DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL ENGINEERING-II

SUBJECT CODE: CE 701

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1.To impart the basic knowledge, skills and attitudes of beneficial uses of water, quality requirements and standards; of water and wastewater treatment, unit operation
2.To various concepts of sedimentation, coagulation, flocculation and primary, secondary and tertiary treatment processes; of anaerobic digestion

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the operation and design of treatment units of water treatment plants.
CO-2	An understanding of the operation and design of primary treatment units of wastewater treatment systems.
CO-3	An understanding of the operation and design of secondary treatment units of wastewater treatment systems.
CO-4	Know the Sources and characteristics of Sludge Thickening, Sludge digestion
CO-5	Know the Waste Water Disposal Methods

ENVIRONMENTAL ENGINEERING-II

SUBJECT CODE: CE 701

Unit	Topic
I	Water treatment Population forecast and water demand – Water treatment Objectives – Unit operations and processes in surface water treatment – Principles, functions and design of flash mixers, flocculators, sedimentation tanks and sand filters – Aeration – iron and manganese removal, Defluoridation and demineralization – water softening Disinfection, Water treatment – Typical layouts and water distribution.
II	Primary Waste Water Treatment Characteristics of sewage, Quantity and flow variation, Primary treatment: Principles, functions and design of screen, grit chambers and primary sedimentation tanks
III	Secondary Treatment of Waste Water Activated Sludge Process and Trickling filter; Other treatment methods – Stabilisation Ponds and Septic tanks – Advances in Sewage Treatment, waste water reuse and recycling
IV	Sources and characteristics of Sludge Thickening – Sludge digestion – Biogas recovery - Drying beds – Conditioning and Dewatering – Sludge disposal, Sewage treatment – Typical layouts.
V	Waste Water Disposal Methods Dilution – Self purification of surface water bodies – Oxygen sag curve – disposal to lakes and sea, Land disposal – Sewage farming – Deep well injection – Soil dispersion system

Text/ Reference Books:

1. Garg S.K., (2001), Environmental Engineering, Vols. I and II, 12th Edition, Khanna Publishers, New Delhi
2. Droste R.L., (1997)., Theory and Practice of water wastewater treatment, John Wiley & sons
3. Metcalf and Eddy (2003), Wastewater Engineering, Treatment and reuse, Tata McGraw-Hill Edition, Fourth edition

DEPARTMENT OF CIVIL ENGINEERING

WATER RESOURCE ENGINEERING

SUBJECT CODE: CE 702

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

To impart the basic knowledge, skills and attitudes of system approach to water resource system development; of application of system engineering in reservoir operation and optimal crop water allocation

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Basic understanding of the water requirement of crops, methods of irrigation and irrigation water quality
CO-2	Understand the role of different components in the hydrologic cycle. Perform hydrograph analysis.
CO-3	Understanding the water table and aquifer
CO-4	Know the methods of irrigation and irrigation appurtenances
CO-5	Know the different types of irrigation systems in practice.

WATER RESOURCE ENGINEERING
SUBJECT CODE: CE-702

Unit	Topic
I	Irrigation Practices Need for Irrigation in India-Scope- Soil moisture & Plant growth - crop water requirements-Irrigation Scheduling Irrigation efficiencies, Duty-Delta-base period-relation between them, Surface & subsurface irrigation method, Irrigation water Quality.
II	Surface Water Hydrology Hydrological Cycle - Types & forms of precipitation-rainfall measurements - interpretation of rainfall data. Missing rain fall data - Runoff- runoff cycle, infiltration indices, Hydrograph analysis - Unit hydrograph, applications
III	Ground Water Hydrology Ground water-Aquifers, Permeability & transmissibility- steady flow towards a well in confined & water table aquiferDupits & Theims equation - measurement of yield of an open well - Tube well & infiltration gallaries. interference among wells-well losses, comparison of well and flow irrigation
IV	Canal Irrigation Sediment Transport- Importance & Mechanics of transport, bed load & suspended load- Estimation, Design of channels in India- Regime channels- Kennedy and Lacey's theory, Water logging- causes- effects- control measures, canal lining, Land Reclamation,
V	Minor Irrigation Structures (Design & Drawing) Tank sluice (Tower head type) - Tank surplus weir- Canal regulator cum road way - canal drop & aqueducts.

