CE(PC)402	**Environmental Engineering – I**	2L + 1T	3 Credits
Course Outcome	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies of water supply engineering and solid waste management 2. Describe different surface and groundwater sources; and composition and characteristics of municipal solid waste 3. Apply the methods of quantifying water requirement and MSW generation 4. Solve different mathematical problems regarding different components of water supply systems, distribution networks and MSW management systems		

	5. Compare between different water samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in water treatment and MSW management	
Prerequisite	Class-XII level knowledge of Physics, Chemistry, Mathematics, Biology and Environmental Science; Undergraduate level knowledge of Engineering Mechanics, Fluid Mechanics and Hydraulics	
Module 1	**Water Requirement Estimation** Water Demand: Different types of water demand; Per capita demand; Variations in demand; Factors affecting water demand Future Demand Forecasting: Design period; Population forecasting methods	2L + 2T
Module 2	**Sources of Water** Surface Water Sources; Ground Water Sources	4L + 2T
Module 3:	**Water Quality** Water Quality Characteristics: Physical, Chemical, and Biological parameters Drinking Water Standards: BIS; WHO; USEPA Water Quality Indices: Basic concept and examples	4L + 2T
Module 4:	**Water Treatment** Typical flow chart for surface and groundwater treatments Unit Operation and Processes: Aeration, Plain Sedimentation, Sedimentation with Coagulation and Flocculation, Water Softening, Filtration, Disinfection	9L + 3T
Module 5:	**Water Conveyance and Distribution** Hydraulic design of pressure pipes; Analysis of distribution network; Storage and distribution reservoirs; Capacity of reservoirs.	4L + 2T
Module 6	**Characteristics of Municipal Solid Waste (MSW)** Composition and characteristics of MSW	1L + 1T
Module 7	**Handling of MSW** Generation, collection and transportation of MSW	1L + 1T
Module 8	**Engineered Systems for MSW Management** Methods of reuse/ recycle, energy recovery, treatment and disposal of MSW	3L + 1T

Reference

Sl.	Book Name	Author	Publishing House
1	Environmental Engineering	S.C. Sharma	Khanna Publishing House
2	Environmental Engineering. Volume-1 and Volume-2	Garg, S.K.	Khanna Publishers
3	Environmental Engineering	Peavy, H.S, Rowe, D.R, Tchobanoglous, G	Tata McGraw Hill Indian Edition
4	Introduction to Environmental Engineering and Science	Masters, G.M., Ela, W.P.	Prentice Hall / Pearson
5	Elements of Environmental Pollution Control	O.P. Gupta	Khanna Publishing House
6`	Elements of Solid & Hazardous Waste Management	O.P. Gupta	Khanna Publishing House
7	Manual on Water Supply and Treatment	CPHEEO	Govt. of India
8	Manual on Municipal Solid Waste Management.	CPHEEO	Govt. of India