SIXTH SEMESTER						CIVIL ENGINEERING
COURSE CONTENTS						
CE-6001	**Steel – I**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	3	1	2	70	22

UNIT - I

Study of IS-800 1984 & 2007 by design of structural connections – Bolted, Riveted and Welded connections both design methods.

UNIT - II

Design of compression members, tension members, Roof Trusses – Angular & Tubular, Lattice Girders.

UNIT - III

Design of simple beams, Built-up beams, Plate girders.

UNIT - IV

Effective length of columns, Design of columns – simple and compound, lacings and battens.

UNIT - V

Design of footings for steel structures, grillage foundation.

Practical Work:

(i) One sheet of drawing on design of Riveted & Welded joints / connections.
(ii) One sheet of drawing on design of Tension member with details of joints.
(iii) One sheet of drawing on design of Compression members with details of joints.
(iv) One sheet of drawing on design of Plate girder.
(v) One sheet of drawing on design of Grillage foundation.
(vi) One sheet of drawing on Lacing System of Column.
(vii) One sheet of drawing on Battened column.

Reference Books :

(i) Design of Steel Structures by Arya & Azmani Nemchand & Bros, Roorkee.
(ii) Design of Steel Structures by P. Dayaratnam.
(iii) Design of Steel Structures Vol. I&II by Rmchandra.
(iv) Design of Steel Structures by L.S. Negi.
(v) Design of Steel Structures by Ramammutham.
(vi) Design of Steel Structures by Punmia.

COURSE CONTENTS

CE-6002	Environmental Engineering – II	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	70	22

UNIT - I

Terminologies of Wastewater Engineering, Sewerage schemes and their importance, collection and conveyance of sewage, storm water quality (urban rain water disposal), fluctuation in sewage flow, flow through sewer, design of sewer, construction and maintenance of sewer, sewer appurtenances, pumps and pumping stations.

UNIT - II

Characteristics and analysis of wastewater, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, instrumentation involved in analysis, natural methods of wastewater disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis, stream flow rejuvenation, effluent discharge standards.

UNIT - III

Unit operations and unit process for wastewater treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

UNIT - IV

Secondary treatment, methods of biological treatment (Theory & Design) – Activated sludge process, oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank and Inhofe tank, sources and treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

UNIT - V

Tertiary treatment, Advanced wastewater treatment – Ultra filtration, adsorption by activated carbon, phosphorus removal, nitrogen removal, physico chemical wastewater treatment, intuitional and industrial sewage management, rural and semi-urban sanitation.

Laboratory work: 08 to 10 experiments (as per below list) based on topics of Environmental Engineering I & II as per facility available in the institution.

List of Experiment:

(1) To study the various standards for wastewater.
(2) To study the sampling techniques for wastewater.
(3) To determine the p of given sample by pH meter only.
(4) To determine the alkalinity in wastewater sample.
(5) To determine the acidity in wastewater sample.
(6) Determination of Dissolved Oxygen in the wastewater sample.
(7) Determination of Dissolved Oxygen by DO Meter.
(8) Determination of Biological Oxygen Demand of a wastewater sample.
(9) Determination of Chemical Oxygen Demand of a wastewater sample.
(10) Determination of various types of solids in the wastewater sample.
(11) Determination of bacterial number by membrane filter technique.
(12) Determination of bacterial colonies by standard plat count method.
(13) Determination of most probable number by multiple tube fermentation techniques.
(14) Determination of Colour of given sample on Platinum Cobalt Scale.
(15) Determination of Odor of given sample.
(16) To determine Iron content of given sample.
(17) To determine Sulphate concentration by Spectrophotometer.
(18) To determine Chloride concentration in given sample of wastewater.
(19) To determine Alum percentage of Alumina Ferric.
(20) To determine Calcium / Magnesium by Flame Photometer.

Reference Books:

(i) Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi.
(ii) Wastewater Engineering by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi.
(iii) Environmental Engineering - M.L. Davis & D.A. Cornwell-McGraw Hill Company.
(iv) Chemistry for Environmental Engineering - Sawyer & McCarty-McGraw Hill Book Company New Delhi.
(v) Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi.
(vi) Waste Water Engineering - Metcalf & Eddy - McGraw Hill Book Company New Delhi.

SIXTH SEMESTER						CIVIL ENGINEERING
COURSE CONTENTS						
CE-6003	**Geo Technology – I**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	3	1	2	70	22

UNIT - I

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behaviour. Soil structure. Three phase system. Index properties and their determination, relationship and interrelationshop. Consistency limits. Classification systems based on particle size and consistency limits.

UNIT - II

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flow nets, uses of a flow net, inverted filters, Effective, neutral and total stresses.

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of pre-consolidation pressure, settlement analysis. Calculation of total settlement.

UNIT - III

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution.

Mohr-Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, stress path & application, critical void ratio, Liquefaction.

