

Department: Civil Engineering
Programme: Diploma in Civil Engineering

Year I

Semester I

			L	T	P	C
PH	3102+	Physics – III-B	2	0	2	3
CY	3101+	Chemistry - III	3	0	2	4
HS	3101+	Communication Skills	2	0	2	3
MA	3101	Engineering Mathematics - I	3	1	0	4
ES	3100	Object Oriented Programming with C++	2	0	4	4
CE	3101	Fluid Mechanics-I	3	0	2	4
CE	3102	Engineering Mechanics	3	1	0	4
ME	3153*	Comprehensive Workshop-II	0	0	4	2
CE	3103*	Surveying - I	2	0	2	3
CE	3104*	Principles of Civil Engineering	3	0	0	3
CE	3151*	Engineering Graphics	0	0	4	2
						26

+ Bridge for 10+2 Vocational / NERIST Certificate

* Bridge for 10+2 PCM.

Semester II

			L	T	P	C
ES	3200	Environment and Ecology	3	0	0	3
PH	3202	Physics IV-B	2	0	2	3
CY	3202	Engineering Chemistry –IA	3	0	2	4
MA	3201	Engineering Mathematics - II	3	1	0	4
CE	3201	Mechanics of Solids	3	1	2	5
CE	3202	Surveying - II	3	0	2	4
						23

Year II

Semester I

			L	T	P	C
HS	4101	Principles of Economics	3	0	0	3
CE	4101	Structural Analysis - I	3	1	2	5
CE	4102	Water Resources Engineering - I	3	0	2	4
CE	4103	Geotechnical Engineering - I	3	0	2	4
CE	4104	Environmental Engineering - I	3	0	2	4
CE	4105	Concrete Technology	3	0	2	4
ME	4121	Principles of Mechanical Engineering	3	1	0	4
						28

Semester II

CE	4201	Design of RCC Structures - I	3	1	0	4
CE	4202	Design of Steel Structures - I	3	1	0	4
CE	4203	Transportation Engineering - I	3	0	2	4
CE	4204	Building Planning and Drawing	2	0	4	4
CE	4205	Construction Management and Accounts	2	0	0	2
CE	40**	Elective	3	1	0	4
CE	4299	Project	0	0	6	3
ED	4288	Extra Curricular Activities and Discipline	0	0	0	2
						25+2

Electives:

CE 4001 Construction Methods and Machinery
CE 4002 Water Resources Management
CE 4003 Architecture and Town Planning
CE 4005 Rural Water Supply and Sanitation
CE 4006 Biological Waste Water Treatment
CE 4007 Elements of Foundation Engineering
CE 4009 Environmental Management

COURSE CONTENTS**CE 3101 Fluid Mechanics I : 4 Credits (3-0-2)**

Unit I	Properties of fluid: mass density, relative density, viscosity, fluid pressure, pressure head. Fluid statics - Pressure at a point, units of measurement, manometers, forces on plane areas, line of action of force, force components on curved surfaces	10 lectures
Unit II	Fundamentals of fluid flow - steady, unsteady, uniform, non-uniform, one dimensional, two dimensional and three dimensional flows; Streamline, stream tube, irrotational flow, velocity potential, stream function, flow net, motion of a fluid element, acceleration of a fluid particle in a velocity field, fluid rotation, fluid deformation, .equation of continuity, energy equation and its applications. .	10 lectures
Unit III	Fluid flow in pipes - Reynolds number, critical velocity, laminar flow, turbulent flow, shearing stresses at pipe wall, velocity distribution, loss of head for laminar flow, steady incompressible flow through simple pipe systems, Darcy - Weisbach equation, Moody diagram, simple pipe flow problems, losses of head for sudden expansion and sudden contraction, various fittings.	10 lectures
Unit IV	Fluid measurements - velocity measurement, Pitot tube, coefficient of discharge, coefficient of velocity, coefficient of contraction, orifices, orifice meter, venturimeter, time to empty tanks, weirs and notches.	6 lectures
Unit V	Introduction to open channel flow - prismatic and non-prismatic channels, equation of continuity for steady flow, uniform flow, Manning's formula, simple problems of steady uniform flow in rectangular and trapezoidal channels.	6lectures

Books :

1. Hydraulics and Fluid Mechanics including Hydraulics Machines, Modi, P.N. and S.M. Seth, Standard Book House, Delhi, 1998.
2. Theory and Problems of Fluid Mechanics, Subramanya, K, Tata McGraw Hill, New Delhi, 1993.
3. Fluid Mechanics through Problems, Garde R.J. , New Age International, New Delhi., 1989.
4. A Text Book of Fluid Mechanics, Rajput, R.K. , S. Chand & Co, New Delhi., 1998.
5. Fluid Mechanics Hydraulics & Hydraulic Machines, Arora, K.R. , Standard Publishers & Distributions, Delhi., 1999.

