Maharshi Dayanand University
Rohtak

Syllabus and Courses of
Reading for
B.Tech. Civil Engg. 3rd to 8th Semester

Session - 2008-2009

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SCHEME OF EXAMINATION OF B.Tech IN CIVIL ENGINEERING

III Semester - 2008-09

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-201E	Structural Analysis -I	3	1	0	4	100	50	-	150
CE-203E	Building Construction Materials & Drawing	4	0	2	6	100	50	-	150
CE-205 E	Fluid Mech. - I	3	1	0	4	100	50	-	150
CE-207 E	Surveying-I	3	1	0	4	100	50	-	150
CE-209 E	Engineering Geology	3	1	0	4	100	50	-	150
Math-201 E	Mathematics-III	3	1	0	4	100	50	-	150
CE-211 E	Structural Analysis-I Lab	0	0	2	2		25	25	50
CE-213 E	Basic Computer Application	0	0	2	2		25	25	50
CE-215 E	Engineering Geology Lab	0	0	2	2		25	25	50
CE-217 E	Surveying-I Lab	0	0	3	3		50	50	100
	TOTAL	19	5	11	35	600	425	125	1150

SCHEME OF EXAMINATION 0F B.TECH. CIVIL ENGG.

IV Semester - 2008-09

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-202E	Structural Analysis -I	3	1	0	4	100	50	-	150
CE-204E	Design of Concrete Structures-I	4	0	2	6	100	50	-	150
CE-206 E	Fluid Mech. - II	3	1	0	4	100	50	-	150
HUM-202 E	Principle of Mang.	3	1	0	4	100	50	-	150
CE-210 E	Surveying-II	3	1	0	4	100	50	-	150
CE-212 E	Const. & Concrete Tech.	3	1	0	4	100	50	-	150
CE-214 E	Structural Analysis-I I Lab	0	0	2	2		25	25	50
CE-216 E	Fluid Mechanics Lab	0	0	2	2		25	25	50
CE-218 E	Professional Practice	0	0	2	2		25	25	50
CE-220 E	Surveying-II Lab	0	0	3	3		50	50	100
CE-222 E	Concrete Lab	0	0	2	2	-	25	25	50
	TOTAL	19	5	13	37	600	450	150	1200

SCHEME OF EXAMINATION 0F B.TECH. CIVIL ENGG.

V Semester - 2009-10

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-301E	Design of Steel Structure-1	3	1	2	6	100	50	-	150
CE-303E	Transportation Engg.-I	3	2	0	5	100	50	-	150
CE-305 E	Water Supply & Treatment	3	1	0	4	100	50	-	150
CE-307 E	Soil Mechanics	3	1	0	4	100	50	-	150
CE-309 E	Numerical Method & Computing Techniques	3	1	0	4	100	50	-	150
CE-311 E	Hydrology	3	1	0	4	100	50	-	150
CE-313 E	Entrepreneurship Development	1	1	2	4		25	25	50
CE-315 E	Soil Mechanics Lab	0	0	2	2		25	25	50
CE-317 E	Survey Camp	0	0	0	0		100	0	100
	TOTAL	19	8	6	33	600	450	50	1100

SCHEME OF EXAMINATION OF B.TECH IN CIVIL ENGINEERING

VI Semester - 2009-10

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-302 E	Design of concrete Structures-II	4	2	0	6	100	50	-	150
CE-304E	Irrigation Engg. - I	3	1	0	4	100	50	-	150
CE-306 E	Geotechnology 3	1	0	4	100	50	50	150	
CE-308 E	Sewerage & Sewage Treatment	3	1	0	4	100	50	-	150
CE-310 E	Transportation Engg.-II	3	1	0	4	100	50	-	150
CE-312 E	Project Planning & Management	3	1	0	4	100	50	0	150
CE-314 E	Geo technology Lab	0	0	2	2		25	25	50
CE-316 E	Transportation Engg. 1 Lab	0	0	2	2		25	25	50
CE-318 E	Environmental Engg. Lab	0	0	2	2		25	25	50
CE-320 E	Auto Cad Lab	0	0	2	2		50	-	50
	TOTAL	19	7	8	34	600	425	75	1100

Note :- Practical training of 6 weeks duration during summer vacations and its evaluation in the 7th semester

SCHEME OF EXAMINATION 0F B.TECH. CIVIL ENGG.

VII Semester 2010-11

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-401E	Design of Steel Structure-II	3	2	0	5	100	50	-	150
CE-403E	Advanced Const. Tech.	3	1	0	4	100	50	-	150
CE-405 E	Estimating and costing	3	1	0	4	100	50	-	150
CE-407 E	Irrigation Engg. design & Drawing	1	0	3	4	100	50	-	150
CE-415-427E	Open Elective (Any one)	3	1	0	4	100	50	-	150
CE-409 E	Non Conventional Sources of energy	3	1	0	4	50	50	-	100
CE-411 E	Elements of Earthquake Engg.	3	1	0	4	50	50	-	100
CE-413 E	Minor Project	0	0	4	4	0	50	-	50
	TOTAL	19	7	7	33	600	400		1000

Open Electives :

1. CE-415E Energy Planning and Management.
2. CE-417E Rural Water Supply & Sanitation
3. CE-419E Environment Impact Assessment & Management
4. CE-421E Finite Elements Methods
5. CE-423 E Rock Mechanics
6. CE-425E Advanced Traffic Engg.
7. CE-427 E Environmental Pollution and Control

SCHEME OF EXAMINATION 0F B.TECH. CIVIL ENGG.

VIII Semester - 2010-11

Course No.	Subject	L	T	P	Total	Theory	Sess	Prac.	Total
C E-402E	Bridge Engineering	3	1	0	4	100	50	-	150
CE-404E	Building Service	3	1	0	4	100	50	-	150
CE-406 E	Industrial Waste water treatment	3	1	0	4	100	50	-	150
CE-408 E	Personality Devp. & Professional Aptitude	1	1	2	4	100	50	-	150
CE-416-424E	Dept. Elective-I (Any one)	3	1	0	4	100	50	-	150
CE-426-436 E	Dept. Elective-II (Any one)	3	1	0	4	50	50	-	100
CE-410 E	Project-II	0	0	6	6	50	50	-	100
CE-412 E	Transportation Engg. II Lab	0	0	2	2	0	25	25	50
CE-414 E	Seminar	0	2	0	2	0	50	-	50
	TOTAL	16	8	10	34	500	425	175	1100

Departmental Electives -I
Any one of the following

CE-416 E Modern Foundation

CE-418 E Hydraulic System Modeling

CE-420 E Computational Fluid Dynamics

CE-422 E Hydro Dynamics

CE-424 E Reinforced Earth &

Departmental Electives -II
Any one of the following

CE-426 E Ground Water Engineering

CE-428 E Transportation Planning

CE-430 E Remote Sensing in Civil Engg.

CE-432 E Sediment Transportation Engg.

CE-434 E Air Quality Control & Monitoring

CE-436 E Disaster Mitigation and Management

III Semester

CE-201E STRUCTURAL ANALYSIS-I

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

Unit-I :- Analysis of stresses and strains-Analysis of simple states of stresses and strains, elastic constants, 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.

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

Unit-III :- Bending moment and shear force in, determinate beams and frames, definitions and sign conventions, axial force, shear force and bending moment diagrams.

Unit-IV :- Three hinged arch-horizontal thrust; shear force and bending moment diagrams.

Unit-V :- 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 Mohr diagram.

Unit-VI :- 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.

Books Recommended :

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

CE-203 E BUILDING CONSTRUCTION MATERIALS & DRAWING

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

Part 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.

Unit-II :- Cavity and Partition Walls

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

Unit-III :- 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 foundations, introduction to deep foundations i.e. pile and pier foundations.

Unit-IV :- 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.

Unit-V :- 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.

Unit-VI :- Doors and Windows

Locations, sizes, types of doors and windows, fixtures and fasteners for doors and windows.

Unit-VII :- Acoustics, Sound Insulations and Fire Protection

Classification, measurement and transmission of sound, sound absorber, classification of absorbers, sound insulation of buildings, wall construction and acoustical design of auditorium, fire-resisting materials & thier properties, fire resistant construction and fire protection requirements for buildings.

Part B : Materials

Unit-I :- Stones :

Classification, requirements of good structural stone, quarrying, blasting and sorting out of stones, dressing, sawing and polishing, preservation, an seasoning of stone

Unit - II Brick and Tiles :

Classification of bricks, constituents of good brick earth, harmful ingradients, manufacturing of bricks, testing of bricks.

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

Unit - III Limes, Cement and Mortars :

Classification of lime, manufacturing, artificial hydraulic lime, pozzolona, testing of lime, storage of lime, cements composition, type 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, fiber boards, masonite and its manufacturing, important Indian timbers.

Unit - V : 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.

Unit - VI : Paints and Varnishes :

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

Unit - VII : Plastic-Definition, classification of plastics, composition and raw materials, manufacturing, characteristics and uses, polymerisation, classification, special grades of plastics.

Part 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.

Book Recommended :

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

CE-205 E FLUID MECHANICS-1

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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.

