

ENVIRONMENTAL ENGINEERING

V Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE015	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			
COURSE OBJECTIVES: The student will try to learn: I. To supply safe and wholesome water in adequate quantity and to make water available within easy reach of the consumers so as to encourage the general cleanliness. II. To allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. III. To select and design of the most appropriate, cost-effective and sustainable wastewater or sanitation treatment system.								
COURSE OUTCOMES: After successful completion of the course students are able to: 1. Summarize the structure of drinking water supply systems, water collection, water purification and water supply scheme for drinking water with focus on ethical principles. 2. Explain water quality criteria and standards, and their relation to public health for domestic supplies. 3. Choose the purpose and operational steps of key water treatment processes used to improve water quality including: Coagulation, Flocculation, Sedimentation, Filtration, Disinfection, Corrosion Control, Taste and Odour Control, Iron and Manganese removal, Fluoridation, and BATs (Best Available Technologies) used for specific water quality challenges. 4. Analyze operation, installation, repair, and maintenance requirements of distribution system components and equipment including pipes, tanks, valves, meters, pumps and motors. 5. Appreciate the importance and methods of operation and maintenance of water supply systems. 6. Explain the characteristics and composition of sewage and process of Self-Purification of streams. 7. Choose to perform basic design of the unit operations and processes that are used in sewage treatment. 8. Learn principles of different levels of wastewater treatment viz., primary, secondary, and tertiary levels. 9. Understand and apply the design principles and criteria in designing units such as oxidation ponds, sludge digestion tanks. 10. List with the handling and disposal methods of both biological and chemical sludge from wastewater treatment facilities and able to comprehend the knowledge on recent advanced technologies. 11. Summarize effectively environmental aspects in oral and written presentations to technical and non-technical audiences.								
MODULE-I	WATER QUALITY, DEMAND AND SUPPLY						Classes: 09	
Protected water supply, population forecasts, design period, water demand, types of demand, factors affecting fluctuations, fire demand, storage capacity, water quality and testing. Drinking water standards. Comparison from quality and quantity and other considerations, intakes, infiltration galleries, confined and unconfined aquifers, distribution systems, requirements, methods and layouts.								

MODULE-II	WATER TREATMENT AND DISTRIBUTION	Classes: 09
Layout and general outline of water treatment units, sedimentation, uniform settling velocity, principles, design factors, surface loading, jar test, optimum dosage of coagulant, coagulation, flocculation, clarifier design, coagulants, and feeding arrangements. filtration, theory, working of slow and rapid gravity filters ,multimedia filters, design of filters, troubles in operation comparison of filters, disinfection, types of disinfection, theory of chlorination chlorine demand and other disinfection treatment methods. distribution systems, types of layouts of distribution systems, design of distribution systems, 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.		
MODULE-III	SEWAGE TREATMENT AND DISPOSAL	Classes: 09
Conservancy and water carriage systems, sewage and storm water estimation, type of concentration, storm water over flows combined flow, characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, B.O.D. and C.O.D. equations. Design of sewers, shapes and materials, sewer appurtenances manhole, inverted siphon, catch basins, flushing tanks, ejectors, pumps and pump houses, house drainage, components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing, ultimate disposal of sewage, sewage farming, dilution.		
MODULE-IV	WASTEWATER TREATMENT	Classes: 09
Lay out and general outline of various units in a waste water treatment plant, primary treatment design of screens, grit chambers, skimming tanks-sedimentation tanks-principles and design of biological treatment, trickling filters, standard and high rate.		
MODULE-V	DESIGN AND WORKING OF TREATMENT UNITS	Classes: 09
Construction and design of oxidation ponds, sludge digestion tanks, factors effecting, design of digestion tank, sludge disposal by drying, septic tanks working principles and design-soak pits. Ultimate disposal of waste water, self-purification of rivers, sewage farming.		
Text Books:		
<ol style="list-style-type: none"> 1. S.K. Garg, “Environmental Engineering”, Vol. I: Water Supply Engineering, 20th Edition Khanna Publishers, 2011. 2. Birdie, G.S. and Birdie, “Water Supply and Sanitary Engineering”, DhanpatRai& Sons, 1992. 3. Duggal, K.N. “Elements of Environmental Engineering”, S.Chand& Co, 2002. 4. Punmia B.C, Ashok Jain &Arun Jain, “Water Supply Engineering”, Laxmi Publications, Pvt. Ltd., New Delhi, 2004. 		
Reference Books:		
<ol style="list-style-type: none"> 1. Metcalf and Eddy, “Waste Water Engineering, Collection, Treatment and Disposal”, Tata McGraw Hill, Inc., New York. 2. H.S. Peavy and D.R.Rowe, “Environmental Engineering”, 2nd Edition, Mc.Graw Hill Publishing. 		