

SCHEME OF EXAMINATION

For

B. Tech. (Civil Engineering)

YEAR II, SEMESTER –III

(Effective from the session: 2010-2011)



Uttarakhand Technical University, Dehradun

COURSES AND EVALUATION SCHEME
B.TECH CIVIL ENGINEERING
YEAR II, SEMESTER -III
(EFFECTIVE FROM SESSION :-2010-2011)

S. No	Course No.	Subject	Periods			Evaluation				Subject Total	Credit
						Sessional Exam			Exam ESE		
Theory			L	T	P	CT	TA	Total			
1.	TMA 301	Mathematics-III	3	1	0	30	20	50	100	150	4
2	THU-301	Engineering Economics	2	1	0	15	10	25	50	75	3
3	TCE 301**	Fluid Mechanics	3	1	0	30	20	50	100	150	4
4	TME 303###	Solid Mechanics	3	1	0	30	20	50	100	150	4
5	TCE 302	Building Material & Construction	3	1	0	30	20	50	100	150	4
6	TCE 303	Basic Surveying	2	1	0	15	10	25	50	75	3
Practical /Design											
7	PCE 351	Fluid Mechanics Lab	0	0	2		25	25	25	50	1
8	PCE 352	Building Materials Lab	0	0	2		25	25	25	50	1
9	PCE 353	Surveying Lab	0	0	3		25	25	25	50	2
10	PCE 354	Building Planning & Drawing	0	0	3		25	25	25	50	2
11	GP-301	General Proficiency (NSS/NCC/Sports/Cultural)	-	-	-		-	50	-	50	-
		Total								1000	28

**Common to Mechanical Engineering

##Common to Mechanical, Biochemical & Chemical Engineering

TMA-301	MATHEMATICS –III	L	T	P
		3	1	0

Unit – I : Function of Complex variable

Analytic function, C-R equations, Cauchy’s integral theorem, Cauchy’s integral formula for derivatives of analytic function, Taylor’s and Laurent’s series, singularities, Residue

theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(\cos\theta \sin\theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$ **10**

Unit – II : Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Probability theory. **08**

Unit – III : Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, X, R, p, np, and c charts. **08**

Unit – IV : Numerical Techniques – I

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, difference tables, Newton’s forward and backward interpolation , Lagrange’s and Newton’s divided difference formula for unequal intervals. **08**

Unit – V : Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson’s one third and three-eight rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler’s, Picard’s and forth-order Runge- Kutta methods. **08**

Reference Books :-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House, 2002.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. E. Kreysig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
5. Devi Prasad, An introduction to Numerical Analysis, Narosa Publication house, New Delhi, 2006.
6. T. Veerajan & T. Ramchandran, Theory & Problems in Numerical Methods, TMH, New Delhi, 2004.
7. S.P.Gupta, Statistical Methods, Sultan and Sons, New Delhi, 2004.
8. Devore, Probability and Statistics, Thomson(Cengage) Learning, 2007.
9. Walpole, Myers, Myers & Ye, Probability and Statistics for Engineers & Scientists,
10. Peter V. O’Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
11. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi , 2003.
12. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd., 2000

THU-301

ENGINEERING ECONOMICS

L	T	P
2	0	0

1. Unit-I

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, payback period comparison. (8)

2. Unit-II

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. (8)

3. Unit-III

Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/cost applications, Cost –effectiveness analysis. (9)

4. Unit-IV

Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques. (8)

Reference Book :

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996

TCE-301

FLUID MECHANICS

L	T	P
3	1	0

Unit-I: Introduction : Fluid and continuum, Physical properties of fluids, Rheology of fluids.

Kinematics of Fluid flow : Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, subcritical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.

Unit-II: Fluid Statics: Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Dynamics of Fluid Flow: Euler's Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.

Unit-III: Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

Unit-IV: Laminar and Turbulent Flow: Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and networks.

