall and approaches.
Brief Description:
Bearings, joints, articulation and other details.
Bridge Foundation:
Various types, necessary investigations and design criteria of well foundation.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1   Essentials of Bridge Engineering, D.J.Victor, Oxford & IBH Pub.N.Delhi.
2   Design of Bridges, N.Krishna Raju, Oxford & IBH, N.Delhi.
3   Bridge Deck Analysis, R.P.Pama & A.R.Cusens, John Wiley & Sons.
4   Design of Bridge Structures, T.R.Jagadish & M.A.Jairam, Prentice Hall of India, N.Delhi.

B. Tech. (Civil) VIII Semester
CE – 404E Railway and Airport Engineering

L   T   P/D   Total
3   1   -   4

Max. Marks: 150
Theory: 100 Marks
Sessional: 50 Marks
Duration: 3 Hours

UNIT-I

Introduction, Permanent Way And Rails

Rail transportation and its importance in India. Permanent way: requirements and components. Gauges in India and abroad. Selection of gauge. Coning of wheels. Adzing of sleepers. Rails: functions, composition of rail steel, types of rail sections, requirements of an ideal rail section, length of rails. Defects in rails. Creep of rails. Long welded rails and continuously welded rails.

Sleepers, Fastenings And Ballast

Sleepers: functions, requirements of an ideal sleeper. Types of sleepers: wooden, cast iron, steel and concrete sleepers, advantages, disadvantages and suitability of each type. Sleeper density. Fastenings for various types of sleepers: fish plates, spikes, bolts, bearing plates, keys, chairs, jaws, tie bars. Elastic fastenings. Ballast: functions, requirements, types of ballast and their suitability.

UNIT-II

Points And Crossings

Necessity. Turnout: various components, working principle. Switch: components, types. Crossing: components and types. Design elements of a turnout, design of a simple turnout. Layout plan of track junctions: crossovers, diamond crossing, single-double slips, throw switch, turn table, triangle.

Signaling, Interlocking And Train Control

Signals: objects, types and classification. Semaphore signal: components, working principle. Requirements / principles of a good interlocking system. Brief introduction to devices used in interlocking. Methods of control of train movements: absolute block system, automatic block system, centralized train control and automatic train control systems.

UNIT-III

Geometric Design Of The Track

Gradients, grade compensation. Super elevation, cant deficiency, negative super elevation. Maximum permissible speed on curves. Tractive resistances, types. Hauling capacity of a locomotive.

Stations, Yards And Track Maintenance

Stations: functions and classification. Junction, non-junction and terminal stations. Yards: functions, types. Marshalling yard: functions, types. Maintenance of railway track: necessity, types of maintenance. Brief introduction to mechanized maintenance, M.S.P and D.T.M.

UNIT-IV

Introduction And Airport Planning

Air transportation, its importance and characteristics, status in India. Layout plan of an airport and its basic elements: terminal area, apron, taxiway, runway, hanger. Aircraft characteristics, their effect on elements of an airport. Site selection of an airport. Classification of airports.

Runway Layout And Pavement Design

Runway orientation, Wind Rose diagram. Basic runway length. Corrections to basic runway length. Runway patterns. Difference between highway and runway pavement. Types of runway pavements. Design factors for runway pavement. Brief introduction to design of thickness of a runway pavement.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. A text book of Railway Engineering *by* S.C.Saxena and S.P.Arora, Dhanpat Rai Publicatios, N.Delhi.
2. Railway Track Engg. *by* J.S.Mundray, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.
3. Airport Planning and Design *by* S.K.Khanna, M.G.Arora, Nem Chand Bros., Roorkee.
4. The Planning and Design of Airports *by* Robort Hornjeff, McGraw Hill Book Co.
5. Air Transportation Planning and Design *by* Virender Kumar & Satish Chandra, Galgotia Publications, N.Delhi.

CE-406E Industrial Waste Water Treatment

L T P/D Total   Max. Marks: 150
3 1 -   4   Theory: 100 marks
                                                    Sessional: 50 marks
                                                    Duration: 3 hrs.

UNIT-I

Effects of industrial wastes on streams, sewerage systems and wastewater treatment plants.