UNIT - IV

Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

UNIT - V

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Stress distribution soil. Analytical and graphical methods of determination of earth pressures on cosion-less and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

Laboratory Work: Laboratory work will be based on the above course as required for soil investigators of engineering projects.

List of Experiment :

(1) Determination of Hygroscopic water content.
(2) Particle – size analysis.
(3) Determination of Specific gravity of soil particles.
(4) Determination of plastic limit.
(5) Determination of liquid limit.
(6) Determination of shrinkage limit.
(7) Permeability tests.
(8) Direct shear test (Triaxial Compression Test).
(9) Consolidation test.
(10) Triaxial compression test.
(11) Laboratory Vane Shear test.

Reference Books:

(i) Soil Mechanics & Foundation Engineering by Dr. K.R. Arora - Std. Publishers Delhi.
(ii) Soil Mechanics & Foundation by Dr. B.C.Punmia- Laxmi Publications, Delhi.
(iii) Modern Geotech Engineering by Dr.I Aram Singh - IBT Publishers, Delhi.
(iv) Geotech Engineering by C. Venkatramaiah - New Age International Publishers, Delhi.
(v) Soil Mechanics & Foundation Engineering by S.K. Garg- Khanna Publishers, Delhi.
(vi) Soil Testing for Engineering by T.W. Lambe - John Wiley & Soms. Inc.
(vii) Relevant I.S. Codes.

SIXTH SEMESTER						CIVIL ENGINEERING
COURSE CONTENTS						
CE-6004	**Water Resource Engineering – I**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	3	1	2	70	22

UNIT - I

Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods, Irrigation development.
Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods-surface and subsurface, sprinkler and drip irrigation.
Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT - II

Hydrology: Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves,
Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

UNIT - III

Reservoirs and storage works: Types of reservoirs, reservoir planning, various investigations, estimation of storage capacity by mass curve analysis, fixing of principal levels in a storage project, economical height of dam, reservoir redimentation, suitable site for a reservoir project.
Dams - classification, selection of suitable type of dam at a particular location.

UNIT - IV

Gravity Dams: Design criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment construction joints, galleries in gravity dams.

UNIT - V

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.
Energy Dissipatiors and Gates: Principles of energy dissipation energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates – vertical lift and radial gates, their design principles and details. Design of canal regulating structures, detailed design of Sarda Falls, design of cross drainage works, sphypn aquaduct.

Reference Books:

(i) Irrigation & Water Power Engineering - Dr. B.C. Punmia, Dr. Pande, B.B. Lal.
(ii) Irrigation, Water Resources & Water Power by Dr. P.N. Modi.
(iii) Irrigation Engineering by Varshney.
(iv) Irrigation Engineering by Santosh Kumar Garg.
(v) Irrigation, Water Power & Water Resources Engg. by K.R. Arora.

SIXTH SEMESTER						CIVIL ENGINEERING
COURSE CONTENTS						
CE-6005	**Quantity Estimation and Costing**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	3	1	2	70	22

UNIT - I

Procedure of Estimating: Estimate purpose and importance of estimate, principle of estimate, Types of estimates: plinth area, cubical content and preliminary estimate, detailed, revised, supplementary and other important estimates, Mode of measurement, measurement and abstract sheet, bill of quantities. Tender, earnest and security money, contingencies, work charge establishment, centage charge day work etc.

UNIT – II & III

Detailed estimate of Buildings: Methods: Long wall and short wall & centre line, methods of taking out the quantities of items of work, preparation of estimate of small and big building (Residential and other buildings), Various percentage for different services in building, administrative section, technical section etc.

UNIT - IV

Analysis of Rates: Cost of work**:** Factors affecting cost of work, overhead charges, various factors involved in rates of items, Task for average artisan, Materials and labour requirements for various trades, preparation for rate of important items of work: Cement concrete, R.C.C., brickwork, plastering, C.C. & Mosaic Terrazzo floor and other important items, Current schedule of rates (C.S.R.), Muster roll and measurement book.

UNIT - V

Valuation and Road Estimate: Definition, purpose, various terms used in valuation, year's purchase, sinking fund, depreciation, methods of depreciation, methods of valuation and rant fixation of buildings.

Road Estimate: Earthwork calculations by mid sectional area, area of side slope, mean sectional area, prismoidal and trapezoidal formula, estimate of culvert etc..

Reference Books :

(i) Estimating & Costing ion Civil Engineering by Dutta, B.N.
(ii) Estimating, Costing, Specification and Valuation in Civil Engineering by Chakraborti, M.
(iii) Contracts and Estimates by Patel, B.S.

List of Experiments / Field work (Expandable) :

(i) Preparing detailed estimate by long wall, short wall & centre line methods.
(ii) Two room building.
(iii) Two room building with verandah.
(iv) Residential building and other buildings.
(v) Road Estimate: Earthwork calculation.
(vi) Numerical problems (Analysis of rates)
(vii) Numerical problem (Valuations)