CE 3102 Engineering Mechanics: 4 Credits (3-1-0)

Unit I	Equilibrium in Space: Forces in space, Rectangular components of a force in space, Unit vectors, Force defined by its magnitude and two points on its line action, Addition of concurrent forces in space, Equilibrium of a particle in space.	8 lectures
Unit II	Trusses, Frames and Machines: Simple, compound and complex trusses, Method of Joints, Zero-force members, Method of sections, Structures containing multi-force members, Analysis of determinate frames, simple machines.	10 lectures
Unit III	Principle of Virtual Work - Displacements, work due to a force and a couple, virtual displacement, applications; Potential energy and stability - Conservative systems and potential energy, Gravitational and elastic potential energy, Principles of potential energy, Stability of equilibrium.	8 lectures

Unit IV	Distributed Forces: Center of gravity of a two dimensional body, Centroid of areas, First moment of areas, Center of gravity of composite areas, Resultant of a general distributed force system, Moment of Inertia of an area, Radius of gyration of an area, Parallel axis theorem, Moment of Inertia of composite areas.	8 lectures
Unit V	Plain Kinematics of Rigid Bodies - Translation, rotation and general plane motion, velocities in relative motion, instantaneous center of velocity, accelerations in relative motion.	8 lectures

Books:

1. Vector Mechanics for Engineers, Statics and Dynamics, Beer and Johnston, Tata McGraw Hill, New Delhi, 1999.
2. Engineering Mechanics, Statics and Dynamics, Hibbeler, Pearson Education Asia Pvt. Ltd., New Delhi, 1997.
3. Engineering Mechanics, Statics and Dynamics, Meriam and Kraige, John Wiley & Sons INC, N.Y., 1997.
4. Engineering Mechanics, S Timoshenko, D H Young, and J V Rao, Tata McGraw Hill, New Delhi 2007
5. Engineering Mechanics, S S Bhavikatti and K G Rajashekharappa, John Wiley, NY, 1994.

CE 3103 Surveying I: 3 Credits (2-0-2)

Unit I	Introduction, classification of survey, chain surveying - principle, instruments used, procedure, Problems and errors in chain survey.	7 lectures
Unit II	Compass surveying: types, description and uses, measurement of bearings in WCB and QB systems, local attraction and related problems.	7 lectures
Unit III	Plane table surveying: methods of plane tabling, two- point and three- point problems and their solutions, errors in plane tabling.	7 lectures
Unit IV	Leveling: leveling principles, booking and reduction of levels, different types of leveling, related problems and practices.	7 lectures

Books:

1. Surveying Vol. I, B.C.Punamia, Laxmi Publications, New Delhi, 2005.
2. Surveying Vol. I, S.K.Duggal, Tata McGraw Hill, New Delhi, 1996.
3. Surveying and Levelling Vol. I, T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Parkashan Pune, 2000
4. Surveying & Levelling, Rangwala, Charotar Publishing House, Anand, India, 2014.
5. Surveying Vol.I, Dr. K.R. Arora, Standard Book House, Delhi, 2013.

CE 3104 Principles of Civil Engineering: 3 Credits (3-0-0)

Unit I	Stones, bricks, tiles. Lime, cement, sand, concrete.	7 lectures
Unit II	Steel, timber, paints, bituminous materials, etc.	7 lectures
Unit III	Foundation, masonry works, lintels.	7 lectures
Unit IV	Doors windows, roofs. Flooring damp proofing, plastering etc.	7 lectures
Unit V	Unit of measurements and payments, Methods of estimates & examples, Preparation of detailed estimates of earthwork, masonry, concreting, flooring. plastering, white washing and painting, wood and steel work, RCC work and sanitary fittings.	7 lectures
Unit VI	Estimate preparation for buildings, roads, culverts, water tank, septic tank and retaining wall, etc.; Rate analysis for construction, materials and various items of work.	7 lectures

Books:

1. Building Construction, Sushil Kumar, Standard Publications, Delhi, 1999.
2. Engineering Materials, Sushil Kumar, Standard Publications, Delhi, 1999.
3. Building Construction Vol-I to IV, W.B. Mackey, Orient Longman, Mumbai, 1993.
4. Text Book of Concrete Technology, P.D. Kulkarni, R.K. Ghosh & Y.R. Phull, New Age International, New Delhi,
5. Estimating & Costing in Civil Engineering, B.N. Dutta, UBS Publishers Distributors Ltd., New Delhi 1, 1998.
6. Estimating & Costing Professional Practice, S.C. Rangwala, Charotar Publishing House, Anand, India, 1995.
7. Quantity Surveying: Estimating and Costing, P L Bhasin, S Chand & Co, Delhi, 1982.
8. Estimating, Costing, Specifications & Valuation, M Chakroborty, Author, Calcutta, 1992.

CE 3151 Engineering Graphics: 3 Credits (0-0-6)

Lines lettering & dimensioning; Engineering curves: Conic sections, Cycloid, Involute, Spiral, Helix etc.
Projection of Points straight lines & planes.
Projection of solids, auxiliary views, and sectional views.
Development of surfaces, and Isometric drawings/views.

Books:

1. Elementary Engineering Drawing, N.D. Bhatt and V. M. Panchal, Charotar Publishing House, Anand, 2000.
2. Engineering Drawing, Venugopal, Wiley Eastern Ltd, New Delhi, 1992.
3. Engineering Drawing & Graphic Technology, French T.E., Vierck C.J. & Forester R.J., McGraw Hill International, Singapore, 1993.