Unit-II :- Kinematics of Fluid Flow : Steady & 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 flow nets.

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

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

Unit-V :- Boundary layer analysis : Boundary layer thicknesses, 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.

Unit-VI :- Dimensional Analysis and Hydraulic Similitude : Dimensional analysis, Buckingham theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, physical modelling, similar and distorted models.

Books Recommended :

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

CE-207 E SURVEYING-1

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

Unit-I :- Fundamental Principles of Surveying : Definition, objects, classification, fundamental principles, methods of fixing stations.

Unit-II :- Measurement of distances : Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line, errors in chaining, tape corrections examples.

Unit-III :- Compass and Chain Traversing : Methods of traversing, instruments for measurement of angles-prismatic and surveyor's compass, bearing of lines, local attraction, examples.

Unit-IV :- Levelling : Definition of terms used in levelling, types of levels and staff, temporary adjustment of levels, principles of levelling, reduction of levels, booking of staff readings, examples, contouring, characteristics of contours lines, locating contours, interpolation of contours.

Unit-V :- Theodolite an 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.

Unit-VI :- Plane Table Surveying : Plane table, methos of plane table surveying, radiation, intersection, traversing and resection, two point and three point problems.

Unit-VII :- Tacheometry : Uses of tacheometry, principle of tacheometric surveying-stadia system fixed hair method, determination of tacheometric constants, tangential system, examples.

Unit-VIII :- 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 cxurve, examples : Vertical Curves: Necessity and types of vertical curves.

Book Recommended :

1. Surveying Vol. 1 by B.C. Punmia
2. Surveying Vol. 1 by T.P. Kanitkar

MATH-201- E MATHEMATICS-1II

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

Part-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Part-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, 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. Integration of complex functions, Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only)

Part-C

Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

Books Recommended :

1. Advanced Engg. Mathematics : F Kreyszig.
2. Higher Engg. Mathematics : B.S. Grewal.
3. Advanced Engg. Mathematics : R.K. Jain, S.R.K. Lyenger.
4. Advanced Engg. Mathematics : Michael D. Greenberg.
5. Operations Research : H.A. Taha.
6. Probability and statistics for Engineers : Johnson. PHI.

Note : Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five questions taking atleast one from each part.

CE-209 E ENGINEERING GEOLOGY

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

Unit-1 :- Introduction : Definition, object, scope and sub division of geology, geology around us. The interior of the earth. Importance of geology in Civil Engineering projects.

Unit-1I :- 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-1II :- Mineralogy and Petrology : Definition and mineral and rocks. Classification of important rock forming minerals, simple description based on pyhysical properties of minerals.
Rocks of earth surface, classification of rocks. Mineral composition, Textures, structure and origin of Igneous, Sedimentary and Metamorphic rocks. Aims and principkles of stratigraphy. Standard geological/stratigraphical time scale with its sub division and a short description based on engineering uses of formation of India.

Unit-1V :- 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-V :- 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.

Unit-VI :- Suitability and stability of foundation sites and abutments. Geological conditions and their influence on the selection, location, type and design of dams, reservoirs, tunnels, highways, bridges etc.

Unit-VII :- Landslides and Hillslope stability :
Improvement of foundation rocks, precaution and treatment against faults, joints and gound water, retaining walls and other precautions. Geology and environment of earth.

Book Recommended:

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.

CE-211 E STRUCTURAL ANALYSIS-1 LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments :

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 deflections & vertical deflections 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.

CE-213 E BASIC COMPUTER APPLICATION

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

Elements of computers and its working-block diagram of computer input, output and storage devices memory-primary and secondary systems s/w application software/programme.

Types of computers-stand alone, multi-user, network/distributed, personal, microcomputer, workstation Servers, mainframes and super computer.

Document preparation using work processing software-purpose and characterization of documents, spell checking, mail merge, paragraph and page layout alignment and justification, tables, charts, graphs, diagram.

Document presentation using power point-preparation of slides and its Presentation, hyperlinks
Concepts of spreadsheets formula graphs and cahrts
Information storage and material-creating, editing and viewing atabase, adding deleting and undeleting records, searching a database ordering the database on a selected key
Concept of internet, server types, connectivity (TC/IP shell) applications of internet like : email and browsing
Concepts of e-commerce.

Books

Buncamentals of computer-V. Rajaraman
Computer today-SK Basanda
MS-office 2000 for everyone-Sanjay Saxena
Internet for everyone Alexis Icon and Mathews
Computer fundamentals-P.K. Sinha
Fundamentals of information technology-Leon and Leon

CE-215 E ENGINEERING GEOLOGY LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments :

1. Study of physical properties of minerals.
2. Identification of rock forming silicate and ore minerals.
3. Recognition of rocks.
4. Use of Clinometer compass and Brunton compass for measurement dip and strike of formations.
5. Drawing of geological cross-selections and study of geological maps.
6. Study of models of geological structure and outcrops patterns of different types of rocks and landforms.

CE-217 E SURVEYING-I LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments :

1. Chain surveying : Chaining and chain traversing.
2. Compass traversing.
3. Plane tabling: methods of plane table surveying, two point & three point problems.
4. Levelling : 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.

CE-202 STRUCTURAL ANALYSIS-II

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

Unit-I :- Statically Indeterminate Structures : Introduction, Static and Kinematic Indeterminate, 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.

Unit-IV :- 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-V:- Unsymmetrical Bending Introduction, Centroidal principal axes of sections, Bending stresses in beams subjected to unsymmetrical bending, shear centre, shear centre for channel, Angles and Z sections.

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

Books Recommended :

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.

CE-204 E DESIGN OF CONCRETE STRUCTURES-I

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 3 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. as per i:s 450

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

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

Unit-V :- 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.

Unit-VI :- 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.

Unit-VII :- 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-VIII :- 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.

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

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

Books Recommended :

1. Design of Reinforced Concrete Structures, P. Dayaratnm, Oxford & IBH Pub., N. Delhi.
2. Reinforced Concrete-Limit State Design, A.K. Jain, Nem Chand & Bros., Roorkee.
3. Reinforced Concrete, I.C. Sayal & A,K, Goel, A.H. Wheeler & Co. Delhi.
4. Reinforced Concrete Design, S.N. Sinha, TMH Pub., New Delhi.
5. SP-16(S&T)-1980, Design Aids for Reinforced Concrete to IS:456, BIS, New Delhi.
6. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, New Delhi.

CE-206 E FLUID MECHANICS-II

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

Unit-I :- Turbulent flow : Introduction to turbulent flow, mixing length theory, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length of pipe, hydraulic and energy gradient lines, pipes in series, pipes in parallel, branching of pipes, pipe network siphon, water Hammer (only quick closure case).

Unit-II :- Flow in open channels : Uniform flow Basic concepts, Resistance equations (Chezy's and mannings formula), Uniform flow computations, Efficient channel section, specific energy concept critical flow and its computations, channel transitions.

Unit-III :- Flow in open channels : Non-Uniform flow, gradually varied flow-basic assumptions and dynamic equations of gradually flow. Types of slopes and their characteristics, analysis and computations of flow profiles, dept analysis, surges in open channels.

Unit-IV :- Turbines : Classification definitions, laws, specific speed and unit quantities, Pelton turbines-their construction and settings, speed regulation dimentions of various element. Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines construction & setting draft tube theory, runaway speed, working proportion of hydraulic turbines and characteristic curves, cavitation. Forces on immersed bodies : types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift.

Unit-V :- Pumps : Centrifugal pumps : Various types and their important components, manometric, total head, net positive suction head, specific speed, shu off head, cavitation. Principle of working and characteristic curves. Priming and maintenance of submersible pumps.
Reciprocating pumps : principle of working, coefficient of discharge, slip, single acting and double acting pump. Manometric head, Acceleration head, Working of air vessels, simplex, duplex and three throw pumps, construction and discharge. Air lift pump.

Books Recommended :

1. Fluid Mechanics-Streeter & Wyile.
2. Fouid Mech & Hyd. M/cs by Modi & Seth
3. Open channel Hydraulics -V.T. Chow.
4. Hydraulic Mechines - J. Lal.
5. Fluid Mechanics by A.K. Jain
6. Fluid Mechanics - Subramanyam.

HUM-202E FUNDAMENTALS OF MANAGEMENT

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

Unit-I :- Meaning of management, definitions of management, characteristics of management, management vs administration management-art, science and profession, importance of management, development of management thoughts.
Principles of management the management functions, Inter relation ships of managerial functions.

Unit-II :- Nature and significance of staffing, personnel management, functions of personnel management, Manpower planning, recruitment, selection, promotion-seniority vs merit training-objective s and types of training.

Unit-III :- Production Management :Definition objectives functions and scope production planning and control its significance, stages in production planning and control its significance, stages in production planning and control brief introduction to the concepts of material management, inventory control, its importance and various methods.

Unit-IV :- Marketing Management : Definition; objectives; importance; limitation; process advertisement-meaning of advertising, objectives, functions, criticism.
Unit-V :- Introduction of financial Management objectives of Financial Management, Function and importance to the concept of capital structure and various sources of finance.

