III B.Tech I Semester

15ACE22-ENVIRONMENTAL ENGINEERING – I

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Course objectives:

To make the students conversant with sources and its demand of water
To understand the basic characteristics of water and its determination
To expose the students to understand the design of water supply lines
To provide adequate knowledge about the water treatment processes and its design
To have adequate knowledge on safe disposal methods

UNIT – I

Introduction: Necessity of protected water supply –Flow chart of public water supply system - Role of Environmental Engineer.

Water Demand and Water Quality: Population forecasts, design period – water demand, types of water demands – factors affecting – fluctuations – fire demand – Characteristics of water – Physical, Chemical & Biological and their testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations.

Water collection structures at source: intakes – infiltration galleries.

UNIT-II

Water Treatment (Sedimentation, Filtration and Disinfection): Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation flocculation clarifier design – coagulants – feeding arrangements– Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices

UNIT-III

Water Distribution Network Analysis : Distribution systems – Requirements, Layout of Water distribution systems – Design procedures- Hardy Cross and equivalent pipe methods - service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

UNIT IV

Waste Water Collection : House plumbing– inverted siphon – catch basins – flushing tanks– ejectors - Conservancy and water carriage systems – sewage and storm water estimation - fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers– shapes and materials.

Waste Water Characteristics: Characteristics of sewage – cycles of decay –decomposition of sewage. - B.O.D. – C.O.D. equations.

UNIT – V

Waste Water Treatment : Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – trickling filters – ultimate disposal of sewage – Construction and design of Oxidation ponds – sewage farming – dilution. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff -Tanks working principles and design – soak pits.

***Course outcomes**:*

- *Understand key current environmental problems.*
- *Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.*
- *Be able to analyze an industrial activity and identify the environmental problems.*
- *Be able to plan strategies to control, reduce and monitor pollution.*
- *Be able to select the most appropriate technique to purify and/or control the emission of pollutants.*
- *Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity.*
- *Be able to plan and design the quantity of water for any given population.*

TEXT BOOKS

1. Water supply and sanitary Engineering by G.S. Birdi, DhanpatRai& Sons Publishers.
2. Water supply and sanitary Engineering by S.A.Garg,
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.
4. Manual on Water supply and Treatment - CPHEEO, 1999.
5. Punmia B.C, Ashok Jain &Arun Jain, Water Supply Engineering, Laxmi Publications, Pvt. Ltd., New Delhi, 2004.

REFERENCS

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water and Waste Water Technology by Steel
3. Water and Waste Water Engineering by Fair Geyer and Okun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
5. Waste water Engineering by Metcalf and Eddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
7. Environmental Engineering by georad.Kiely TMH Pubilications.