CE 3201 Mechanics of Solids: 5 Credits (3-1-2)

Unit I	Mechanical Properties of Material, Axial Load, Direct shear, and Torsion: Stress-strain diagram for mild steel in tension and compression, Elastic behavior, Yield point, Strain hardening point, Stress-strain behavior of brittle materials, Hooke's law, Modulus of Resilience, Modulus of toughness, Poisson's ratio, Elastic deformation of an axially loaded member, Thermal stress, Direct shear stress, Shear strain, Modulus of rigidity, Torsion of a circular shaft, Power transmission, Deformation of a circular shaft, Angle of twist.	8 lectures
Unit II	Shear and Bending Moment Diagrams, Pure Bending: Shear force and bending moment at any point along the length of a beam, Regions of distributed loads, Concentrated loads and moments, Shear force and bending moment diagrams, Bending of a straight beam, Simple beam theory, Bending stress and its distribution, Composite beams, Transformed section.	10 lectures
Unit III	Transverse Shear: Shear on the horizontal face of a beam element, Horizontal shear per unit length, Transverse shear stress, The shear formula, Distribution of shear stress on the cross-section of a beam, Shear stress in the web of a thin walled section.	6 lectures
Unit IV	Plane Stress Transformation: General equation of transformation of plane stress, Principal stresses- magnitudes and their planes, Max shear stress and its plane, Mohr circle for plane stresses, Analytical and graphical solution of problems of plane stress.	6 lectures
Unit V	Deflection of Beams: Deformation of a beam under transverse loading,, The elastic curve, Moment-curvature relationship, Slope and deflection by direct integration, Boundary and continuity conditions, Equation of the elastic curve, Maximum deflection.	6 lectures
Unit VI	Columns: Euler's load for pin – ended columns, Columns with other end conditions, Critical load, Slenderness ration, Effective length, Ratio of effective length and slenderness ratio, Eccentric loading and Secant formula, Euler's curve.	6 lectures

Books:

1. Elements of Strength of Materials, Timoshenko and Young, EWP, New Delhi, 1968
2. Strength of Material, G.H. Ryder, MacMillan, ELBS, London, 1969.
3. Engineering Mechanics of Solids, E.P. Popov, Prentice Hall of India, New Delhi, 1990.
4. Mechanics of Materials, Gere & Timoshenko, CBS Publications, New Delhi, 1984.
5. Strength of Material, Andrew Pytel and Ferdinand L. Singer, Harper Collins Publishers, India, New Delhi, 1991.

CE 3202 Surveying II: 4 Credits (3-0-2)

Unit I	Contouring; Principles, methods and applications, contour gradient.	6 lectures
Unit II	Theodolite-description and adjustment of transit theodolite, measurement of angles and setting out lines. Introduction of Total Station.	10 lectures
Unit III	Trigonometrical leveling- Height and distance of objects with accessible and inaccessible base, Terrestrial refraction, determination of difference in elevation.	8 lectures

Unit IV	Tacheometry - Principles, field observations, reduction of readings, applications.	8 lectures
Unit V	Curve surveying - different methods of setting out curves – simple curves, compound curves, reverse curve, transition curve & vertical curves, related practice.	10 lectures

Books:

1. Surveying Vol.-I & II, B.C. Punamia, Laxmi Publications, New Delhi, 1994.
2. Surveying & Levelling, Vol.I & II, T.P. Kanetkar & S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune, 1985
3. Surveying Vol.-I & II, S.K. Duggal, Tata McGraw Hill, New Delhi, 1996.

CE 3221 Surveying for Forestry: 4 Credits (3-0-2)

Unit I	Contouring; Principles, methods and applications, contour gradient.	8 lectures
Unit II	Theodolite-description and adjustment of transit theodolite, measurement of angles and setting out lines.	8 lectures
Unit III	Trigonometrical leveling- Height and distance of objects with accessible and inaccessible base, Terrestrial refraction, determination of difference in elevation.	8 lectures
Unit IV	Tacheometry - Principles, field observations, reduction of readings, applications.	8 lectures
Unit V	Curve surveying - different methods of setting out curves – simple curves, compound curves, reverse curve, related practice.	10 lectures

Books:

1. Surveying Vol.-I & II, B.C. Punamia, Laxmi Publications, New Delhi, 1994.
2. Surveying & Levelling, Vol.I & II, T.P. Kanetkar & S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune, 1985
3. Surveying Vol.-I & II, S.K. Duggal, Tata McGraw Hill, New Delhi, 1996.

ES 3200 Environment and Ecology: 3 Credits (3-0-0)

Unit I	Basic Concept of Environment and Ecology: Introduction, types of environment, components of environment, environmental studies, need for public awareness, Introduction to ecosystem, classification of ecosystem, structure of ecosystems, functioning of ecosystems, balance of ecosystems.	8 lectures
Unit II	Environmental Impact of Human Activities: Impact of industrialization, modern agriculture, housing, mining, and transportation on environment.	6 lectures
Unit III	Natural Resources: Classification of natural resources, water resources, mineral resources, forest resources, material cycles, energy resources, electromagnetic radiation.	8 lectures
Unit IV	Environmental Pollution: Types of environmental pollution, water pollution, waterborne diseases, land pollution, noise pollution, air pollution, automobile pollution, effects of environmental pollution, public health aspects, solid waste management.	9 lectures
Unit V	Current Environmental Issues: Population growth, global warming, climate change, urbanization, acid rain, ozone layer depletion, animal husbandry..	5 lectures
Unit VI	Environmental Protection: Role of Government, Legal aspects, initiatives by NGOs, environmental education, women's education	6 lectures

Books:

1. Textbook of Environment & Ecology – Dave, D. and Katewa, S. S., Cenage Learning India Pvt. Ltd, Delhi. 2010.
2. Textbook of Environmental Studies – Bharucha, E., Universities Press (India) Pvt. Ltd., Hyderabad. 2010.