Text/ Reference Books:

1. Mays L.W. (2001), Water Resources Engineering, first edition, John Wiley Publications, Singapore.
2. Sharma, S.K. (1996), Irrigation Engineering, S. Chand & Co. Pvt. Ltd.
3. Punmia. B.C. (1997), Irrigation and Water Power Engineering, Laxmi Publications.

DEPARTMENT OF CIVIL ENGINEERING

STEEL STRUCTURE

SUBJECT CODE: CE 703

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

The primary focus of this course is to understand the design philosophy of steel structures along with design methodology of different structural components based on Indian Standard.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Concept to know the analyse and design of flexural members
CO-2	Concept to know the analyse and design of plate girder
CO-3	Able to analyse and design of industrial truss structures
CO-4	Able to analyse and design of water head tank
CO-5	Able to design and drawing of Steel Structures

STEEL STRUCTURE

SUBJECT CODE: CE 703

Unit	Topic
I	Simple and Built-up Beams Design of beams - simple and built-up beams - laterally supported and unsupported beams, concept of shear.
II	Plate Girders Plate girders - design of plate girders- curtailment of flange plates- design of stiffeners and splices- gantry girder
III	Roof Trusses Roof Trusses - calculation of dead load- live load & wind load, Design of joints- supports- members for pitched roof truss, purlins.
IV	Water Tanks Overhead water tanks - design of rectangular water tank- cylindrical water tank and pressed steel tanks- design of staging and foundation – Maintenance of Water tanks
V	Design and Drawing of Steel Structures Design and drawing details of the following steel structures: Column and base plate - Plate girder & Gantry girder - Simple roof trusses - Over head water tanks.

Text/ Reference Books:

1. V.N. VajraniI & M.M. Ratwani (2000), Design and Analysis of Steel Structures, Khanna Publishers.
2. IS: 800 –Draft mode.
3. Ramachandra (2002), Design of Steel structures, Vol. I & Vol. III, Standard Publishers Distributors.
4. I. Csyal (2005), Design of Steel Structures, Standard Publishers Distributors, New Delhi.

DEPARTMENT OF CIVIL ENGINEERING

EARTHQUAKE RESISTANT DESIGN

SUBJECT CODE: CE 704

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of nature and characteristics of dynamic loads; of multi-degree freedom systems;
2. To assessing structural failure due to earthquake; to analyze and design structures subjected to seismic loading as per I.S. codes
3. To ductile detailing of structures and design of shear walls.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Know the earthquake origin and measurement
CO-2	Understanding the analysis of dynamic loads
CO-3	Know the Design Principles of Earthquake Resistant structures
CO-4	Understanding the earthquake damage
CO-5	Know the guidelines for earth resistant construction

EARTHQUAKE RESISTANT DESIGN
SUBJECT CODE: CE-704

Unit	Topic
I	Elements of Earthquake origin & Propagation Elements of Seismology - Earthquakes - Structure of the Earth -History of the Earth -Earthquake Mechanism - Propagation of Seismic Waves -Earthquake Phenomena -Earthquake Measurements -Definitions of magnitude, intensity, epicenter etc; Plate tectonics, seismographs, liquefaction, Types, effects and controlling factors .
II	Theory of Vibration Effects Dynamic Loads.-D'Alembert's Principle and inertia forces-Stiffness and flexibility of elastic structures -Theory of Vibrations - Free vibrations of single and multiple degree freedom systems -computations of dynamic response to time dependent forces- mass and stiffness matrices - natural frequencies - Plate Tectonics Theory.
III	Earthquake Resistant Design Principles of Earthquake Resistant Design - Response spectrum theory. Time – Acceleration method Application of response spectrum theory to seismic design of structures.
IV	Earthquake Damages Earthquake Damages to Various Civil Engineering Structures - Case Histories Earthquake-Earthquake response of structures – Soft storey collapse – Slender structures, unsymmetrical structures
V	Methods of disaster prevention. Earthquake resistant building Regulations – specification – guidelines for construction – Materials selection .

