CE(PC)505	**Environmental Engineering – II**	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 waste water engineering and hazardous waste management 2. Describe different home plumbing systems for water supply and wastewater disposal 3. Apply the methods of quantifying sanitary sewage and storm sewage 4. Solve different mathematical problems regarding different components of sewerage system 5. Compare between different wastewater samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in wastewater treatment		
Prerequisite	Class-XII level knowledge of Physics, Chemistry, Mathematics, Biology and Environmental Science; Undergraduate level knowledge of Engineering Mechanics, Fluid Mechanics and Hydraulics; Environmental Engineering – I (CE(PC)402)		
Module 1	**Sewage and Drainage** Definition of Common Terms: Sewage or Sanitary Sewage, Drainage or Storm Sewage, Sullage, Black Water, Grey Water Sewerage Systems: Separate system, Combined System, Partially Separate System; applicability, advantages and disadvantages		1L+1T
Module 2	**Sewage and Drainage Quantity** Quantity estimation for sanitary sewage; Quantity estimation for storm sewage		3L+1T
Module 3	**Conveyance of Sewage** Sewers: Shapes; Design parameters; Operation and maintenance of sewers; Sewer appurtenances Hydraulic Design of Sewers: Partial flow diagrams and Nomograms		4L+2T
Module 4	**Wastewater Characteristics** Physical, chemical and biological characteristics of municipal and domestic sewage; Effluent discharge standards		4L+2T
Module 5	**Wastewater Treatment** Primary, secondary and tertiary treatment of wastewater; aerobic an anaerobic treatment options Primary and Secondary Treatment of Domestic Wastewater: Typical Flow Chart of STP; Screen and Bar Racks; Grit Chamber; Primary and Secondary Sedimentation Tank; Activated Sludge Process; Trickling Filter		8L+4T
Module 6	**Sludge Handling and Disposal** Sludge Thickening; Sludge Digestion; Sludge Drying Bed		3L+1T
Module 7	**Building Plumbing** Introduction to various types of home plumbing systems for water supply and waste water disposal; high rise building plumbing; Pressure reducing valves; Break pressure tanks; Storage tanks; Building drainage for high rise buildings; various kinds of fixtures and fittings used		3L+1T
Module 8	**Hazardous waste** Types and nature of hazardous waste as per the HW Schedules of regulating authorities		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	Elements of Environmental Pollution Control	O.P. Gupta	Khanna Publishing House
	5`	Elements of Solid & Hazardous Waste Management	O.P. Gupta	Khanna Publishing House
	6	Introduction to Environmental Engineering and Science	Masters, G.M., Ela, W.P.	Prentice Hall / Pearson
	7	Manual on Sewerage and Sewage Treatment	CPHEEO	Govt. of India
	8	Manual on Municipal Solid Waste Management.	CPHEEO	Govt. of India
	9	Hazardous and other waste (Management and Transboundary Movement) Rules, 2016	MoEF	Govt. of India