- Environmental Studies: From Crisis to Cure – Rajgopalan, R., Oxford University Press, New Delhi. 2008.
- Fundamentals of Ecology – Dash, M. C. and Dash, S. P., Tata McGraw Hill Education Private Limited, New Delhi. 2009.
- Principles of Environmental Science & Engineering – Rao, P. V., PHI Learning Pvt. Ltd., New Delhi. 2009.
- Elements of Environmental Science & Engineering – Meenakshi, P., PHI Learning Pvt. Ltd., New Delhi. 2009.
- Environmental Science & Engineering – Debi, A. University Press (India) Pvt. Ltd. Hyderabad. 2008.

CE 4101 Structural Analysis: 5 credits (3-1-2)

Unit I	Deflection of Beams: Bernoulli-Euler beam equation, Slope and Deflection by Moment- Area and Conjugate Beam methods.	8 lectures
Unit II	Deflection of Beams, Trusses and Frames by Work-Energy Methods: Principal of virtual displacements for rigid bodies, Principal of virtual displacements for deformable bodies, Principal of virtual forces for deformable bodies, Deflection of beams by virtual work method, Deflection of pin-jointed truss joints, Effect of temperature change and fabrication errors, Deflection of determinate frames by the virtual work, Principal of conservation of energy, Strain energy due to axial loads and moments, Castigliano's theorems, Application of Castigliano's second theorem to beams, trusses and frames, Betti's law and Maxwell's law of reciprocal deflection.	12 lectures
Unit III	Cables and Arches: Cables subjected to concentrated loads and uniformly distributed loads, Three Hinged Arch, Three-hinged trussed arch, Tied three-hinged trussed arch.	6 lectures
Unit IV	Influence Line Diagrams for Statically Determinate Structures: ILD for Reaction, Shear, Bending Moment at a point, for determinate beams, floor girder, arches and member force in trusses.	10 lectures
Unit V	Introduction to Statically Indeterminate Structures: Degree of indeterminacy and stability, principles of superposition, Analysis of indeterminate beams with single degree of indeterminacy by Consistent Deformation Method..	6 lectures

Books:

- Structural Analysis, 6th Edition, R C Hibbeler, Pearson Education, New Delhi, 2008.
- Structural Analysis, Aslam Kassimali, PWS Publishing, 1999.
- Basic Structural Analysis, C S Reddy, Tata McGraw Hill, New Delhi, 1996.
- Elementary Structural Analysis, S. Utku, C H Norris, and J.B. Wilbur, McGraw Hill, N.Y., 1991.
- Theory of Structures, Timoshenko and Young, McGraw Hill, N.Y., 1965.

CE 4102 Water Resources Engineering I: 4 Credits (3-02)

Unit I	Hydrological cycle - precipitation, measurement of precipitation, mass curve, hydrograph, point rainfall, depth-area-duration relationships, depth area duration curve, maximum intensity duration frequency curve. evapotranspiration and infiltration.	10 lectures
Unit II	Stream flow measurement, measurement of stage and velocity; Rainfall - runoff characteristics, rainfall runoff correlation, flow duration curve, flow mass curve. Hydrographs - definition, influencing factors and components of a hydrograph, base flow separation, effective rainfall, unit hydrograph, use and limitations.	12 lectures
Unit III	Groundwater - forms of surface water, aquifer, aquitard, aquiclude, aquifuse; Aquifer properties, specific yield and specific retention, Darcy's law, hydraulic conductivity, transmissibility - steady flow in a well.	10 lectures
Unit IV	Crops and crops season; Soil - water relationships, field capacity, consumptive use, requirement and frequency of irrigation; Canal irrigation, Canal outlets. Water logging and Canal lining. River training works.	10 lectures

Books :

- Engineering Hydrology, Subramanya, K., Tata McGraw Hill, New Delhi, 2006.
- Hydrology, Principles, Analysis and Design, Raghunath, H.M., New Age International, New Delhi, 1985.
- Applied Hydrology, Chow, VT, D R Maidment and L W Mays, McGraw Hill Book Company, New York, 1988.
- Elementary Hydrology, Singh, V.P., Prentice-Hall India, New Delhi, 1994.

5. A Text Book of Hydrology, Rani Reddi, P.J., Laxmi Publications, New Delhi, 1999.
6. Irrigation and Water Power Engineering. Punmia, B.C. and Pandey, B.B. Lal, Laxmi Publication, Delhi, 1986.
7. Irrigation Engineering, Asawa, G.L., New Age International, New Delhi, 1993.

CE 4103 Geotechnical Engineering I: 4 Credits (3-0-2)

Unit I	Introduction; Preliminary definitions and relationships; Index properties of soils; Classification of soils.	10 lectures
Unit II	Soil structure and Clay mineralogy; Soil compaction; Flow of water in soils: permeability and seepage.	8 lectures
Unit III	Effective stress concepts; Stress distribution in a soil mass; One-dimensional consolidation of soil.	8 lectures
Unit IV	Shear strength of soils: theoretical considerations and tests.	8 lectures
Unit V	Introduction to shallow and deep foundations; Introduction to soil exploration.	8 lectures

Books :

1. Principles of Soil Mechanics and Foundation Engineering, Murthy, V.N.S., UBSPD, New Delhi, 2001.
2. Principles of Geotechnical Engineering, Das, B.M., PWS and ITP Pub. Company, London, 1998.
3. Soil Engineering Part-I: Fundamentals and General Principles, Singh, Alam and Chowdhary, G.R., CBS, New Delhi, 1994.
4. Soil Mechanics and Foundation Engineering, Punmia, B.C., Standard Book House, Delhi, 2001.
5. Principles of Foundation Engineering, Das, B.M., Bostova Cole Publishing Co, London, 1999.

