

Subject Code: 1ET4010503	Subject Title: Public Health Engineering
Pre-Requisite	----

RATIONALE:

Water is very important element in civilization. Social life from the ancient times developed on the bank of water-sources. If society wants to make remarkable growth, the mental as well as social health play vital role. For that purpose and to maintain the hygiene Pure, potable and palatable water needs to be supplied to the society. Water must be collected and disposed of in nature by giving proper treatment, so the natural flora and fauna will not get affected by sewage disposal. This course focuses on students' acquisition of knowledge, skills & practices in water supply and sanitary engineering. Knowledge about domestic water supply & sanitation system (external & internal) and house drainage & disposal facilities is imparted. The technician must know about the quality of domestic water to be supplied to the society and treatment of waste water. The knowledge and application of such aspects is essential in developing a good technician who should be conversant with the collection, conveyance, treatment, maintenance and disposal of waste water.

COURSE OBJECTIVE:

Following are the objectives of this course:

- To learn the principles for identification of sources of surface and subsurface water
- To learn calculation of population and requirement of drinking water
- To understand the plotting of water supply scheme highlighting different features
- To know evaluation of characteristics and treatment of sewage.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	0	2	4	60	40	20	30

DETAILS OF COURSE CONTENTS:

S. NO.	TOPIC	Total Hrs.	WEIGHTAGE
1	Sources, Demand and Quality of water: 1.1 Water supply schemes - Objectives, components, 1.2 Sources of water: Surface and Subsurface sources of water 1.3 Intake Structures, Definition and types, Factors governing the location of an intake structure, Types of intakes. 1.4 Demand of water: Factors affecting rate of demand, Variations of water demands,	08	18 %

	1.5 Forecasting of population, Methods of forecasting of population, (Simple problems on forecasting of population), Design period, estimating of quantity of water supply required for city or town. 1.6 Quality of water: Need for analysis of water, Characteristics of water- Physical, Chemical and Biological 1.7 Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli, B coli index, MPN, Sampling of water, Water quality standards as per IS 10500.		
2	Purification of water: 2.1 Purification of Water: Objectives of water treatment, Aeration- objects and methods of aeration. 2.2 Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, types of sedimentation tanks, Clary-flocculator. 2.3 Filtration - mechanization of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter. 2.4 Construction and working of slow sand filter and rapid sand filter, operational problems in filtration. 2.5 Disinfection: Objects, methods of disinfection. 2.6 Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, Flow diagram of water treatment plants. 2.7 Miscellaneous water Treatments: Introduction to water softening, DE fluoridation techniques.	10	24 %
3	Conveyance and Distribution of water: 3.1 Conveyance: Types of Pipes used for conveyance of water, choice of pipe material. 3.2 Types of joints & Types of valves- their use, location and function on a pipeline. 3.3 Distribution of water: Methods of distribution of water- Gravity, pumping, and combined system, Service reservoirs - functions and types 3.4 Layouts of distribution of Water-Dead end system, grid iron system, circular system, radial system; their suitability advantages and disadvantages.	07	17 %
4	Domestic sewage and System of Sewerages: 4.1 Building Sanitation: Necessity of sanitation, Necessity to treat domestic sewage, Definitions- Sewage, sullage, types of sewage.		

	4.2 Definition of the terms related to Building Sanitation Civil Engineering. Water pipe, Rain water pipe, Soil pipe, Sullage pipe, Vent pipe. 4.3 Building Sanitary Fittings-Water closet – Indian and European type, flushing cistern, wash basin, sinks, Urinals. 4.4 Traps types, qualities of good trap. Systems of plumbing - one pipe, two pipe, single stack, choice of system. 4.5 Principles regarding design of building drainage, inspection and junction chambers, their necessity, location, size and shape. 4.6 Systems of Sewerage and Sewer Appurtenances: Types of Sewers, Systems of sewerage, self-cleansing velocity and non-scouring velocity, Laying. 4.7 Testing and maintenance of sewers 4.8 Manholes and Drop Manhole-component parts, location, spacing, construction details, Sewer Inlets, Street Inlets.	10	24 %
5	Characteristics and treatment of Sewage: 5.1 Analysis of sewage: Characteristics of sewage, B.O.D., C.O.D. and its significance. Central Pollution Control Board Norms for discharge of treated sewage. 5.2 Objects of sewage treatment and flow diagram of conventional sewage treatment plant. 5.3 Treatment of Sewage: Screening, Types of screens, Grit removal, Skimming, Sedimentation of sewage, Aerobic and anaerobic process, Sludge digestion, trickling filters, Activated sludge process, Disposal of sewage, Oxidation Pond, Oxidation ditch. 5.4 Septic tank, Recycling and Reuse of domestic waste.	07	17 %

COURSE OUTCOME:

After competing this course, student will be able to:

1. Know the procedure to identify the sources of surface and subsurface water
2. Estimate the quantity of drinking water required for a population
3. Draw labeled layout for water supply scheme.
4. Device suitable water treatment technique.
5. Evaluate the characteristics and suggest treatment of sewage.

LIST OF PRACTICAL:

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of practical skills so that students are able to acquire the competencies (Program outcomes). Following is the list of exercises/practical/experiments for guidance.

SR. No.	Experiment / Practical
	PRACTICALS
1	Determine pH value of given sample of water.
2	Determine the turbidity of the given sample of water.
3	Determine residual chlorine in a given sample of water.
4	Determine suspended, dissolved solids and total solids of given sample of water.
5	Determine the dissolved oxygen in a sample of water.
6	Determine the optimum dose of coagulant in a given raw water sample by jar test.
7	Determine B.O.D. of given sample of sewage.
8	Determine pH value of given sample of sewage.
9	Determine suspended solids dissolved and total solids for sample of sewage.
10	Determine the dissolved oxygen in the given sample of sewage.
11	Determine C.O.D. of given sample of sewage.
	FIELD VISIT AND TUTORIALS
12	Undertake a field visit to water treatment plant and prepare a report.
13	Draw sketches of various valves used in water supply pipe line
14	Draw a sketch of one pipe and two pipe system of plumbing
15	Prepare a report of a field visit to sewage treatment plant

LIST OF REFERENCES:

- 1 Sharma S.C, Environmental Engineering, Khanna Publishing House, New Delhi
- 2 Garg, S.K., Environmental Engineering Vol. I and Vol. II, Khanna Publishers
- 3 Birdie, G. S. and Birdie, J. S. Water Supply and Sanitary Engineering, Dhanpat Rai
- 4 Gupta, O.P., Elements of Environmental Pollution Control, Khanna Publishing House, Delhi
- 5 Rao, C.S., Environmental Pollution Control Engineering, New Age International
- 6 Punmia, B C, Environmental Engineering, vol. I and II, Laxmi Publishers
- 7 Peavy H S, Rowe D R, and Tchobanoglous G, Environmental Engineering, McGraw
- 8 Basak N N, Environmental Engineering, McGraw Hill Publishers.