Books Recommended :
Test Book

1. Principles and practice of Management-R.S. Gupta, B.D. Sharma, N.S. Bhalla (Kalyani Publisher).
2. Organisation and Management-R.D. Aggarwal (Tata Mc Graw Hill)

Reference Books

1. Principles & practices of management - L.M. Prasad (Sultan Chand Sons)
2. Management -Harold, koontz and Cyrilo Donell (Mc Graw Hill)
3. Marketing Management-S.A. Sherlikar (Himalaya Publishing House, Bombay)
4. Financial Management- I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R. Edwar Freeman, PHI

Note :- Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.

CE-210 E SURVEYING - II

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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.

Unit-II :- Trangulation : 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-III :- Survey Adjustment and Treatment of Observations : Definite weight of an observation, most probable values, type of error, principle of least squares, adjustment of triangulation figures by method of least squares.

Unit-IV :- Astronomy : Definitions of astronomical terms, star at elongation, star at prime vertical star at horizon, star at culmination, celestial coodinate systems, Napier's rule of circular parts, various time systems: sidereal, apparent, solar and mean solar time, equation of time-its cause, effect, determination of longitude, inter-conversion of time, determination of time, azimuth and latitude by astronomical observations.

Unit-V :- Elements of Photogrammetry : Introduction: types of photographs, Terrestrial and aerial photographs awerial camera and height displacements in vertical photographs, stereoscopic vision and stereoscopies, height determination from parallax measurement, flight planning, plotting by radiline method, principle of photo interpretation and photogrammetric monitoring in Civil Engineering.

Unit-VI :- Introduction of remote sensing and its systems.

Unit-VIII :- Concept of G.I.S. and G.P.S.- Basic Components, data input, storage & output.

Books Recommended :

1. Surveying Vol. 2 by B.C. Punmia
2. Surveying Vol. 3 by B.C. Punmia
3. Surveying Vol. 2 by T.P. Kanitkar

CE-212 E CONSTRUCTION & CONCRETE TECHNOLOGY

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

Unit-1 :- CPM - Project Management, Bar chart and Milestone Charts, Elements of network, development of network, network analysis.

Unit-I1 :- Concrete Technology - Concrete making materials : cements, aggregates, water, admixtures, properties of fresh and hardened concrete, variability of concrete strength, extreme weather concreting, Testing of concrete mixes, prestressed concrete.

Unit-II1 :- Mix Design - Principles of concrete mix design, basic considerations, Factors in the choice of mix design, outline of mix design procedure, ACI mix design practice, USBR method, British mix design method IS guidelines.

Unit-IV :- Heavy Construction - Construction of large structures, dams, bridges, multi-storeyed buildings etc.

Unit-V :- Construction Equipments - Introduction to heavy construction equipment, crushers, hot mix, plants, dozers etc.

Books Recommended :

1. Handbook of mix design - BIS
2. PERT & CPM by B.C. Punmia
3. Concrete Technology by M.S. Shetty.

CE-214 E STRUCTURAL ANALYSIS-II LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments :

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 alalytical 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.

CE-216 E FLUID MECHANICS - LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments :

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-218 E PROFESSIONAL PRACTICES

Sessional : 25 Marks
Practical : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

Leadership - Concepts of leadership, role of training role of leader, leadership in industry.

Professional ethics-concepts of ethics character, duty & responsibility, disciplines, Integrity, courage etc conducts, codes.

Motivation - Dynamics of human behaviour, classification of motives, pay, promotion, competition, and participation rewards etc. job satisfaction.

Human Relations - Behaviour modification techniques, industrial relations, characteristics of group behaviour, Mob psychology, lookouts, handling of grievances, labour welfare.

Communication - Process, bareness & effective communication

Conflicts - Genesis, Inter group, resolving conflicts team building

Labour Industrial & Tax Law - Factory act, workmen compenstion act, minimum wage act etc.

Accident Safety- Classification & action

CE-220 E SURVEYING-II LAB

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

List of Experiments :

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. Setting of simple circular curves by off set method, off set from chord produced, off set from long chord and by deflection angle method.
4. An exercise of triangulation including base line measurement.

CE-222 E CONCRETE LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

Tests on Cement :

1. Standare 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.

Tests on Aggregates :

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. Modules 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, New Delhi.
2. Concrete Technology-M.L. Gambhir, Tata McGraw Hill, New Delhi.

CE-301 E DESIGN OF STEEL STRUCTURE-1

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

Unit-I :- Introduction - Properties of structural steel. I.S. Rolled sections and I.S. specifications.

Unit-II :- Connections - Importance, various types of connections, simple and moment resistant, riveted, bolted and welded connections.

Unit-III :- Design of Tension Members : Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices.

Unit-IV :- Design of Compression Members - Introduction, effective length and slenderness ratio, various types of sections used for columns, build up columns its, necessity, design of built up columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members & columns.

Unit-V :- Column Bases and Footings: Introduction, types of column bases, design of slab base and gusseted base plate, design of gusseted base subjected to eccentrically loading, design of grillage foundations.

Unit-VI :- 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-VII :- Gantry Girders - Introduction, various loads, specifications, design of gantry girder.

Unit-VIII :- 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 of beam to column connections : Introduction, design of framed and seated 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.

Books Recommended :

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.

CE-303 E TRANSPORTATION ENGINEERING I

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

Unit-I :- Design of Flexible Pavements - Types of pavements. Flexible and rigid pavements. Components of a pagvement 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.

Unit-II :- 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-III :- 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.

Unit-IV :- 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 construction of bituminous roads: bitumen boiler, sprayer, pressure distributor, hot-mix plant, coldmix plant, tripper trucks, mechanical paver of finisher, rollers. Mastic asphalt, Introduction to various IRC and MOST specifications.

Unit-V :- 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.

Unit-VI :- 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-VII :- 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.

Unit-VIII :- Tunnels - Sections of tunnels : Advantages, limitations and suitability of each section. Shaft. Pilot tunnel. Driving tunnel 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.

Books Recommended :

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. & Witezak, M.W., John Wiley and Sons, USA.
4. Tunnel Engineering by S.C. Saxena, Dhanpat Rai Publications, New Delhi.
5. A text book of Tunnel, Bridges and Railway Engg. by S.P. Bindra, Dhanpat Rai Delhi.

CE-305 E WATER SUPPLY AND TREATMENT

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

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 borne diseases, water quality standards.

Unit-III :- Water Treatment : Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation-plan 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.

Other water treatment processes : Purification processes in natural system, water softening, removal of taste and odour, advanced methods of water treatment, deflouridation, dissolved solids removal.

Unit-IV :- Water Conveyance System : Conveyance of water, Intake structures, Rising and Gravity system, Dual systems, Pumping Systems and pumping stations, valves and appurtenances, pipe materials and pipe fitting, O & M and trouble shooting for conveyance system.

Unit-V :- Water Distribution System : Layout of Distribution system - Dead End system, Grid Iron system, Ring system, Radial system, their merits and demerits, Distribution Reservoir-functions and determination of storage capacity, Water Distribution Network, Analysis of distribution network, layout, capacity and pressure requirements, leak detection, Maintenance, Water supply in buildings and plumbing.

Books Recommended :

1. Water Supply and Sewerage : E.W. Steel.
2. Water Supply and Sewage by Terence J. McGhee.
3. Water Supply Engineering : S.R. Kshirsagar.
4. Water Supply Engineering : S.K. Garg.
5. Water Supply Engineering: B.C. Punmia, Ashok Jain & Aru Jain.
6. Manual on Water Supply and Treatment : Ministry of Urban Dev., New Delhi.
7. Water Supply Waste Disposal and Environmental Pollution Engineering by A.K. Chatterjee.
8. Elements of Public Health Engineering by K.N. Duggal.
9. Water Supply and Sanitary Engineering by G.S. Birdie and J.S. Birdie.
10. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous.
11. Water and Waste Water Technology by Mark T Hammer.

CE-307 E SOIL MECHANICS

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

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, inter-particle forces, soil structure, principal clay minerals.

Unit-II :- 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.

Unit-III :- 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.

Unit-IV :- 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-V :- 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 flow net, graphical method of construction of flow nets, piping, protective filter.

Unit-VI :- 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-VII :- 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.

Unit-VIII :- 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-IX :- Shear Strength
Introduction, Mohr stress circle, Mohr-Coulomb failure-criterion, relationship between principal stresses at failure, shear tests, direct shear test, unconfined compression test, tri-axial 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.

Unit-X :- 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.

Books Recommended

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

CE-309 E NUMERICAL METHODS & COMPUTING TECHNIQUES

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

Unit-I Roots of Equation :
Graphical Methods, Newton Raphson's Method, Solution of Ordinary differential equations by Runga Kutta Method, Solution of linear algebraic equations by Relaxation Methods.

Unit-II Numerical Interpolation :
Numerical Interpolation : Linear and Lagrangian Ingterpolation, Numerical Integration, Trapezoidal and Simpson's Rule. Curve Fitting : Linear and Polynomial regression. Curve Fitting: Linear and Polynomial regression.