CE 4104 Environmental Engineering-I: 4 Credits (3-0-2)

Unit I	Introduction, Estimation of quantity of water, per capita demand, design period, population forecasting.	8 lectures
Unit II	Sources of water and their suitability with regard to quality & quantity, storage capacity of reservoirs, water quality parameters, standards.	8 lectures
Unit III	Treatment of water- screenings, sedimentation, aeration, coagulation and flocculation, filtration & disinfection, Storage Reservoir, distribution system, methods of water supply.	8 lectures
Unit IV	Sewerage system, estimation of quantity of sewage, dry weather flow (DWF), wet weather flow (WWF), variation in flows, hydraulic design of sewers, pumping of sewage.	8 lectures
Unit V	Characteristics of sewage, strength of sewage, population equivalent, treatment of sewage- primary and secondary treatments, oxidations ponds, sewage disposal, self-purification of streams, sludge digestion and disposal, concept of air pollution control.	10 lectures

Books :

1. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publications, Delhi, 2009.
2. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi, 2009.
3. Environmental Engineering, Peavy, Tachobanoglous & Rowe, McGraw Hill International, N.Y., 1985.
4. Wastewater Engineering: Treatment, Disposal and Reuse, Metcalf & Eddy, Tata McGraw Hill, New Delhi, 2003.
5. Water Supply Engineering (Environmental Engineering Vol. I): P. N. Modi, Standard Book House, N. Delhi. 2010.
6. Water Supply & Sanitary Engineering, G.S. Birdi and J.S. Bindie, Dhanpat Rai Publishing Co., New Delhi, 1998.

CE 4105 Concrete Technology: 4 Credits (3-0-2)

Unit I	Concrete: Importance, grades, Ingredients, Cement: Objective, Composition, Varieties and respective advantages; Aggregates: Objectives, Classification, Characteristics and properties of aggregates; Water: Quality, Mixing and Curing. Admixtures: Objective, Types of admixture and compounds.	10 lectures
Unit II	Quality Control - Influencing Parameters, advantages, measure of variability and	7 lectures

	Statistical Quality Control, Yield of concrete, Concrete mix proportioning using BIS and IRC methods	
Unit III	Production of concrete: Batching, mixing, transporting, placing, compacting, finishing, curing; operations involved in pavement concreting.	5 lectures
Unit IV	Rheology of fresh concrete, Properties of fresh and hardened concrete.	10 lectures
Unit V	Special Concrete - Ferro-Cement, Polymer Concrete Composites, Lightweight, Heavy weight concrete, Fibre reinforced concrete, Dry lean concrete, Pavement quality concrete, Roller compacted concrete, Mass concrete, Guniting.	10 lectures

Books:

1. Concrete Technology, A. M. Neville and J. J. Brooks, Pearson Education Asia, 1999.
2. Concrete Technology, M L Gambhir, Tata McGraw Hill, New Delhi, 1995.
3. Concrete Technology, P. D. Kulkarni, R. K. Ghosh and Y. R. Phull, New Age International, New Delhi, 1998.
4. Concrete Technology, M S Shetty, S. Chand & Company, New Delhi, 2005(e).
5. Concrete for Construction, V K Raina, Tata McGraw Hill, New Delhi, 1988.
6. Concrete Technology, A. R. Santhakumar, Oxford University Press, New Delhi, 2007.
7. IS 16415: 2015, Composite Cement – Specification, BIS.
8. IS 456: 2000, Plain and Reinforced Concrete - Code of Practice, (4th Revision), BIS.
9. IS 10262: 2009, Concrete Mix Proportioning – Guidelines BIS.
10. IS 383, 1970, Specification for Coarse and Fine Aggregates from Natural Sources for Concrete, BIS.
11. Concrete Manual: Laboratory Testing for Quality Control of Concrete, M L Gambhir, Dhanpat Rai & Sons, New Delhi, 1987

CE 4201 Design of RCC Structures - I: 4 Credits (3-1-0)

Unit I	Introduction to design; Concrete and Reinforced Concrete. Philosophy of Limit State Design; Different limit states. Characteristic strengths and loads; codal provisions; design values/parameters.	8 lectures
Unit II	Design for flexure of singly and doubly reinforced rectangular beams.	8 lectures
Unit III	Design for flexure of flanged beams T and L beams.	6 lectures
Unit IV	Design of beams for shear, torsion, development and bond, control of deflections in beams and slabs.	6 lectures
Unit V	One way, Two way and Continuous slabs.	8 lectures
Unit VI	Axially loaded short and long columns. Uniaxial bending of columns, Isolated footings.	6 lectures

Books:

1. Limit State Design of Reinforced Concrete, 2nd Edition, P C Varghese, Prentice Hall of India, New Delhi, 2002.
2. Reinforced Concrete Design, 2nd Edition, S Unnishrishna Pillai and Davdas Menon, Tata McGraw Hill, New Delhi, 2003.
3. Design of Reinforced Concrete Design, N Subramanian, Oxford University Press, New Delhi, 2013
4. Limit State Design of Reinforced Concrete, B C Punmia, Ashok K. Jain and Arun K Jain, Laxmi Publications, Delhi, 2007.
5. IS: 456-2000, Code of Practice for Plain and Reinforced Concrete, BIS, New Delhi.
6. SP 16 Design Aids to IS 456 1978, BIS, New Delhi
7. SP 24 Explanatory Handbook on IS 456 Code of Practice for Plain and Reinforced Concrete, BIS, New Delhi.
8. SP 34 Handbook on Concrete Reinforcement and Detailing, BIS, New Delhi