Unit-V: Boundary Layer Analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub layer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

Reference Books :

1. S Narasimhan: First Course in Fluid Mechanics, University Press
2. Som, S.K. & Biswas G.: Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
3. M M Das: Fluid Mechanics & Turbomachines, Oxford University Press
4. S.K.Agarwal: Fluid Mechanics & Machinery, TMH
5. Garde, R.J., " Fluid Mechanics through Problems", New Age International Pvt. Ltd, New Delhi, 2nd Edition.
6. Hunter Rouse, "Elementary Mechanics of Fluids", John Wiley & Sons. Omc. 1946
7. I.H.Shames, "Mechanics of Fluids", McGraw Hill, Int. Student, Education, 1988.
8. Vijay Gupta and S.K.Gupta, " Fluid Mechanics and its Applications", Wiley Eastern Ltd, 1984.
9. Modi, P.N., and Seth, S.H., "Hydraulics and Fluid Machines", Standard Book House, 1989.

TME- 303

SOLID MECHANICS

L	T	P
3	1	0

Unit-I

Introduction. Stress and strain: stress at point, Cauchy stress tensor, equilibrium equations, analysis of deformation and definition of strain components, compatibility relations, (8)
principal stresses and strains, stress and strain invariants, Mohr's circle representation. (3)

Unit-II

Constitutive relations: true and engineering stress-strain curves, Material properties for isotropic materials and their relations. Theories of failures for isotropic materials. (7)

Unit-III

Shear Force and Bending Moment diagrams. Axially loaded members. Torsion of circular shafts Stresses due to bending: pure bending theory, combined stresses. (7)

Unit-IV

Deflections due to bending: moment-curvature relation, load-deflection differential equation, area moment method, and superposition theorem. Stresses and deflections due to transverse shears. (8)

Unit-V

Torsion of circular shaft. Energy methods: Strain energy due to axial, torsion, bending and transverse shear. Castigliano's theorem, reciprocity theorem etc. (7)

Reference Books:

1. S. C. Crandall, N. C. Dahl, and T. J. Lardner, *An Introduction to the Mechanics of Solids*, 2e, McGraw Hill, 1978.
2. E. P. Popov, *Engineering Mechanics of Solids*, Prentice Hall, 1990
3. I. H. Shames, *Introduction to Solid Mechanics*, 2e, Prentice Hall, 1989
4. S. P. Timoshenko, *Strength of Materials*, vols. 1 & 2, CBS publ., 1986
5. *Mechanics of Materials* by Bear Jhonson

TCE 302

Building Materials and Construction

L	T	P
3	1	0

Unit – 1: Classification of materials, materials and their performance, economics of the building materials. Stones, Requirement of good building stone, characteristics of stones and their testing. Common building stones. Preservation of stones.

Bricks : Manufacture of clay bricks, and their classification. Properties of clay bricks and their testing. Problems of efflorescence & lime bursting in bricks & tiles.

Gypsum : properties of gypsum plaster, building products of gypsum and their uses. Lime : Manufacture of lime, classifications of limes, properties of lime.

Pozzolona : Natural and Artificial fly ash, Surkhi (burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction.

Timber : Classification and identification of timber, Fundamental Engineering properties. Defects in timber, Factors affecting strength of timber, seasoning and preservation of timber. Wood based products.

Asphalt, Bitumen and Tar : Terminology, specifications and uses, Bituminous materials.

Unit – II : Chemistry of Plastics manufacturing process, classification, advantages of plastics, Mechanical properties and their use in construction.

Paints varnishes and distempers, Common constituents, types and desirable properties, Cement paints. Ferrous metals, Desirable characteristics of reinforcing steel. Principles of cold working. Detailed Discussion on reinforcing steel mechanical and physical properties chemical composition. Brief discussion on properties and uses of Aluminum and lead. Glass : Ingredients, properties types and use in construction.

Insulating Materials: Thermal and sound insulating material desirable properties and type.

Unit – III: Components of building area considerations, Construction Principle and Methods for layout, Damp proofing ant termite treatment, Vertical circulation means staircases ramp design and construction. Different types of floors, and flooring materials (Ground floor and upper floors). Bricks and stone masonry construction. Cavity wall hollow block and Waffle slab construction.