Unit-III Evolution of program design concepts
Basic object oriented concepts. Object oriented languages: C++, constructs & syntax : Algorithm development and implementation ; Application of object oriented programming in Civil Engineering Systems.

Unit-IV
Introduction to data structure, computer graphics and graphical user interfaces. Overview of technical application software : spread sheets, databases, CAD and GIS.

Unit-V
Formulation of the various problems of Civil Engineering like calculation of slope & definition of a beam, Seepage and development of flownets, consolidation of soil layer, head loss due to friction, water supply pipe network etc. and development of computer programming using C++.

Books Recommended :

1. Numerical Methods in Engineering by Pierson.
2. Numerical Methods in Computer Programming by Krishna Raju.
3. Higher Mathematics by B.S. Grewal.
4. Programming in C++ by Robort laffore.
5. Programming in C++ by Bala Guruswamy.

CE-311 E HYDROLOGY

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

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

Unit-II : Precipitation : Forms and types of precipitation, characteristics of precipation in India, measurement of precipitation, 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-III : Evaporation & Transpiration : Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, tanspiration, evapo-transpiration and its measurement, Penman's equation and potential evapo-transpiration.

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

Unit-V : 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-curreny meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

Unit-VI : Hydrogaph : Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph 9of 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-VII : 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.

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

Books Recommended :

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

CE-313 E ENTREPRENEURSHIP DEVELOPMENT

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

Need, scope and characteristics of entrepreneurship
Identification of opportunities
Market survey techniques
Assistance to small scale industries form national level organization s like NSIC & SIC & state level organizations like SFC, SISI commercial banks etc.
Special schemes for technical entrepreneurs, identification of opporthnities Market survey techniques.

Project formulation process
CPM and PERT as planning tools
Structure of a project report & Analysis of sample project reports
Techno-economic feasibility of the project
Steps in planning a small scale industry, structure of a project report & its analysis, techno-economic feasibility of the project.

Technological Dimensions
Choice of Technology, plans & Equipment
Produce development
Shop Layout & Process Planning
Product development, shop lay out etc.

Marketing Perspective
Costing & PRicing
Packaging & Advertising
Elements of marketing management, costing & pricing, packaging & adverting

Finance and Accounting
Working capital cost
Credit institutions, Financial incentives

Managing the Enterprise
Concept of TQM
Human behavior
Oral & written communication
Concept of TQM, oral & written communication

Rules & Regulations
Licensing & Registration Procedure
Important acts like Establishment act, Partnership act
Income tax, sales tax & Excise rules
Municipal byelaws & Insurance coverage

Important provision of factory act, commercial establishment act, negotiable instrument act etc.

Books
1. Entrepreneurship development & management - Dr. A.K. Singh.
2. Total Quality Management-Dr. S. Kumar.
3. Comprehensive project Management-Abdul Matheen

CE-315 E SOIL MECHANICS LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments
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 Recommended :

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.

CE-317 E SURVEY CAMP AS PER COURSE WORK

Sessional : 100 Marks
Total : 100 Marks

CE-302 DESIGN OF CONCRETE STRUCTURES-II

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

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.

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

Unit-IV : 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 sidewalls, battery of bunkers, design examples.

Unit-V : Prestressed Concrete-Basic principles, classification of pre-stressed members, various prestressing systems, losses in pre-stress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, IS Specifications.
End blocks-Analysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.

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

Unit-VII : 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.

Books Recommended :

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., New Delhi.
3. Design of Prestressed Concrete Structures, T.V. Lin, John Wiley & Sons., New Delhi.
4. Reinforced Concrete-Limit Stage Design, A.K. Jain, Nem Chand & Bros., Roorkee.
5. IS 1343-1980, IS Code of Practice for Pre-stressed 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.
8. IS 1893, 4326 & 13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

CE-304 E IRRIGATION ENGINEERING I

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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, 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.

Unit-III : 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, of Khosla's curves, various corrections, silt excluders.

Unit-IV : 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 sketches, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

Unit-V : Spillways and Energy Dissipators : 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.

Books Recommended :

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.

CE-306 E GEOTECHNOLOGY

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

Unit-I : Earth Dams
Introducion, 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 fouccation, drainage of foundations, criterion for filter design. Introduction to rock fill dams.

Unit-II : 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 centre 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-III : 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.

Unit-IV : 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-V : Cantilever Sheet Piles
Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method, simplified procedure, cantilever sheet pile, penetating clay, limiting height of wall.

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

Unit-VIII : 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.

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 Sopil 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.

CE-308 E SEWERAGE AND SEWAGE TREATMENT

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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 swer lines. Sewer materials. Joints and appurtenances.

Unit-II : Sewage Characterisation
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, screnning 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)

Books Recommended :

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

CE-310 E TRANSPORTATION ENGINEERING -II

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

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.

Unit-II : 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-III : 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.

Unit-IV : 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 construction of bituminous roads: bitumen boiler, sprayer, pressure distributor, hot-mix plant, coldmix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MOST specifications.

Unit-V : 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.

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

Unit-VIII : Tunnels
Sections of tunnels: advantages, limitations and suitability of each section. Shift. 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.

Books Recommended :

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, New Delhi.
5. A text book of Tunnel, Bridges and Railway Engg. by S.P. Bindra, Dhanpat Rai Delhi.

CE-312 E PROJECT PLANNING AND MANAGEMENT

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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.

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

Unit-III : 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.

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

Unit-V : 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, shzred float, updating, resources allocation, resources smoothing and resources leveling.

Unit-VI : 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-VII : 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.

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

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 Punmia & Khandelwal, Lakshmi Pub. Delhi.
4. Construction Management & Planning by B.sengupta & H. Guha, Tata McGraw Hills.

CE-314 E GEOTECHNOLOGY LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

List of Experiments

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 Recommended :

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.

CE-316 E ETRANSPORTATION ENGINEERING I LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 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.

CE-318 E ENVIRONMENTAL ENGG. LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

1. Based on course work corresponding to Environmental Engineering.
2. Sampling and analysis of water test like hardness, chloride, sulphate phosphate, D.O., PH, conductivity.

3. Sampling and analysis of waste water Like D.O., B.O.D., C.O.D. Suspended solid.
4. Measurement of noise level
5. Total suspended particulate matter
6. Sulphation rate
7. Fluoride measurement
8. High volume and handy samplers.

CE-320 E AUTO CAD LAB

Sessional : 25 Marks
Theory : 25 Marks
Total : 50 Marks
Duration of Exam. : 3 Hrs.

Introduction to CAD : Introduction to interactive computing and use of graphics requirement of interactive computing dedicated v/s time sharing models, Interactive interface.

Computer Aided Drafting : Introduction to Autocad, Basic drawing and editing, commands for 2d drawings, simple drawing exercises for application of auto cad commands.

Advanced 2d drafting : using auto cad, use of layers and blocks exercises on simple drawings.

Introduction to 3d drafting : Simple exercises on 3d drafting walk through exercises.

CE-401 E DESIGN OF STEEL STRUCTURES-II

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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 : Industrial Buildings : Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Unit-III : Design of Water Tanks : Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.

Unit-IV : Design of Steel Stacks : Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

Unit-V : Towers : Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

Unit-VI : Cold Formed Sections : Introduction and brief description of various type of cold-formed sections, local buckline, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

Books Recommended :

1. Design of Steel Structures, A.S. Arya & J.L. Ajmani, New 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.

CE-403 E ADVANCED CONSTRUCTION TECHNOLOGY

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

Earth Work :
Excavation in ordinary and hard soils, excavation in soft and hard rock blasting techniques, Excavation in weak soils.

Slide slopes of excavation : Minimum working space at bottom, shoring, strutting
Dewatering techniques - pumping and well points
Disposal of spoil and balancing
Safety aspects
Embankments Compaction of earth fills protection and drainage of embankment.

High Rise Construction :
Construction techniques for high rise building.
Construction techniques for chimneys and cooling towers.

Precast and Pre stressed Concrete Construction :
Introduction prestressed concrete, general theory linear post tensioning-general post tensioning advantages to the design engineer and the contractor.

Linear post tensioning system high strength post tensioned stands, parallel lay wire, high strength alloy Steel bars.

Technique of post tensioning- general, special requirements for forming and false work, ducts and closure, placing of ducts of tendons, concreting, stressing procedure, grouting, protecting anchorage from corrosion.
Pretensioning - general, Pretensioning yards set up, form for pretensioned structural elements, special techniques of Pretensioning.

Materials of Pretensioning-cement : aggregates, concrete, admixtures vibration, curing light weight aggregates, high strength steel bars, high strength stand, stress relaxation, galvanization Codes specifications and inspection, manufacturers of Prestressing equipment specifications sizes and costs.

Piles-Basic Piling methods, Non displacement Piles, Problems to Pile construction, pile testing.

Books

1. Purify-Advance Construction Equipment
2. Mahesh Verma-Advanced Construction & Equipment
3. S.C. Sharma-Advance Construction
4. Chandola & Vazrani-Heavy construction khanna Publishers
5. Satyanarayana & Saxena-Construction Planning & Equipment.

