

ENVIRONMENTAL ENGINEERING-I

Course Code: 13CE1127

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Course Educational Objectives:

- ❖ To create an awareness about the importance of supply of safe drinking water.
- ❖ To familiarize the students about safe disposal of sewage, collection of data, design and execution of water and waste water treatment plants.

Course Outcomes:

- ❖ The student will be equipped with the requisite knowledge about conventional and miscellaneous treatment units and execution of the projects.
- ❖ Student will be able to design of oxidation ponds, septic tanks, aerobic and anaerobic lagoons using low cost technologies.

UNIT-I

(12 Lectures)

WATER DEMANDS- STANDARDS -SOURCES:

Aspects of Environmental Engineering – Protected water supply – Need – Water demands – factors affecting - fluctuations – design period – population forecast – water quality – drinking water standards-Quality and Quantity and other considerations – surface and sub- surface sources – yield calculations – intake works – storage reservoir capacity – systems of water supply – requirements – detection of leakages – selection of pump – economical diameter of pumping main water quality – D.W.S. – testing and significance.

UNIT-II

(12 Lectures)

TREATMENT OF WATER AND DISTRIBUTION :

Water treatment, conventional treatment flow diagram – Sedimentation types – principles – design factors – coagulation – design of clariflocculator

– filtration – slow and rapid gravity filters – multimedia and pressure filters
 – design principles-Disinfection – chlorination – miscellaneous treatment methods – distribution systems – layouts – design- and analysis, Hardy Cross and equivalent pipe method - pipe joints – valves – other appurtenances.

UNIT-III

(12 Lectures)

WASTE WATER MANAGEMENT:

Introduction: waste water treatment system – definitions of terms – waste water management systems – collection and conveyance of sewage – sewage flow rates – storm water – characteristics of sewage – cycles of decay – BOD- COD – ultimate disposal of sewage.

UNIT-IV

(12 Lectures)

DESIGN OF SEWERS AND PRIMARY TREATMENT:

Layouts – design of sewers – sewers appurtenances – sewage pumping – conventional sewage treatment – primary treatment screens – grit chamber – sedimentation tanks – design principles. Septic tanks and Imhoff tanks rural latrines – House plumbing – appurtenances.

UNIT-V

(12 Lectures)

SECONDARY BIOLOGICAL TREATMENT:

Secondary treatment – Biological treatment – trickling filters – Activated Sludge Process – low cost waste treatment methods – Design of oxidation ponds – Aerobic and anaerobic lagoons. Sludge Digestion – Design principles – Disposal.

TEXT BOOKS:

1. G.S. Birdi, “*Water supply and sanitary Engineering*”, Dhanpat Rai & Sons Publishers. 8th Edition, 2010.
2. B.C.Punmia, “*Water Supply Engineering*”, Vol. I, “*Waste water Engineering Vol. II*”, 2nd Edition, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
3. K.N. Duggal, “*Elements of Environmental Engineering*”, 7th Edition, S. Chand Publishers, 2010.

REFERENCES:

1. Hammer and Hammer “*Water and wastewater Technology*”, 4th edition, Prentice hall of India, 2003.
2. Fair, Geyer and Okun, “*Water and Waste Water Engineering*”, 3rd Edition, Wiley, 2010.
3. Metcalf and Eddy, “*Waste Water Engineering*”, 3rd edition, Tata Mc Graw Hill, 2008.
4. Howard S. Peavy, Donand P. Rowe, George Technobanoglous, “*Environmental Engineering*”, 1st Edition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