Unit - IV : Doors, Windows and Ventilations, Construction details types and relative advantages & disadvantages. Roofs types and treat ents, Lintels and Chhajja Functional efficiency of Buildings.

Unit - V : Natural Ventilation , Water Supply and Sanitary fittings (Plumbing), Electricity. Heating Ventilation & Air conditioning , Mechanical Lifts and Escalators , Fire Fighting , Acoustics. Plastering different types, pointing, Distempering, Colour washing, Painting etc. Principles & Methods of building maintenance

Reference Books:

1. S K Duggal : Building Materials , New Age International
2. P.C. Varghese : Building Materials , PHI
3. P.C. Varghese : Building Construction , PHI
4. B.C. Funmia : A Text Book of Building Construction, Luxmi Publications, Delhi.
5. O.H. Koenisberger : “Manual of tropical housing and building” Orient Longman
6. S.P. Arora at al., “A Text Book of Building Construction - Dhanpat Rai & Sons,

TCE 303

Basic Surveying

L	T	P
2	1	0

Unit – I: Importance of surveying to engineers, plane and geodetic surveying, principles of surveying, classification of surveys (2)

Principles of different methods and their accuracies, measurement by tape, Reference meridians, bearing and azimuths, magnetic declination, compass, Vernier theodolite, temporary adjustments, measurements of horizontal angle, modern trends- EDM, electronic theodolites and Electronic Total Station. (4)

Unit – II: Methods of determining elevations, Direct levelling- basic terms and definitions, principle, booking and reduction of field notes, curvature and refraction, automatic levels, Contouring- methods and uses (4)

Definition, Principles of stadia systems, subtense bar and tangential methods (2)

Unit – III:

Elements of simple circular curves, theory and methods of setting out simple circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves (5)

Unit – IV

Principles of traversing by compass and theodolite, computations of traverse coordinates, Principles and classification of triangulation systems, strength of figures, satellite stations, intervisibility of stations, triangulation field work (5)

Principles, plane table equipments, methods, resection by three point problem (2)

Reference Books:

1. S K Duggal : Surveying Vol 1 & 2 , TMH
2. R Subramanian : Surveying & Leveling , Oxford University Press
3. B C Punamia : Surveying & Leveling
4. C Venkatramaih : Text Book of Surveying , University Press
5. H . Kanitkar : Surveying & Levelling

PCE-351

Fluid Mechanics Lab

L	T	P
0	0	2

1. To verify the momentum equation using the experimental set-up on diffusion of submerged air jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter, venturimeter, and bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
5. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
6. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
7. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.

PCE-352

BUILDING MATERIALS LAB

L	T	P
0	0	2

I. Cement (Two turns only)

1. Normal Consistency of cement.
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement by air permeability and Le-chatalier's apparatus.
5. Soundness of cement.
6. Tensile strength

II. Coarse Aggregate (Two turns only)

1. Crushing value of aggregate
2. Impact value of aggregate
3. Water absorption of aggregate
4. Sieve Analysis of Aggregate
5. Specific gravity & bulk density
6. Grading of aggregates.

III Fine Aggregate: (one turn only)

1. Sieve analysis of sand
2. Silt content of sand
3. Bulking of sand

IV) Destructive and non destructive testing on concrete

V) Physical and mechanical properties of reinforcing steel.

VI) Bricks: 1. Water absorption.

2. Dimension Tolerances
- 3 Compressive strength
4. Efflorescence

PCE 353

SURVEYING LAB

L	T	P
0	0	3

1. Study of different types of topographical maps and to prepare conventional symbols chart.
2. To measure bearings of a closed traverse by prismatic compass and to adjust the traverse by graphical method.
3. To find out reduced levels of given points using dumpy/Auto level.
4. To perform fly leveling with a Auto /tilting level.
5. To study parts of a vernier / Electronic theodolite and practice for taking angle measurements.
6. To measure vertical angle of given points by Electronic theodolite.
7. To measure horizontal angle between two objects by repetition method with three repetitions.
8. To measure horizontal angle by method of reiteration
9. To determine the elevation of chimney top by trigonometrical levelling by taking observations in single vertical plane.
10. To set out a simple circular curve by Rankine's method
11. To study various parts and practice with Wild T-2 micro-optic theodolite and EDM (Distomat DI-1600).