CE-405 E ESTIMATING AND COSTING

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

Estimate :
Principle of estimation, units, item work, different kinds of estimates, different methods of estimation, estimation of materials in single room building, two room building with different sections of walls, foundation, floors and roofs, R.B. and R.V.C.C. works, Plastering, white washing, Distempering and painting, doors and windows, lumpsum items, Estimates of canals, roads etc.

Specification of Works :
Necessity of specification types of specification, general specification, specification of bricks, cement, sand, water, lime, reinforcement: detailed specification for earthwork, cement, concrete, brickwork, flooring, D.P.C,R.C.C, cement plastering, white and colour washing, distempering, painting

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

Public Works Account :
Tender and acceptance of tender, Ernest money, security money, retention money, measurement book, cash book, preparation, examination and payment of bills, first and final bills, administrative sanction, technical sanction.
Billing- maintenance of muster ROLL, preparation of pay bill, measurement of work for payment of contractors, different types of payment-first & final, running advance and final payment Valuation.
Purpose of valuation, principles of valuation depreciation, sinking fund, salvage & scrapvalue, valuation of a building-cost method, rental-return method.

Books :

1. Dutta BN-Estimating & costing
2. Chakraborty-Estimate costing & specification in civil engg.
3. Kohli & kohli - A text book on estimating & costing (Civil) with drawings Ambala Ramesh Publications.
4. Rangwala SC-Estimating & Costing-Anand Charotar Book Stall.
5. Pasrija & Arora Estimating Costing, Valuation, New Asian Publishers.

CE-407 E IRRIGATION ENGINEERING

(DESIGN & DRAWING)

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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 Aquaduct.
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 sitting basin.
8. Design of dams, aqueducts, symphonic systems & their inlets & outlets, design of spillways.

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

Books

1. PunmicBC & PANDE-Irrigation & Water POWER Engineering
2. Sharma RK-text book of Irrigation Engg. & Hydraulics structure
3. Sharma RK-Principles & practices of Irrigation Engg.
4. Garg S.K-Irrigation engineering & hydraulics structure-khanna publishers.
5. Varshney RS & Gupta-theory & design for Irrigation Structures.
6. Swami Sharan-Analysis & Design of substructure.

CE-409 E NON CONVENTIONAL SOURCES OF ENERGY

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

Unit-I : Introduction
Global and National Energy Scenario, Conventional Energy Sources, Renewable Energy Sources need and Development of Renewable Energy Sources, types of Renewable Energy Systems.

Unit-II : Solar Energy System
Principle and Scope, Solar Radiation, Energy Collection and Devices, Solar Cells, Solar Water Heater, Solar Pump etc. Introduction to Wind Energy Conversion, Wind Turbines, Wind Farms.

Unit-III : Bio Energy System
Biomass and its uses, characteristics of biomass, bio mass conversion processes, Gasification and Combustion of Bio-mass, Gasifiers, Bio-gas as a Renewable Energy Source, Bio-gas Plant and its components, types of bio-gas plants, Design and constructional features.

Unit-IV : Hydel Energy System
Types of Hydro Power Plant, Importance of Small Hydro Power Plants, and their elements, types of turbines for small hydro, estimation of Primary and Secondary Power. Tidal and Wave Energy its scope and Development, Scheme of Development of Tidal Energy.

Unit-V : Solar Energy System
MHD and Geo Thermal Renewable Energy Systems-Principles and Application Appropriate Energy Technology for Rural Development, Energy Conservation, Environmental aspects of renewable energy systems.

Books Recommended :

1. Energy systems and development-Jyoti Parikh, Oxford University Press.

CE-411 E ELEMENTS OF EARTHQUAKE ENGINEERING

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

Unit-1 : Seismology
Introduction, plate tectomics, earthquake distribution and mechanism, seismicity, seismic waves, earthquake magnitude and intensity, seismic zoning and seismometry.

Unit-1I : Single Degree of Freedom Systems
Various types of dynamic loads, vibration of single degree of freedom system, Free and forced vibrations, types of damping, critical damping. Transmissibility, vibration measuring instruments, response spectrum.

Unit-III : Multi-degrees of Freedom (MDOF) Systems
Equation of Motion, normal modes and natural frequencies, semi-definite systems, dynamic vibration absorbers, vibration dampers, principle of orthogonally, Stodolas method, Holzer's method, matrix method, modal analysis and its limitations. Mode super position method.

Unit-IV : Seismic Analysis and Design
General principles, assumptions, seismic coefficient method, response spectrum method, strength and deflection, design criterion for structures, significance of ductility, design and detailing for ductility, codal provisions, design examples.

Unit-V : Seismic Performance, Repair and Strengthening
Methods for assessing seismic performance, influence of design ductility and masonry infills, criterion for repair and strengthening, repair and strengthening techniques and their applications, additional of new structural elements.

Unit-VI : Vibrational Control
General features of structural control, base isolation, active and passive control system, earthquake resistance design as per I.S: 1893, I.S: 4326 and I.S: 13920.

Books Recommended :

1. Elements of Earthquake Engineering, Jai Krishna, A.R. Chandershekaran & Brajesh Chandra, South Asian Pub New Delhi.
2. Dynamics of Structures, Clough & Penzion, McGraw Hill
3. Earthquake Engineering, Y-X Hu, S-C. Liu and W. Dong, E and FN Sons., Madras.
4. Earthquake Resistant Concrete Structures, George G. Penelis and A.J. Kapoor, E & FN Sons, Madras.
5. Structural Dynamics, Mario Paz, CBB Pub. New Delhi.

CE-415 E ENERGY PLANNING AND MANAGEMENT

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

Unit-I : Planning
Energy scenario of the world in general and India in particular with respect to demand, supply and resources, energy requirement and demand forecasting, isolated and integrated planning, concept of national grid, rural energy planning.

Unit-II : Generation
Production of energy from conventional and non conventional sources - Hydel, Thermal, Nuclear, Solar, Tidal, wind, H.H.D., Geothermal, Bioconversion etc. Economic feasibility and cost analysis.

Unit-III : Ecological & Environmental aspects
Impact assessment of power plants on environment and ecosystem, Environmental degradation & control strategies, Air population, water population and their control.

Unit-IV : Engineering Aspects
Load predictions, peak load, base load, load factor, plant factor, capacity factor etc. operation and economics of power stations. Losses in energy generation, transmission and distribution, energy storage and conservation techniques, reliability analysis energy system, energy audit and economics.

Unit-V : Instrumentation
Measurement of pressure, flow temperature and humidity, concept of automatic control, power & frequency control, voltage & reactive power control. Microprocessor applications in power systems.

Books Recommended :

1. Energy Planning & Management by D. Sawyer.

CE-417 E RURAL WATER SUPPLY & SANITATION

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

Environmental its effects on public health refuse collection and disposal.
Sanitation of swimming pools and bathing places;
Sanitation of public place of assembly and other public building
Sanitation of camps and fairs
Sanitation problems attributed to natural calamities such as floods, fires, cyclones etc.
Industrial wastes its classification and characteristics diseases of industrial origin and its control
Rural Sanitation-concepts of low laterines & pre septic tanks
Materials-Importance of pipe material & then types with fixtures & fittings.
Construction of open well, chlorination of open well, construction of hand pump, construction of bathing ghats.

Books

1. Municipal & rural sanitation-Ehlers & Steel
2. Water supply for rural areas & communities-Wagaer & Lanoix - WHO.
3. Excreta disposal for rural areas & small communities-Wagaer & lanoix-WHO.
4. EW Steel-Municipal & Rural Sanitation
5. Manual of water supply-CPHEEO

CE-419 E ENVIRONMENTAL IMPACE ASSESSMENT AND MANAGEMENT

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

Unit-I : Environmental Problems and Issues : Explosion of Environmental issues and scientific, technological and regulatory

responses. Effects on ecology, environment, society, health and economy. Review of national and international developments related to environmental issues.

Unit-II : Review of Remedial Actions: Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology. Religio-philosophical approaches and concept of Deep ecology.; Market based instruments including taxation for pollution control; Role of environmental ethics.

Unit-III : Environmental Management, Planning and Economics: Multidisciplinary environmental strategies, planning and decision making, human dimensions. Siting of industries and concept of Zoning Atlas, Economic valuation of environmental assets and preliminary concept of Natural Resource Accounting.

Unit-IV : Sustainable development: Concept of limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services etc. Their inter linkages and use of Systems approach including feed back loops. Carrying capacity of systems, prerequisites for sustainable development, concepts of sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure.

Unit-V : Impact Assessment: Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for the above.

Books Recommended :

1. Ecology and Environment by P.D. Sharma
2. Environment Management in India by R.K. Sapru.
3. Environmental Quality Management by Bindu N. Lohani.
4. Studies in Environment and Development by R.B. Singh.
5. Environmental Impact Assessment by Larry W. Canter.
6. Environmental Planning, Policies and Programmes in India by K.D. Saxena.
7. Concepts in Environmental Impact Analysis by S.K. Shukla & P.R. Shrivastava.