Text/ Reference Books:

1. Stratta.J.L. (2000), Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
2. A K. Chopra (2003), Dynamics of Structures – Theory and Applications to
3. Earthquake Engineering, Second Edition, Printice-Hall India Pvt Ltd.

DEPARTMENT OF CIVIL ENGINEERING

NON-DESTRUCTIVE TESTING

SUBJECT CODE: CE 705

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of analyzing structural health and regular maintenance
2. To various non-destructive method

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Know the structural health, safety and maintenance
CO-2	Know the various non-destructive testing for assessment of building
CO-3	Apply the knowledge of retrofitting of structures
CO-4	Apply the concept of demolition of structures and method
CO-5	Know the recycle of demolished materials

NON-DESTRUCTIVE TESTING

SUBJECT CODE: CE 705

Unit	Topic
I	Structural health, factors affecting health of structures, effect of leakage, age, creep, corrosion, fatigue on life of structure. Structural health monitoring. Various measures, regular maintenance, structural safety in alteration. Quality control and assurance.
II	Structural audit, assessment of health of structure, study of structural drawing, nature of distress, visual observations. Various NDT methods for assessment of building.
III	Retrofitting of structures, parameters for assessment for restoration strategies selection of construction chemicals during restoration. Structural detailing for restoration.
IV	Demolition of structure, study of structural system and structural drawing, need and importance of demolition. Demolition methods.
V	Role of safety measures, temporaray support structures in demolition. Recycling of demolished materials, contracts.

Text/Reference Books

1. Non destructive testing by Halmshaw
2. Durable structures by R. N. Raikar
3. Structural audit by Mr. Umesh Dhargalkar.

DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL POLLUTION CONTROL

SUBJECT CODE: CE 706

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of various types of wastes and their origin from different industries
2. To control and abatement techniques of pollution; handling of wastes; of solid wastes generated from industries; of environmental auditing.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand air pollutants and their impacts.
CO-2	Demonstrate methods for controlling gaseous air pollutants, particulate air pollutants.
CO-3	Apply methods for controlling water pollution.
CO-4	Apply methods for controlling land pollution.
CO-5	Apply methods for controlling noise pollution.

ENVIRONMENTAL POLLUTION CONTROL

SUBJECT CODE: CE-706

Unit	Topic
I	Impact of man on environment: The biosphere, hydrologic cycle, nutrient cycles, consequences of population growth, energy problems, pollution of air, water and land.
II	Air pollution: Sources and effects, meteorological aspects, air pollution sampling and measurement, control methods and equipments, control of specific air pollutants.
III	Water pollution: sources and classifications of water pollutants, wastewater sampling and analysis.
IV	Land pollution: types of land pollution, solid waste management, generation, storage, collection, transport, processing and disposal.
V	Noise pollution: sources, effects and preventive measures.

Text/ Reference Books:

1. Metcalf and eddy inc: wastewater engineering.
2. Sewage disposal and air pollution engineering by S. K. Garg. Vol II

ENVIRONMENTAL ENGINEERING LAB –II

SUBJECT CODE: CE – 751

L-T-P: 0-0-2

Credit: 1

1. Determination of total suspended solids.
2. Determination of BOD of sample.
3. Determination of COD of sample.
4. Determination of Kjeldahl nitrogen.
5. Determination of fluorides.
6. Determination of rate kinetics constant of aerobic reactions
7. Filed visit of water / wastewater treatment plant.

STRUCTURE DETAILING LAB – II

SUBJECT CODE: CE – 752

L-T-P: 0-0-2

Credit: 1

Preparation of working drawings for the following:

1. Rolled sections and connections (Welded and riveted)
2. Built up columns and beams.
3. Gusset bases
4. Grillage footing
5. Roof trusses
6. RC Retaining walls
7. RC water tanks