PCE-354

BUILDING PLANNING & DRAWING LAB

L	T	P
0	0	3

Drafting of following Using Any CAD software

1. Symbols used in Civil Engineering drawing, Masonry Bonds
2. Doors, Windows and staircases.
3. Plumbing & Electrical fitting drawing.
4. Comprehensive Drawing of Residential building (Layout, plan, elevation & sectional elevation, plumbing & electrical fillings in out)
5. Preparation of Layout planning of different civil engineering Projects.
7. Preparation of lay out plan/Maps and building drawing using computer

SCHEME OF EXAMINATION

For

B. Tech. Civil Engineering

YEAR II, SEMESTER –IV

(Effective from the session: 2010-2011)



Uttarakhand Technical University, Dehradun

COURSES AND EVALUATION SCHEME

B. Tech. Civil Engineering

YEAR II, SEMESTER –IV

(Effective from Session 2010-11)

Sl. No.	Course code	Subject	PERIODS			Evaluation Scheme			Subject Total	Credit	
						SESSIONAL EXAM		ESE			
			L	T	P	CT	TA	Total			
A) THEORY											
1	TCE-401	Hydraulics & Hydraulic Machines	3	1	0	30	20	50	100	150	4
2	TCE-402	Structural Analysis-I	3	1	0	30	20	50	100	150	4
3	TCE-403	Advanced surveying	3	1	0	30	20	50	100	150	4
4	TCE-404	Engineering Geology	2	1	0	15	10	25	50	75	3
5	TCE-405	Environmental Engineering-I	2	1	0	15	10	25	50	75	3
6	TCE-406	Concrete Technology	3	1	0	30	20	50	100	150	4
B) PRACTICAL / TRAINNG / PROJECT											
7	PCE-451	Hydraulics & Hydraulic Machines Lab	0	0	3	-	25	25	25	50	2
8	PCE-452	Advanced Survey Field work	0	0	3	-	25	25	25	50	2
9	PCE-453	Geology lab	0	0	2	-	25	25	25	50	1
10	PCE-454	Concrete Lab	0	0	2	-	25	25	25	50	1
11	GP-401	General Proficiency (NSS/NCC/Sports/Cultural)	-	-	-	-	-	50	-	50	-
TOTAL			16	06	10	-	-	-	-	1000	28

TCE 401 HYDRAULICS AND HYDRAULIC MACHINES

L T P
3 1 0

Unit I

Introduction: Difference between open channel flow and pipe flow, geometrical parameters of a channel, Velocity and pressure distribution in an open channel, Continuity equation. (3)

Uniform Flow: Chezy's and Manning's equations for uniform flow in open channel, Equivalent roughness, most efficient channel section, simple problems of compound channel sections. (5)

Unit II

Energy and Momentum Principles: Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions. (8)

Unit III

Non-Uniform flow in Open Channel: Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels. (6)

Mobile Bed Channel Hydraulics: Difference between rigid and alluvial channels, Incipient motion condition, Different approaches to study sediment motion, Tractive force approach, Shields curve, Types of bed forms or regimes of flow, characteristics and types of sediment load. (3)

Unit IV

Hydraulic Jump, Surges, Water Waves: Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Use of jump as an energy dissipater, End depth in a free overfall, Equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves. (5)

Hydraulic Pumps: Rotodynamic pumps, basic equations, axial and mixed flow pumps, cavitation in pumps, characteristics curves. (3)

Unit V

Hydraulic Turbines: Introduction, Rotodynamic Machines, Including elementary concept of bulb and tubular turbines pelton Turbine, equations for jet and roter size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, basic equation for type, Head on reaction turbine, basic equation for rotodynamic machines, similarity law and specific speed, cavitation characteristic curves. (8)