UNIT-II

Minimizing the effects of industrial effluents on waste water treatment plants and receiving streams-conservation of water, process change, reuse of waste water, volume reduction, strength reduction, neutralization, equalization and proportioning.

UNIT-III

Population equivalent. Industrial effluent standards for disposal into inland surface water sources and on land for irrigation.

UNIT-IV

Study of the following Industries from waste generation, quality and its treatment including brief overview of manufacturing process:
Textile, tannery, sugar mill, distillery, dairy, pulp & paper, metal plating, oil refinery, nitrogenous fertilizers, thermal power plants and radio active wastes.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.
Books:

1.   Industrial and Hazardous Waste Treatment by N.L.Nemerow & A.Dasgupta.
2.   Industrial Effluents by N.Manivasakam.
3.   Waste Water Treatment by M.N.Rao & A.K.Dutta.

L T P/D Total
- -   3   3

Max. Marks: 75
Viva Voce: 25 marks
Sessional: 50 marks
Duration: 3 hrs.

UNIT-I

Estimate:
Principles of estimation, units, items of work, different kinds of estimates, different methods of estimation, estimation of materials in single room building, two roomed building with different sections of walls, foundation, floors and roofs, R.B. and R.VC.C. works, Plastering, White-washing, Distempering and painting, doors and windows, lump sum items, Estimates of canals, roads etc.

UNIT-II

Specification of Works:
Necessity of specifications, types of specifications, general specifications, specification for bricks, cement, sand, water, lime, reinforcement; Detailed specifications for Earthwork, Cement, concrete, brick work, floorings, D.P.C., R.C.C., cement plastering, white and colour washing, distempering, painting.

UNIT-III

Rate Analysis:
Purpose, importance and requirements of rate analysis, units of measurement, preparation of rate analysis, procedure of rate analysis for items:- Earthwork, concrete works, R.C.C. works, reinforced brick work, plastering, painting, finishing(white-washing, distempering).

UNIT-IV

Public Works Account:
Introduction, function of P.W. department, contract, guidelines, types of contracts, their advantages and disadvantages, Tender and acceptance of tender, Earnest money, security money, retention money, measurement book, cash book, preparation, examination and payment of bills, first and final bills, administrative sanction, technical sanction.

Books
1.   Estimating and Costing for Building & Civil Engg.Works by P.L.Bhasin, S.Chand & Co., N.Delhi.
2.   Estimating, Costing & Specification in Civil Engg. by M.Chakarborty, Calcutta.
3.   Estimating & Costing in Civil Engg..: Theory & Practice by B.N.Dutta, S.Dutta & Co., Lucknow.
4.   Building Construction Estimating by George H.Cooper, McGraw Hill Book Co., New York.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

CE - 426E TRANSPORTATION ENGINEERING – II (P)

L   T   P/D   Total   Max. Marks : 75
-   -   2   2   Sessional   : 50 Marks
                                                 Pract /Viva voce: 25 Marks
                                                 Duration   : 3 Hours

LIST OF EXPERIMENTS

1. Flakiness and Elongation Index of aggregates.

2. Specific gravity and water absorption test on aggregates.

3. Specific gravity of bitumen.

4. Proportioning of aggregates.

5. Marshall's stability test.

6. Stripping test on aggregates.

7. Determination of bitumen content.

8. CBR lab test on soil.

9. Traffic volume study using videography technique.

10. Traffic speed study using videography technique.

B. Tech. VIII Semester (Civil)
CE-428E   ENVIRONMENTAL ENGINEERING-II(P)

L T P/D Total   Max.Marks:75
- -   2   2   Pract:25 marks
                                                      Sessional:50 marks
                                                      Duration:3 hrs.

1.   To determine the acidity of a sewage sample.

2.   To determine the alkalinity of a sewage sample.

3.   To determine total, suspended, dissolved and settable solids in a sewage sample.

4.   To determine volatile and fixed solids in a sewage sample.

5.   To determine oil and grease in a sewage sample.

6.   To determine the chloride concentration in a sewage sample.

7.   To determine the sulphate concentration in a sewage sample.

8.   To determine the B.O.D. of a given sewage sample.

9.   To determine the C.O.D. of a given sewage sample.

10.   To determine the T.O.C. of a given sewage sample.

11.   To determine the fecal count of a given sewage sample.

12.   Microscopic studies of a sewage.