CE 4202 Design of Steel Structures-I: 4 Credits (3-1-0)

Unit I	Properties of steel and rolled steel sections. Design of riveted connections.	7 lectures
Unit II	Design of welded and bolted connections.	7 lectures
Unit III	Design of tension and simple compression members.	7 lectures
Unit IV	Design compression members with splicing, lacing, and battening.	7 lectures

Unit V	Design of Beam-Column connections; Design of laterally supported beams.	7 lectures
Unit VI	Column bases and foundations and Roof trusses.	7 lectures

Books:

1. Design of Steel Structures, L.S. Negi, Tata McGraw Hill, New Delhi, 1996.
2. Design of Steel Structures Vol. I, 10th Edition, Ram Chandra, Standard Book House, Delhi, 2006
3. Design of Steel Structures, P Dayaratnam, Wheeler Publishing, Allahabad, 1990.
4. Steel Structures, A S Arya and J L Azmani, Nem Chand & Brothers, Roorkee, India, 1996.
5. Structural Design in Steel, Sarwar Alam Raj, New Age Publications, New Delhi, 2002.
6. Design of Steel Structures, Kazmi and Jindal, Prentice Hall of India, New Delhi, 1987.

CE 4203 Transportation Engineering I: 4 Credits (3-0-2)

Unit I	Roads: Introduction, Highway development in India, Classification of Road patterns, Master Plan, Road Network and Characteristics.	6 lectures
Unit II	Geometric Design of Highways - Factors, cross-section elements, sight distances, horizontal and vertical curves, and transition curves, Related Practice.	10 lectures
Unit III	Traffic Engineering: Introduction, traffic characteristics, traffic sign and signal, traffic control devices.	10 lectures
Unit IV	Railways: Geometrics for Broad Gauge, Cant deficiency, Sleeper Density, Design of Ballast Depth. Points and Crossings, Station and Yards, Signals.	10 lectures
Unit V	Airport: Characteristics, Planning considerations.	6 lectures

Books:

1. Highway Engineering, S K Khanna , C E G Justo and A.Veeraraghavan, Nem Chand & Brothers, Roorkee, India, 2015.
2. Principles of Transportation Engineering, P. Chakroborty and A. Das, Prentice Hall of India Pvt. Ltd., 2003.
3. Railway Engineering, Chandra, Satish, Agarwal, M.M., OXFORD University Press, New Delhi, 2013.
1. A Text Book of Railway Engineering, Arora and Saxena, Dhanpat Rai & Sons, New Delhi, 2010.
2. Airport: Planning and Design, Khanna and Arora, Nem Chand & Brothers, Roorkee, India, 1990.

CE 4204 Building Planning and Drawing: 4 Credits (2-0-4)

Unit I	Model Building Byelaws for urban centres in plain and hilly region, Growing Environmental concerns, Increased Safety and Security measures, Technological Developments, Swachh Bharat Mission, Development permission; site planning.	7 lectures
Unit II	Planning for utility - Principles of building planning for utility, aspects, prospect, grouping, circulation, privacy, furniture layout, sanitation, elegance, economy flexibility.	7 lectures
Unit III	Planning for Aesthetic - Principles of architecture, Quality of architecture, factors in architecture etc.	7 lectures
Unit IV	Planning and designing of different types of buildings: residential building, school building, library building, auditorium building hotel building, bus stand etc.	7 lectures

Books:

1. Model building bye laws, Town and Country Planning Organisation, Ministry of Urban Development, New Delhi, 2016.
2. National Building Code, Part I, BIS, 2005.
3. Planning and Designing of Residential Buildings, Y.N. Raja Rao & YSubrahmanyam, Standard Publisher, New Delhi, 2000.
4. Planning and Designing Buildings, Y.S. Sane, Engineering Book Publishing Co., Pune, 1959.
5. The Great Ages of World Architecture, G.K. Hiraskar, Dhanpat Rai & Sons, New Delhi, 1994.
6. Time Saver Standard: Architectural Design Data, Callender, McGraw Hill International, Singapore, 1982.
7. Time Saver Standard: Building Types, De Chiara and Callender, McGraw Hill International, Singapore, 1990..

CE 4205 Construction Management and Accounts: 2 Credits (2-0-0)

Unit I	Scientific management, Need of management, function and application of	7 lectures
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	management, organization, site and construction management.	
Unit II	Control and monitoring of progress, Cost control, Inspection and quality control.	7 lectures
Unit III	Network analysis, PERT and CPM.	6 lectures
Unit IV	Labour welfare and labour law. Departmental procedure and accounts, PWD accounts. Stores and material management.	8 lectures

Books:

1. Construction Management and Accounts, Harpal Singh, Tata McGraw Hill, New Delhi, 1981.
2. Construction Management Practices, V K Raina, Tata McGraw Hill, New Delhi, 1988.
3. Management in Construction Industry, P.P.Dharwadker, Oxford & IBH, New Delhi, 1979.
4. Construction Planning & Management, P.S. Gahlot & B.M Dhir, New Age International, New Delhi, 1992.