Reference Books:

- 1) Chow, V.T., "Open channel Hydraulics", McGraw Hill International
- 2) Ranga Raju, K.G., "Flow Through Open Channels", T.M.H.
- 3) Modi & Seth, "Fluid Mechanics & Fluid Machines".
- 4) R.K. Bansal, "Fluid Mechanics & Hydraulics Mechanics".
- 5) Henderson, F.M., "Open Channel Flow", McGraw Hill International
- 6) Subramanya, K., "Flow in Open Channels", Tata McGraw Hill
- 7) French, R.H., "Open Channel Hydraulics", McGraw Hill International
- 8) Graf, W.H., "Hydraulics of Sediment Transport", McGraw Hill International

TCE 402 STRUCTURAL ANALYSIS – I

L T P
3 1 0

Unit I

(3)

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

Unit II

(5)

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

Unit III

(8)

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

Unit IV

(8)

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

Unit V

(8)

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

Reference Books:

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

TCE 403

ADVANCED SURVEYING

L T P
3 1 0

Unit I

Triangulation and Trilateration

(8)

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

Unit II

Adjustment Computations

(8)

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

Unit III

Curves

(8)

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

Unit IV

Project Surveys

(5)

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

Field Astronomy

(3)

Astronomical terms, co-ordinate systems, Spherical trigonometry, Astronomical triangle, Relationship between coordinates.

Unit V

Photogrammetry and Remote Sensing

(5)

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

GPS and GIS

(3)

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

Reference Books:

1. Arora, K.R., "Surveying", Vol. II & III, Standard Book House, Delhi.
2. Punmia, B.C., "Surveying", Vol. II & III Laxmi Publications, New Delhi.
3. Chandra, A.M. "Higher Surveying", New Age International Publisher, Delhi
4. Lillesand, T.M. and Kiefer, R.W., "Remote Sensing and Image Interpretation".
5. Agor, R., "Surveying", Vol. II & III, Khanna Publications, Delhi.

6. Bannister, A. And Baker, R., "Solving Problems in Surveying", Longman Scientific Technical, U.K.
7. Kennie, T.J.M. and Petrie, G., "Engineering Surveying Technology", Blackie & Sons Ltd. London.
8. Duggal S.K., "Surveying", Vol. I & II TMH
9. Basak, "Surveying" TMH.
10. Kanetkar, "Surveying"
11. Chandra, A.M. "Plane Surveying", New Age International Publisher, Delhi

TCE 404 ENGINEERING GEOLOGY

L T P
2 1 0

Unit I

Earth Sciences and its importance in Civil Engg. Minerals and their physical properties. Study of common rock forming minerals. (4)

Internal structure of the earth. Suitability of rocks as engineering materials. Building stones occurrences and characteristics, selection (4)

Unit II

Stratification, Lamination bedding. Outcrop-its relation to topography, dip and strike of bed, overlap, outlier and inlier.

Rock deformation : Folds, Faults, joints unconformity and their classification, causes and relation to engg. Behaviour of rock masses. (7)

Unit III

Earthquake causes, classification, earthquake waves, intensity and magnitude, Seismic zones for India, Geological consideration for construction of building. (4)

Underground water, sources, Aquifer, Artesian well, Ground water provinces of India and its role as geological hazard. (4)

Unit IV

Geological investigations for site selection of dams & reservoirs, tunnels, bridges and highways. Reservoir induced seismicity.

Methods of Geophysical explorations-gravity, electrical and seismic, methods. (5)

Note: In tutorial class of this subject's, students shall practice for mineral & rock identifications

Reference Books:

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

8. F G Bell : Fundamentals of Engineering Geology , B S Publication
9. Tony Waltham : Fundamentals of Engineering Geology ,SPON Press

TCE – 405

ENVIRONMENTAL ENGINEERING – I

L	T	P
2	1	0

UNIT-1

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period.

Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply; intakes and their design for lakes, streams and rivers, impounding reservoir and canal; determination of the capacity of impounding reservoir. (7)

UNIT 2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures. (4)

UNIT 3

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.

Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply. (6)

UNIT 4

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows.

Storm water: Collection and estimation of storm water by different formulae. (6)

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines; small bore sewer systems. Planning of sewerage systems. Institutional and industrial wastewater management. (6)

Reference books:

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
4. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol- II).
5. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
6. Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban
7. Development, Government of India, New Delhi
8. Steel and McGhee: Water Supply and Sewerage
9. Fair and Geyer: Water Supply and Wastewater Disposal

10. Arceivala: Wastewater Treatment for Pollution Control
11. Hammer and Hammer Jr.: Water and Wastewater Technology
12. Raju: Water Supply and Wastewater Engineering
13. Sincero and Sincero: Environmental Engineering: A Design Approach
14. Pandey and Carney: Environmental Engineering
15. Rao: Textbook of Environmental Engineering
16. Davis and Cornwell: Introduction to Environmental Engineering
17. Kshirsagar: Water Supply and Treatment and Sewage Treatment Vol. I and II
18. Punmia: Water Supply and Wastewater Engineering Vol. I and II
19. Birdie: Water Supply and Sanitary Engineering
20. Ramalho: Introduction to Wastewater Treatment Processes
21. Parker: Wastewater Systems Engineering

TCE 406

CONCRETE TECHNOLOGY

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Unit-I: Concrete as a Building Material and its gradients :

(i) Cement: Manufacture of Portland Cement, its composition, Hydration of cement, physical and chemical properties, concept of strength development. Gel. space Ratio, Powers Law. Gel. structure.

(ii) Testing of Cement for general physical and chemical properties as per BIS specifications.

(iii) Different types of cement such as Slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties. (8)

Unit-II: Aggregates and Testing of Aggregates:

Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties. (7)

Unit-III: Production of Fresh Concrete:

(i) Proportioning of concrete, operations involved in concrete production, Workability, Factors Affecting workability, Measurement of workability. Problem of Segregation and bleeding and Laittance. (7)

(ii) Properties of Hardened Concrete.

Strength and durability, Factors affecting strength and durability of concrete. Mechanics of setting and hardening of concrete (4)

Unit-IV: Concrete Mix Design: principle and Methods, Statistical Quality control. Concrete Rheology, Maturity concept. (4)

Introduction to special concretes:

(a) Admixtures in concrete.

(b) Special concrete as lightweight concrete. High Density Concrete, Sulpher Impregmented concrete Polymer concrete, Lime concrete constituents and uses.

(c) High strength concrete (d) Fibre Reinforced Concrete (e) High performace concrete, Ready mix concrete and mass concrete (5)

Unit-V: Material testing and instrumentation:

Conventional vs. Non-Destructive Testing. Methods & Principles of NDT.

(4)

References

1. Rai Mohan and Jai Singh M.P. ?Advances in Building Materials and Construction-CBRI Roorkee.
2. Civil Engineering Materials ?Technical Teachers? Training Institute Chandigarh, Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Spence RJS and Cook DJ-?Building Materials in Developing Countries? John Wiley and Sons.
4. Shetty M.S. ?Concrete Technology, Theory and Practices.? S. Chand & Company Ltd., New Delhi.
5. Neville A.M., Properties of Concrete, Pitman Publishing Company.
6. Gambhir M.L. ?Concrete Technology? - Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Gambhir M.L. ?Concrete Manual? - Dhanpal Rai & Sons, Delhi.

PCE 451

HYDRAULICS AND HYDRAULIC MACHINES LAB

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List of Experiments

1. To determine the Manning's coefficient of roughness 'n' for the given channel bed.
2. To study the velocity distribution in an open channel and to find the energy and momentum correction factors.
3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir and study the pressure distribution on the upstream face of the weir.
6. To study the characteristics of free hydraulic jump.
7. To study the flow over an abrupt drop and to determine the end (brink) depth for a free over fall in an open channel.
8. To study rotodynamic pumps and their characteristics.
9. To study rotodynamic turbines and their characteristics.