CE-421 E FINITE ELEMENTS METHODS

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

Unit-1 : General Proceure of Finite Element Methods.
Basic concept of FEM engineering applications. Comparison of FEM with other methods of analysis. Discretization of the domain basic element shapes. Descritization process. Interpolation polynomials. Selection of the order of the interpolation polynomial. Convergence experiments. Linear interpolation polynomial in terms of global and local coordinates. Formulation of elements characteristics matrices and vector's direct approach. Variation approach. Weighted residual approach. Assembly of elements matrices and vectors and derivation of system equation together with their solution.

Unit-1I: High Order and Iso-Parametric Element Formulations.
Introduction, Higher order one-dimensional element. Higher order elements in terms of natural coordinates and in terms of classical interpolation polynomials. Continuity condition, Numerical integration in one, two and three dimensions.

Unit-1II : Solid And Structural Mechanics
Introduction, Basic equation of solid mechanics. Static analysis-formulation of equilibrium equations. Analysis of trusses and frames, analysis of plates, analysis of three dimension problems. Analysis of solids of revolution. Dynamic analysis, dynamic equation of motion. Consistent and lumped mass matrices. Constant mass matrices in global coordinate systems. Dynamic response calculation using FEM.

Unit-1V : Applications and Generalisation of the Finite Element Method
Energy balance and rate equations of heat transfer. Govening differential equation for the heat conduction in three dimensional bodies. Derivation of finite element equation for one dimensional, two dimensional. Unsteady state and radiation heat transfer problems and their solution. Solution of Helmotz's equation and Reynolds equation. Least squares finite element approach.

Books Recommended :

1. The finite element methods in engineering-S.S. rao, Pub-Pergamon Press.
2. Numerical methods in Finite Element Analysis, Klaus-Jurgen Bathe & Edward L Wilson, PHI
3. The Finite Element Methods-O.C. Zienkiewiez, McGraw Hill.
4. The Finite Element Methods for Engineers KH Huebner, Wiley, New York.

Note : In the semester examination, the examiner will set eight questions in all entire syllabus and students will required to attempt only five questions.
The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

CE-423 E ROCK MECHANICS (Departmental Elective-I)

Theory : 75 Marks
Sessional : 25 Marks
Total : 100 Marks
Duration : 3 Hrs.

Introduction :
Importance of rock mechanics, composition of rocks, geological and lithological classification of rocks, classification of rocks for engineering purposes, R.Q.D. method of classification of rocks.
Theories of Brittle failure.

Laboratory Testing of Rocks :
Various methods of obtaining rock cores, methods of sample preparation, methods of removing end friction of the rock samples. Compression testing machine, uniaxial compression strength of rock samples, methods of finding tensile strength-direct and indirect methods, Brazilian test, shear box test, triaxial shear test, punch shear test.

In-situ Testing of Rocks :
Field direct shear test on rock blocks, field triaxial strength, use of flat jacks, chamber test, plate load test, cable jacking test.

Stress Evaluation in Field :
Stress-relief technique (over coring), use of strain gauges, bore hole, deformation cell, photoelastic stress meter, stress measurement with flat jack. Hydraulics Fracturing Techniques.

Stabilization of Rocks :
Rock bolting, principle of rock bolting, various types of rock bolts, application of rock bolting. Field testing of rock bolts and cable anchors.

Elastic and Dynamic Properties of Rocks :
Stress-strain behaviour dynamic properties, resonance method and ultra-sonic pulse method.

Pressure on Roof of Tunnels :
Trap door experiment, Terzaghi's theory, Bieraumer, Kommerel, Protodyakanov theory.

Stress Around the Tunnels :
Basic design and Pri8nciples of tunnels in rocks, design of pressure tunnels in rocks.

Books :

1. Rock Mechanics, Vol. I, II, III, IV by Lama, et.al.
2. Fundamentals of Rock Mechanics by Jaeger and Cook.
3. Rock Mechanics by Stagg & Zienkiewiez.
4. Rock Mechanics & Design of Structures in Rocks by Obert & Duvell.
5. Rock Mechanics & Engineering by Jaeger.
6. Art of Tunneling by Schzy.

CE-425 E ADVANCED TRAFFIC ENGG.

Theory : 75 Marks
Sessional : 25 Marks
Total : 100 Marks
Duration : 3 Hrs.

1. Introduction and Traffic Characteristics :

Objectives and scope of traffic engg. Organisational set up of traffic engg. department in India. Importance of traffic characteristics. Road user characteristics. Vehicular characteristics. Max dimensions and weights of vehicles allowed in India. Effects of traffic characteristics on various design elements of the road.

2. Traffic Surveys

Methods of conducting the study and presentation of the data for traffic volume study, speed study and origin and destination study. Speed and delay study. Parking surveys. On street parking, off street parking. Accident surveys. Causes of road accidents and preventive measures. Use of photographic techniques in traffic surveys.

3. Highway Capacity

Importance. Space and time headway. Fundamental diagram of traffic flow. Relationship between speed, volume and density. L:evel of service. PCU. Design service volume. Capacity of non-urban roads. IRC recommendations. Brief review of capacity of urban roads.

4. Traffic Control

Types of traffic control devices. Traffic signs, general principles of traffic signing, types of traffic signs. Road markings, types, general principles of pavement markings. Design of rotary. Grade separated intersections. Miscellaneous traffic control aids and street furniture.

5. Signal Design

Types of signals. Linked or coordinated signal systems. Design of signal timings by trial cycle method, approximate method, Webstor's method and IRC method.

6. Traffic Regulation and Management

Need and scope of traffic regulations. Regulation of speed, vehicles and drivers, General traffic regulations. Motor vehicles act. Scope of traffic management. Traffic management measures: restrictions on turning movements, one way streets, tidal flow operations, exclusive bus lanes, traffic restraint, road pricing.

7. Traffic And Environment

Detrimental effects of traffic. Vehicular air pollution. Situation in India. Vehicular emission norms in India and abroad. Alternate fuels. Factors affecting fuel consumption. Arboricultur.

8. Computer Application, Traffic Simulation

Computer application in traffic engg., transport planning and public transport. Traffic simulation, advantages. steps in simulation. Scanning techniques. Introduction to Intelligent vehicle highway system. Various types of IVHS.

Books :

1. Traffic Engg. and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi.
2. Highway Engg. by S.K. Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
3. Traffic Engg. by Matson, T.M., Smith, W.S. and Hurd, F.W., McGraw-Hill Book Co., New York.
4. Traffic Flow Theory by Drew, D.R., McGraw-Hill Book Co., New York.

CE-427 E ENVIRONMENTAL POLLUTION AND CONTROL

Theory : 75 Marks
Sessional : 25 Marks
Total : 100 Marks
Duration : 3 Hrs.

Principles involved in the protection of public health sanitation of dwelling houses, principles of villages and town planning: land pollution and its control.

Air borne diseases and their control, sources of pollution, occupational health

Water borne diseases, river pollution and control of water pollution

Environmental Consideration of ventilation, air conditioning and illumination

Sample collection and sampling devices: mathematical modeling Application of above in the design of hospitals and other public buildings.

Book :

1. Bhatia H.S. Environmental pollution & Control-Galgotia

CE-402 E BRIDGE ENGINEERING

Sessional : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 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.

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

Unit-V : Hydraulic & Structural Design of piers, abutments, wing wall and approaches.

Unit-VI : Brief descriptions of bearings, joints, articulation and other details.

Unit-VII : Bridge foundation-Various types, necessary investigations and design criteria of well foundation.

Books Recommended :

1. Essentials of Bridge Engineering, D.J. Victor, Oxford & IBH Pub. New Delhi.
2. Design of Bridges, N. Krishna Raju, Oxford & IBH, New 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, New Delhi.

CE-404 E BUILDING SERVICES

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

Principles service installations

Domestic eater supply;
Water supply requirements & quality, house connection, water supply networks, cold and hot water ser ices, water services to multistoried buildings., pipe materials, jointing, valves & taps

Building Drainage
Discharge & Ventilation pipes, building drainage systems, Drainage pipe materials, jointing & testing, types of fixtures & fittings.

Refuse handling
Collection of refuse from buildings, refuse bins & sacks

Acoustics
Basic problems & technology, transmission of sound in rooms, coefficient of sound absorption, noise reduction, classification & selection of acoustical materials, acoustics of auditorium, schools etc.

Air conditioning, Heating & Ventilation
Different types of heating materials, Solar water heaters, requirement of comfort conditions, temperature & humidity control, Mechanical Ventilation, Air conditioning units & their working principles.

Lifts
Classification & types of lifts, lift codes & rules, Traffic analysis & selection of lifts, car speed, Fire safety, arrangement of lifts.

References
Jain V.K. Design & installation of services in building complexes & High rise buildings Merrit F.S. Mechanical and Electric design of buildings.
Sinha A : Building Environment
Bhatia H.S. : Environmental Services (Plumbing)- Galgotia

CE-406 E INDUSTRIAL WASTE WATER TREATMENT

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

Unit-I : Problem of Water Pollution : Effects of wastes on streams and sewage treatment plant, natural purification of stream, oxygen sag curve, allowable organic load on stream classification of stream, stream standards and effluent standards, requirement of water for different purposes.

