Faculty of Engineering and Technology

Bachelor of Technology

Effective from Academic Year: 2018-19

Branch Name:	Civil Engineering
Semester/Year:	Semester V/ Third Year
Subject Title:	Water and Waste Water Engineering
Subject Code:	1ET1060503
Pre-requisite:	Study of Basic Environmental Engineering

Course Objective:

- To develop a student's skills in designing the water treatment process which can provide potable water to the community in accordance with the water demand
- To understand waste water collection, treatment and disposal which are essential for maintaining the quality to the water sources and to reduce effects of water pollution.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (Marks)
03	00	02	04	70	30	30	20	150

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weightage (%)**
1	**Water treatment plant:** Layout plan and section of water treatment plant, Estimation of raw water discharge for treatment plant, Design period, and factors considered for selection of design period. Treatment plant site selection, factors considered, future stages of expansion, selection of treatment train.	6	15
2	**Collection and conveyance of raw water from source**: Intakes, types of intakes, conveyance of water, design of pumps and gravity and rising mains	6	10
3	**Water treatment processes and treatment units:** Plain sedimentation, aeration, sedimentation tank & its design, sedimentation with coagulation, types of coagulants, optimum dose of coagulants, mixing devices, design of flocculation unit. theory of filtration, types of filters and their comparison, design of rapid sand filter, washing of filter, methods of disinfection, methods of removing hardness Computation of dose of chemicals for removal of hardness	8	20
4	**Distribution system:** Layouts of distribution networks, Components of distribution system, Newton's and Hardy cross methods for network analysis, storage capacity of ESR and underground reservoir, determination of location and height of ESR	4	10

5	**Collection of sewage & estimation of its discharge :** Different types of sewers, sewerage systems, variation in sewage flow, sewer appurtenance, estimation of wastewater discharge in a sewer in sewerage system, estimation of storm water discharge in urban area, separate and combined sewerage systems, laying and testing of sewers	4	10
6	**Unit operations/ processes for wastewater treatment:** Layout plan and section of municipal wastewater treatment plant, Physical unit operation screening, flow equalization, mixing, flocculation, sedimentation. Chemical unit processes-chemical precipitation. Biological unit processes: Aerobic attached growth and aerobic suspended growth treatment processes, anaerobic suspended growth treatment processes, an aerobic suspended growth treatment processes, low cost sanitation systems, septic tanks, soak pit, stabilization ponds.	8	20
7	**Design of wastewater treatment units:** Design of racks, screens, grit chamber, aeration units, primary & secondary clarifiers, activated sludge plant and trickling filter units, rotating biological contactors, sludge dewatering units, sludge digesters and drying beds	6	15

Course Outcome:

After successful completion of the course the students shall be able to:

1. Design the water supply and wastewater treatment systems.
2. Determine the treatment efficiency of treatment units

List of Experiments:

1. Introduction to standards, collection and preservation of samples, sampling techniques and laboratory equipment
2. Determination of turbidity and jar test
3. Determination of DO and BOD
4. Determination of COD
5. Treatability study of domestic wastewater
6. Determination of dose of chemicals for removal of hardness of given water sample

List of Text Books:

1. Environmental engineering volume 1 and 2 by S.K.Garg, Khanna publisher
2. Environmental engineering volume 1 and 2 by B.C.Punamia, laxmi publication
3. Environmental engineering volume 1 and 2 by Dr.P.M.Modi, Rajsons Publications Pvt. Ltd.

List of Reference Books:

1. Water supply and sanitary engineering by G.S.Birdie and J.S.Birdie
2. Environmental pollution engineering by C.S. Rao wiley eastern
3. Water supply and wastewater engineering by B.S.N Raju, Tata McGraw hill, New Delhi
4. H.S. Peavy, D.R.Row & G.Tchobanoglous, environmental engineering,Mc Graw Hill Intranational Edition

E-Resources :

1. http://nptel.ac.in/