

20CE3401-ENVIRONMENTAL ENGINEERING

Offering Branches	CE		
Course Category:	Professional Core	Credits:	3
Course Type:	Theory	Lecture-Tutorial- Practical:	3-0-0
Prerequisites:	20BS1206 – Chemistry of materials 20MC1301 – Environmental Science	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Examine the quantity & quality of the water	K4
CO2	Design of the different water treatment units & understand the water distribution	K3
CO3	Analyze the quantity, quality of wastewater & illustrate the sewer appurtenances	K4
CO4	Apply appropriate sewage treatment methods	K3
CO5	Classify different sewage disposal methods & Design of septic tank	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				3				3			2	3
CO2	2	2	2	2			3						2	
CO3	3	3	3			2				2			3	2
CO4	2	2	2	2									2	
CO5	2	2				3	3						2	3
Avg.	2	2	2	2		3	3			2			2	3

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>QUALITY AND QUALITY OF WATER: Objectives of water supply scheme, estimating requirements; Design period; Per capita consumption; Factors affecting per capita consumption; Fire demand; Fluctuations in demand; Population forecasting methods. water quality and testing, drinking water standards, water borne diseases</p>	CO1
UNIT-2	<p>WATER TREATMENT: Sedimentation- Theory of sedimentation; Stoke's law; Sedimentation tanks- Design aspects; Principle of coagulation; Chemicals used for coagulation; Optimum dose of coagulant; Filtration - working of slow and rapid gravity filters; disinfection - theory of chlorination, chlorine demand, and other disinfection practices</p> <p>WATER DISTRIBUTION: Distribution systems; Layout of distribution systems, Analysis of Pipe networks – Hardy Cross Method; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Sluice valves; Check valve; Air valve; Drain valve; Meters, Fire Hydrants</p>	CO2
UNIT-3	<p>QUANTITY OF WASTEWATER: Introduction to Sanitary Engineering: Conservancy and water carriage system; Sewerage systems; Sanitary and storm water sewage; Estimation of their quantities; Design of sewers; Sewer Appurtenances-Types</p> <p>QUALITY OF SEWAGE: Characteristics of sewage-physical, chemical and biological; decomposition cycles; BOD and COD.</p>	CO3
UNIT-4	<p>PRIMARY TREATMENT OF SEWAGE Primary treatment- theoretical concepts of Screens; Grit chamber; Skimming tanks; design aspects of Sedimentation tanks.</p> <p>SECONDARY TREATMENT OF SEWAGE: Trickling filters; high rate</p>	CO4

	trickling filters; Recirculation; Operational problems and remedies; Activated sludge process- Principle of action; Sludge bulking; Sludge volume index	
UNIT-5	SEWAGE DISPOSAL & SEPTIC TANKS Methods; Disposal by dilution; Self-purification process; Oxygen sag; Zones of pollution of river Disposal by irrigation; sewage sickness; Septic tank-Design; effluent disposal	CO5

Learning Resources

Text Books	<ol style="list-style-type: none"> 1. Environmental Engineering Vol. I& II - Water supply engineering by S. K. Garg; Khanna Publishers, New Delhi, 2017. 2. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi, 2014.
Reference Books	<ol style="list-style-type: none"> 1. B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, New Delhi, 2010. 2. Metcalf and Eddy, Waste water Engineering Collection, Treatment, Disposal and Reuse, McGraw Hill Pub. Co., 1995.
e-Resources & other digital material	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105104102/ 2. https://nptel.ac.in/courses/105105048/