Unit-II : Pretreatment & Measurement of Wastes : Effects of industrial wastes on streams, sewerage systems and waste water treatment plants. Sampling of waste waters, grab and composite samples, analysis of waste water, biochemical oxygen demand, chemical oxygen demand and pH value of waste, toxicity of waste by bio-assay method, Various steps to minimize effects of industrial effluents on waster water treatment plants and receiving streams-conservation of water, process change, reuse of waste water, recovery of byproducts, volume reduction, strength reduction, neutralization, equalization and proportioning. Population equivalent. Industrial effluent standards for disposal into inland surface water sources and on land for irrigation.

Unit-III : Convenstional Methods of Treatment of Waste Water : Energy requirement, optimization and budget, municipal regulation, sewer rental charge, instrumentation in waste water treatment plants, collection of data, operation and maintenance of plants, water pollution control board, removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal, advance methods of treatment such as reserve osmosis, ion exchange, electro dialysis, algal harvesting etc. low cost treatment plants, common effluent treatment plant, design and operation.

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, hazardous wastes: thermal power plants and radio active wastes, impact, handling and disposal.

Books Recommended :

1. Industrial and Hazardous Waste Treatment by N.L. Nemerow & A. Dasgupta.
2. Industrial Effluents by N. Manivasakam.
3. Waste Watewr Treatment by M.N. Rao & A.K. Dutta.
4. Waste Water Treatment for pollution Control by Soli J. Archieival.
5. Environmental Engoineering by G.N. Pandey and G.C. Carney.
6. Industrial Waste Water Source Control by Nancy Rilkmen and Clay Jones.
7. Pollution Control in process industries by S.P. Mahajan.
8. Environmental Industrial Pollution control by P.R. Trivedi and Gurdeep Raj.
9. Industrial Water Pollution Control by Eckenfelder.
10. Principles of Industrial Waste Treatment by C.Fred Gurnham.

CE-408 E PERSONALITY DEVELOPMENT & PROFESSIONAL APTITUDE

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

Purpose/objectives
Future manager along with managerial skills and competence
Leadership and itsw qualities
SWOT analysis and consolidation of the strength and general proficiency.
Business Communication & Assertiveness
Creativity, Innovation and team Spirit
Attitude building & logical Analysis
Field visit

CE-416 E MODERN FOUNDATIONS

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

Unit-I :

a) Foundation in Special Soils : Foundations in expansive soils, foundations in soft and compressible soils, foundations in over sonsolidated desiccated soils.
b) Modern Soil Testing : Centrifugal testing of soil models, pressure meter testing of soils.

Unit-II :

Modern Foundation Techniques: Drilled piers, reinforced earth, and reinforced concrete retaining walls with relieving shelves. Diaphragm walls and bored pile walls, the stabilizing action of drilling mud, root, piles, vibrofloation, stone columns, sand wicks.

Unit-III :

Shells in Foundation : shell as a structural form Classification of shells used in foundation. Design of shell foundation-hyperbolic parabolodial shell, conical shell, inverted dome shell, construction of shell foundation, in-situ construction, precast construction.

Unit-IV :

Foundations for special structures: Foundations for water tanks, chimneys and cooling towers, telecommunication and transmission line towers. Foundation for guyed structure, industrial structure and for ground storage tanks.

Unit-V :

Foundations for underground structure : Bedding of conduits, tunnels, underground powerhouses. Foundations for Coastal and offshore structures: Marine piles, foundations for offshore drilling platforms, and foundations for offshore defence installations.

Books Recommended :

1. Modern foundations by Arockia Samy.

CE-418 E HYDRAULICS SYSTEM MODELLING

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

Unit-I : Development of water resources, demand of water, availability of water, estimation of surface water flow at ungaged site.

Unit-II : Computation of extreme flow : Concept of probability in hydrology, design flood for hydraulic structure, methods of flood frequency analysis, computation of peak flow from precipitation, measurement of peak discharge.

Unit-III : Conveyance System: Methods of conveyance of water, resistance equations for flow, design of rigid boundary channels, design of loose boundary channels. Conduit System: Types of pipes, laying of pipes and joints, forces and stresses in pipe band, pipe line analysis and design, methods of supplying water, storage and distribution reservoir, pipe materials, large conduit design. Hydraulic transient analysis.

Unit-IV : Water Distribution System Analysis : Types of pipe network, equivalent pipes, pumps in water distribution system, Network with loops, flow equation, node equation, loop equation, numerical solution technique- Linear theory method, Newton-Ralphson method. Hardy-Cross method, application of water distribution softwares. Water distribution system models.

Unit-V : Drainage System : Types of drainage systems, Urban drainage system, Agriculture drainage system, Roadways drainage system, Airport drainage system, computer applications.

Books Recommended :

1. Water supply & Sanitary Engg. - V.N. Naziram & S.P. Chandole - Khanna Pub.
2. Hydrology & Hydraulic System- Ram S. Gupta, Printice Hall, New Delhi.
3. Fluid Mechanics & Fluid Machinery-S.K. Som & Biswas.

CE-420 E COMPUTATIONAL FLUID DYNAMICS

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

Unit-I : Introduction and overview of CFD, need, solution accuracy, consistency, stability and its method of analysis, Lax-Equivalence theorem, typical practical problems and models.

Unit-II : Mathematical models of fluid dynamics, Equations of motions, Compressible and Incompressible flows, invisoid flows, viscous laminar and turbulent flows, Navier-Stokes equations, Laplace & Poisson Equation.

Unit-III : Computational techniques, finite difference methods, Explicit and Implicit formulations, Finite element methods, Weighed residual, finite Volume method, panel method.

Unit-IV : Numerical Integration, Newton-cotes, Guass-Lagendre quadrature, essential and necessary, Dirichlet Neumann, Newton boundary condition, coordinate transformations.

Unit-V : Physical aspects of grid generation, element geometries, structured and unstructured mesh, mesh refinement, conformal mapping, algebraic grid generation, transfinite interpolation, Delaunay triangulation and voronoi diagram.

Books Recommended :

1. Computational Fluid Dynamics-John D Anderson, McGraw Hill
2. Computational Fluid Dynamics-Tarit K Bose, Wiley Eastern Ltd.
3. Computational Methods for Fluid Dynamics-JH Ferziger, M Peric, S Pringer.

CE-422 E HYDRO DYNAMICS

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

Unit-I : Introduction : Fluid Mechanics & Hydrodynamics types of fluids, fluids as continuum, ideal & real fluid properties, rheological properties.
Fluid Kinematics : Mathematical and streamline representation of velocity, steady, usteady ad relative motions acceleration, continuity equation (Lagrange's & Euler's form and relation between the two forms). Irrotational and rotational motion, vorticity vector, circulation relation.
Potential and stream functions : Velocity potential, stream function, Kinematics boundary conditions and impulsive motions.

Unit-II : Fluid Kinematics : Equation of motion, integration of equations of motions, singular forces in terms of velocity potential (Blasius theorem and application, Kutta-Joukowsky law, Lagally's theorem), source, sinks doublet and image, stagnation points.
Vortex Dynamics: General fluid motions, description of vortex motions (line vortices & line doubles), vortex construction theorems, Kelvin's circulation theorem, vortex streets (rows), and D'Alembert's paradox.

Unit-III : Methods of solution (Potential Flows) : Hydrodynamics singularities in two-dimentional flows. Conformal transformation and mapping (including Schwartz Christoffel), numerical methods of solution, electro conductivity analogy & other analogies.

Unit-IV : Hydraulic Flows: Confined porous-media flow, Darcy's Law, wells in uniform bed, and seepage under dams. Wave Motions: Water waves, wave celerity and types, standing waves (deep water & shallow water dams).

Unit-V : Magneto Hydrodynamics: Definition, basic field equations (medium at rest, medium in motion), simplification of field equations, Altven theorem, MHD waves and altven waves.

Books Recommended :

1. Hydrodynamics-Sir Horace Lamb, Dover Publication
2. Principles of Magneto Hydrodynamics-H Goed Bloed & S Poedt, Cambridge University Press, 2004.

CE-424 E REINFORCED EARTH AND GEOSYNTHETICS ENGG.

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

Unit-I : Reinforced Earth : History, field of applications, natural fibres, overview of Geotextiles, Geomembrances, Geogrids, Geonets, Geowebs, Geomats and Geocomposites and economic aspects of their applications.

Unit-II : Production of Geotextiles, composites, physico-mechanical, hydraulic and chemical properties. Functions of Geosynthetics, fluid transmission, filtration, separation, protection.

Unit-III : Soil Reinforcement : Basic principle of soil reinforcement, shear strength of reinforced soil, theoretical strength, factors affecting, requirements on synthetic reinforcement, installation techniques.

Unit-IV : Calculation methods : Basic concepts, embankment on soft soils, internal stability, overall stability, foundation stability and bearing capacity failures-construction of the steep slope, retaining walls-external stability, internal stability.

Unit-V : Use of Geosynthetics in Roads and Railways, drainage system- Control of groundwater level, dewatering and reclamation of land, use of Geomembranes - for lining application, management and maintenance.