CE 4226 Basics of Civil Engineering: 4 Credits (3-0-2)

Unit I	Surveying: chain, compass, plane table surveying and leveling. Related practices.	12 lectures
Unit II	Building Construction: foundation, masonry work, concrete and RC elements in buildings, doors and windows, roofs, finishes; Industrial structures; Machine foundations.	10 lectures
Unit III	Water supply and Sanitary services: sources of water supply, conveyance of water through pipes, pumping, principles of water and waste water treatment, working and construction of septic tanks and soak pits.	10 lectures
Unit IV	Elements of roads, railways and bridges.	10 lectures

Books :

1. Surveying Vol.I, B.C. Punmia, Laxmi Publications, New Delhi, 2005.
2. Surveying and Levelling Vol.I, T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Parkashan Pune, 2000
3. Building Construction, Sushil Kumar, Standard Publishers, Delhi, 2015.
4. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publications, Delhi, 2010.
5. Environmental Engineering Vol. II: Sewage Disposal & Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi, 2010.
6. Elements of Civil Engineering, Dr. Anurag Kandyia, Charotar Publishing House, Anand, India, 2015.

CE 4001 Construction Methods and Machinery: 4 Credits (3-1-0)

Unit I	Engineering and construction economy, steps involved in construction.	8 lectures
Unit II	Supervision of concreting in hot and cold climate, quality control, precautions to be taken in construction of highrise buildings.	8 lectures
Unit III	Erection of steel structures. Use of compressed air in construction.	10 lectures
Unit IV	Standard and special equipments, Selection, operation and maintenance of equipments.	8 lectures
Unit V	Construction accidents; types and causes, effective preventive measures.	8 lectures

Books:

1. Construction Equipments, Job Planning, S.V. Deodhar, Khanna Publishers, New Delhi, 1988.
2. Construction of Structures & Management of Works, S.C. Rangawala, Charotar Publishing House, Anand, India, 1985.
3. Construction Planning Equipments and Methods, R.L. Peurifoy, W B Ledbetter and C J Schexnayder, McGraw Hill, NY, 1996.

CE 4002 Water Resources Management : 4 Credits (3-1-0)

Unit I	Water resources development: Socio-economic objective, Social cost-benefit, Environmental and ecological objectives.	7 lectures
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Unit II	Evaluation criteria, Watershed functional analysis.	7 lectures
Unit III	Soil-sub system analysis, Groundwater sub-system, Stream flow generation.	7 lectures
Unit IV	Agricultural demand; Water conveyance and distribution, reservoir system.	7 lectures
Unit V	Conjunctive surface and groundwater. Management of river basin.	7 lectures
Unit VI	Drainage requirements: Drainage system management, Wasteland development for agriculture recreation.	7 lectures

Books :

1. Watershed Management, Murthy, J.V.S., New Age International, New Delhi, 1994.
2. Land and Water Management Engineering, Murthy, V.V.N., Kalyani Publications, New Delhi, 1985.
3. Watershed Management, V V D Narayana, G Sastry, and U S Pattanaik, ICAR Publication and Information Div, New Delhi, 1997.

CE 4003 Architecture and Town Planning: 4 Credits (3-0-2)

Unit I	Brief history of architecture, evolution of structural forms, Impact of materials and construction technique; Philosophy of architectural design.	7 lectures
Unit II	Functional and Aesthetic requirements, scale & proportion, colour, texture, composition of space etc. Modern architecture.	7 lectures
Unit III	Acoustics of auditorium, lighting of buildings like school, hospital, and library, Interior decoration & Landscape Architecture.	7 lectures
Unit IV	Principles of urban planning, land-use pattern, population density.	7 lectures
Unit V	Services & transportation, concept of habitat including environment problem of metropolis.	7 lectures
Unit VI	Satellite town, concept garden city, integrated growth, housing, master plan, neighborhood planning & action plan.	7 lectures

Books:

1. Planning & Designing Building, Y.S. Sane, Engineering Book Publishing Co. Pune, 1959.
2. Fundamentals of Town Planning, G.K. Hiraskar, Dhanpat Rai & Sons. New Delhi, 1989.
3. Town Planning, R.C. Rangwala, Charotar Publishing House, Anand, India, 1999.
4. Urban Pattern, A.B. Gallion, CBS Publications, New Delhi, 1986.
5. The Great Ages of World Architecture, G.K. Hiraskar, Dhanpat Rai & Sons, New Delhi, 1994.
6. Development Control Rules for Class A Town, Respective Municipal Corporation/ N.B.C., Latest Publication.
7. National. Building Code, B I S.

CE 4005 Rural Water Supply and Sanitation: 4 Credits (3-1-0)

Unit I	Sources: Selection of sources, surface sources - springs, streams, rivers, lakes, ponds etc., under ground sources; wells and tube wells.	8 lectures
Unit II	Quality aspects of rural water supply, Examination of water quality parameters- physical, chemical and biological parameters and their significance.	8 lectures
Unit III	Design considerations for rural water supply schemes, Appropriate technology in rural water supply, Design, treatment and distribution of water.	10 lectures
Unit IV	Rural Sanitation: Refuse collection and disposal, sanitary latrines, privies, protection of water sources.	8 lectures
Unit V	Biogas generation: Basic principles of anaerobic degradation, various types of biogas plants, design considerations of various biogas digesters.	8 lectures

Books:

1. Rural Water Resources Utilization & Planning, Ram Bilas, Concept Publishing, New Delhi, 1988.

2. Manual for Rural Water Supply, SKAT- Swiss Center for Appropriate Technology, Switzerland, Geo-Environ Academia, Jodhpur, 1989.
3. Renewable Energy Sources and Their Environmental Impact, S A Abbasi and N Abbasi, Prentice Hall of India, New Delhi, 2001.
4. Introduction to Environmental Engineering, Davis & Corn Well, McGraw Hill International, N.Y., 1996.
5. Introduction to Environmental Science and Engineering, A.K. Datta, Oxford & IBH, New Delhi, 2000.
6. Environmental Engineering, M. N. Rao and V. Thanikachalam, Tata McGraw Hill, New Delhi, 1993.
7. Rural Waste Management, A C Varshney, Associated Publishing Co, New Delhi, 1987.
8. Municipal and Rural Sanitation, V M Ehlers, and E W Steel, Tata McGraw Hill, New Delhi, 1976.