Books Recommended :-

1. Geotextiles and Geomembranes in Civil Engg.- Gerard P.T.M. Van Santvrot, A.A. Balkema, Oxford and IBH publishing company, New Delhi.
2. Reinforced Soil and Geotextiles - J.N. Mandal, proceedings FIGC-1988, Oxford and IBH publishing company private Ltd., New Delhi.
3. Geosynthetics: Application, Design and Construction-R.J. Tarmat, proceedings First Europian Geosynthetics Conference, Netherland A.A. Balkema, Publisher-Book field, U.S.A.
4. Geosynthetics World- J.N. Mandal, Willey Eastern Ltd., New Delhi.

CE-426 E GROUND WATER ENGINEERING

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

Unit-I : Properties of Aquifers, Formation constants, compressibility of aquifers, Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers, Dupit's assumptions. Unconfined flow with a recharge, tile drain problem. Ground water exploration and methods of investigations.

Unit-II : Effect of boundaries, interference of water, leady acqifers, Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers. Partial penetration of an aquifer by a well, spherical flow in a well. Non equilibrium formula for aquifer (unsteady radial flows).

Unit-III : Tubewells, optimum capacity, silting of tube well, design of tube wells in different aquifers, tube well types, parts, bore hole, strains, its types, well pipe, casing pipe, blind pipe. Construction and working of tube wells, site selection, drilling operation, cable tool method, hydraulic method, rivers Rotary Method and drilling fluids, well screen assembly installation, verticality and alignment of tube wells, gravel packing, development of tube wells, sickness, in construction and corrosion and failure of tube wells, Pumping equipment and hydraulic testing of pumps.

Unit-IV : Artificial recharge of ground water, considerations and methods, recharge techniques induced infiltration, water spreading, flooding, basins, ditching, modification of natural channels, irrigation, recharge pits, shafts and recharge wells.

Books Recommended :

1. Groundwater Hydrology, D.K. Todd, John Wiley & Sons Inc. Newyork.
2. Groundwater, H.M. Raghunath, Wiley Eastern Ltd., New Delhi.

CE-428 E TRANSPORTATION PLANNING

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

Unit-I : Hierarchical level of planning, passenger and goods transportation, general concept and process, Urban travel characteristics, private and public travel behaviour analysis.

Unit-II : Travel demand estimation and forecasting, trip generation methods and their comparison, model split analysis, behavioral approach, two-stage model splits models.

Unit-III : Trip distribution - Growth factor methods, gravity model, intervening opportunity and competing opportunity models, trip route assignment.

Unit-IV : Land use transport planning, transport related land use models, corridor type travel planning, state wide and regional transportation planning.

Unit-V : Intelligent transportation system, Urban mass transportation planning, LRT, development of bus as a transit systems, economic evaluation of transport plan.

Books Recommended :

1. Hutchinson B.G., Principles of urban transport system polanning. McGraw Hill, New York.
2. Kadiyali L.R., Traffic engineering and transport planning. Khanna Publishers.
3. Florian Michael, Transportation planning models. Elsevier Science Publishers, Netherlands.
4. Khanna and Justo, Highway engineering. Nemchand Brothers, Roorkee.

CE-430 E REMOTE SENSING IN CIVIL ENGG.

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

Unit-I : Introduction
Physical basis of Remote Sensing, Sensor systems ground based, air borne and satellite, passive scanning system multi-spectral scanners (MSS), Thermal infrared Scanning system, Radio-meters, Active Scanning system: Radar, Lidar, Satellite data-types, description and utility for various Civil Engineering projects.

Unit-II : Remote Sensing in Civil Engineering Projects
Introduction, Role of remote sensing in terrain investigation, photogrammetry, photo-interpretation, Selection of appropriate date, Digital processing of satellite data, Necessity of field work to collect ground truth.

Unit-III : Topographic Mapping using remote sensing
Introduction, Aerial photographs, Scale, geometric characteristics, parallax bar, generation of Digital Elevation Model, Stereoplotters, Requirementsw for cartograsphic presentation of satellite data. Mapping using satellite image interpretation, Mapping of inaccessible areas using side Looking Airborne Radar data.

Unit-IV : Resource mapping for civil engineering projects
Identification of Geomorphic and Hydrogeomorphic features and mapping. Locating construction materials-water resources, sand, soil, kankar, rocks.
Soil characteristics using remote sensing: Application of visible, infra-red and microwave remote sensing for identification of soil types, grain size and soil moisture studies, Monitoring areas prone to Landslides using remote sensing, digital model and GIS.

Unit-V : Application in water resources engineering
Mapping surface water bodies using satellite data, studies related to floods, snow melts, wetland, coastal environment, sediment transport, ground water targetting, bathymetry. Regional and urban planning using remote sensing: Land use. Land cover classification, urban land use planning, urban sprawl monitoring, waste disposal sites.

Books Recommended :

1. Introductory Digital Image processing - J.R. Jeusen.
2. Remote Sensing for Environment and Forest Management by A. Mehrotra & R.K. Suri.
3. Remote Sensing and Image Interpretation by Lilles T.M. and Kiefer R.W.
4. Manual of Remote Sensing-Vol-1.
5. Principles of Remote sensing -P.T.
6. Mapping & Compiling by K.K. Rampal
7. Manual of Photographic Interpretation.
8. A Multipurpose Level Information System for Rural resources planntey (soil & water conservation) by S.J. Ventura, Niemann B.J. and D.D. Mayer.

CE-432 E SEDIMENT TRANSPORTATION ENGG.

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

Unit-I : Introduction to sediment & Fluvial Hydraulics
Properties of Sediments: Origin & formation of sediments, fundamental properties of individual sediment particles, bulk properties of sediments. Incipient motion of sediment particles, competent velocity, life concept, critical tractive force, critical tractive stress.

Unit-II : Regime of Flows
Description in Regimes of flow of regimes. Velocity Distribution in Alluvial Streams. Velocity distribution and resistance in turbulent flow over rough boundaries, resistance to flow in alluvial stream, velocity distribution in alluvial streams.

Unit-III : Bed Load Transport
Bed load equations empirical, semi theoretical and based on dimensional considerations saltation. Suspended Load Transport: Mechanism of suspension, general of diffusion, sediment distribution equations, effect of temperature or suspended load transport, wash load.

Unit-IV : Total load transport
Approaches to the problem, microscopic and macroscopic methods, some approximate methods, effect of hydraulic conditions on sediment transport.

Unit-V : Design of Stable Channels
Variables in channels design and conditions of design, secondary factors influencing stable channel design, stable channels carrying clear water in coarse, non-cohesive materials and alluvial materials. Sediment Control in Canals: Sediment controlling actions, methods of sediment control and their details, water requirements.

Books Recommended :

1. The Flow of Complex Mixtures in Pipes by G.W. Govier & K. Aziz, van Nostrand Reinhold Ltd. Toronto.
2. Hydraulics Transport of Bulky Materials I. Zandi, Pergamon Press.
3. Hydraulics of Sediment Transport, W.H. Graf, McGraw Hill Series in Water Resources.
4. Mechanics of Sediment Transportation and alluvial Stream Problems, R.J. Garde & K.G. Ranga Raju Willey Eastern Ltd.

CE-434 E AIR QUALITY CONTROL & MONITORING

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

Unit-I : Air pollution problem : Economics and social aspects, historical episodes of air pollution.

Unit-II : Sources of Air Pollution : Effects of air pollution on health, animal, plants and materials, role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants, general diseases caused by air pollutions, toxicity of various pollutants.

Unit-III : Sampling and Analyzing of Air Pollutants : Instruments pollution survey, standards of air pollution.

Unit-IV : Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

Unit-V : Air Pollution in control legislation, public education pollution standards, status of air pollution control in various countries.

Unit-VI : Industrial Hygiene : Concept and importance, factory involved in environmental hazards, industrial ventilation occupational diseases, control methods.

Books Recommended :

1. Air Pollution by C.R. Philips.

CE-436 E DISASTER MITIGATION AND MANAGEMENT

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

- Introduction to disaster Control-integrated approach, role of engineer.
- Hydrological, coastal and marine disaster
- Atmospheric Disaster
- Geological mass movement and land disasters
- Case studies-Damage profile analysis-uttarkashi/Bhuj/IATUR
- Disaster mitigation
- Forest related disasters
- Wind and water driven disasters
- Mining disasters
- Major earthquake & causes
- Hazard resistant construction-symmetry eccentric loading, framed structure, soft floors, simple configurations.
- Building codes & other recommended practices cyclones & landslides - causes & remedies.

- Theoretical concepts & structural behaviour-seismic response of foundation & soil behaviour, failure-deformation.

Books :

1. IS 4326-1993 code of practice for eartrh quake resistant construction BIS
2. IS 13920-1993-Ducticle detaining of reinforced concrete structure
3. Journal of Indian building Congress Vol. IV 1997.
4. Seismic design Handbook-Farzad Naeim
5. IS 1893-1984-Criteria for earthquake resistant design for structure
6. IS 13827-1993 Guidelines for improving earthquake structure
7. Johri etcl disaster Mitigation-Experiences & Reflections.