CE 4006 Biological Waste Water Treatment: 4 Credits (3-1-0)

Unit I	Introduction, Principles of biological treatment: Aerobic and anaerobic treatment; bioconversion processes, kinetics of bioconversion.	8 lectures
Unit II	Aerobic treatment: Activated sludge process, trickling filter, aerated lagoons, aerobic filters, rotating biological contactors, roughing filters.	8 lectures
Unit III	Low-cost wastewater treatment: oxidation ponds, fishponds, maturation ponds, oxidation ditches.	8 lectures
Unit IV	Anaerobic treatment: Conventional and high rate anaerobic digesters, anaerobic filters: up flow filters – fixed bed and submersed media anaerobic reactor, expanded bed, fluidized bed and moving bed reactors, down flow stationary fixed film reactors.	10 lectures
Unit V	Advanced Anaerobic treatment: Up flow anaerobic sludge blanket reactor (UASB) reactor and hybrid reactors. Anaerobic rotating biological contactors.	8 lectures

Books:

1. Wastewater Treatment Concept and Design Approach: G. L. Karia & R. A. Christian, PHI, N. Delhi.
2. Wastewater Treatment for Pollution Control and Reuse, S. J. Arceivala, Asolekar, Tata McGraw Hill, New Delhi.
3. Water and Wastewater Engineering, Desogh Principles and Practice: Mackenzie L. Davis, McGraw Hill Education (India) Private Limited, New Delhi, 23015.
4. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi. 2009.
5. Sewage Treatment & Disposal and Waste Water Engineering (Environmental Engineering Vol. II): P. N. Modi, Stabard Book House, N. Delhi. 2008.
6. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi, 1990.
7. Wastewater Treatment Plants: Planning, Design & Operation, S.R. Qasim, CBS College Publishing, NY, 1985.
8. Wastewater Engineering: Treatment, Disposal and Reuse, MetCalf and Eddy, Tata McGraw Hill, New Delhi, 1991.
9. Environmental Engineering, Peavy, Rowe and Tachbangolous, McGraw Hill International, New York, 1985.

CE 4007 Elements of Foundation Engineering: 4 Credits (3-1-0)

Unit I	Soil investigation: boring in open pits, sampling, lab and field tests, SPT, plate load tests, geophysical explorations.	10 lectures
Unit II	Shallow foundations: bearing capacity theories of Terzaghi and Meyerhof, general, local and punching shear failures, IS recommendations; Settlement of foundations, factor affecting settlements, allowable bearing pressure, proportioning of footings.	12 lectures
Unit III	Deep foundations: pile foundations, classification, bearing capacity of pile foundations, pile driving formulae, pile load tests, bearing capacity of under-reamed piles.	10 lectures
Unit IV	Pile groups, group efficiency, Converse Labarre formula, settlement of piles; Structural design of deep foundations; Constructional methods.	10 lectures

Books:

1. Principles of Soil Mechanics and Foundation Engineering, Murthy, V.N.S.,UBSPD,New Delhi, 2001.
2. Soil Engineering Part-I: Fundamentals and General Principles, Singh, Alam and Chowdhary, G.R., CBS, New Delhi, 1994.
3. Introduction to Soil Mechanics and Shallow Foundations Design, French, Samuel E., Prentice Hall Inc, NJ, 1989.
4. Geotechnical Engineering: Foundation Design, Cernica, John N., John Wiley & Sons, Singapore 1994.
5. Design of Foundation Systems, N.P. Kurian, Narosa Publishing House, New Delhi, 1994.

CE 4009 Environmental Management: 4 Credits (3-1-0)

Unit I	Introduction, Principles of Environment Management, basics of water, land, air management, salient features of environment management.	8 lectures
Unit II	Management of wastewater from combined sewers, Computation of flow rates, design of sewers, waste disposal.	8 lectures
Unit III	Management of air pollutants, control of gaseous and particulate matters, dispersion model for air pollutants.	8 lectures
Unit IV	Management of solid wastes, material flow in a society, collection, handling, processing and safe disposal of solid wastes.	10 lectures
Unit V	Socio -economic aspects of Environmental Management.	8 lectures

Books:

1. Environment Management: An Indian Perspective, Ed: S N Chary and V Vyasulu, MacMillan India Ltd, New Delhi, 2000.
2. Environmental Risks & Hazards, S.L. Cutter, Prentice Hall of India, New Delhi, 1999.
3. Environmental Audit- An Overview, A.K. Mahaskar, Media Enviro, Pune, 1990.
4. Environmental Accounting, N Das Gupta, Wheeler Publishing, Allahabad, 1997.
5. Environmental Management, B Narayan, A P H Pubkishing Corp, New Delhi, 2000.
6. Hazardous Waste Management, C A Wentz, McGraw Hill Inc, Singapore, 1995.
7. Legal Aspects of Environmental Pollution and its Management, Ed: S Masharaf Ali, CBS Publications, Delhi, 1992.
