Devi Ahilya University Indore, India Institute of Engineering & Technology				II B.E. (CIVIL ENGINEERING) (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR4G2 Environmental Engineering-I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

1. To provide knowledge of Water Supply scheme to fulfil public demand.
2. To learn the Water treatment technological options for different quality of water.
3. To learn the sewerage treatment process for community waste water.
4. To know about the different pipe material and sewer materials and should be able to select the most appropriate material.

Pre-requisites: Engineering Chemistry.

COURSE CONTENTS

Unit – I

Planning for Water Supply System:

Public water supply system, planning, objectives, Design period, Population forecasting-different methods limitations and field practice., Water demand, fluctuation in demand (daily, hourly and seasonal), Sources of water and their characteristics,

Water Quality Characterisation and standards, types of impurities and their sources and effects, water borne diseases, examination of water (physical, chemical, bacteriological and sanitary), significance of important parameters, Water Quality Index.

Unit - II

Conveyance & Distribution System:

Water supply Intake structures, Pipes and conduits for water, Materials and class of pipes-specification, merits & demerits of pipes Cast iron ,mild steel pipes, asbestos cement, R.C.C and pre-stressed pipes. Selection of pump and pipe materials, types of pumps, Types of distribution systems, layout of Distribution System, Analysis of Water Distribution system by Hardy Cross Method.

Unit – 3

Water Treatment:

Objectives of water treatment, unit operations and processes. Methods of water treatment, theory and design of sedimentation, coagulation, filtration, disinfection, aeration, water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Unit-4

Quality of Waste Water

Characterisation & composition physical, chemical, microbiological, primary parameters of pollution BOD, COD, total solids, volatile solids total organic carbon, nitrogen & its forms, pH, Chlorides, Colour, Toxic Substances, Micro Organisms etc.

Unit - 5

Design of Sewerage System:

Types of systems, sanitary sewers, storm sewers, combined and partially combined sewers, quantity of sewerage, infiltration, design period, factors, self cleaning velocity, maximum velocity depth/section of sewers, minimum size, slope, alignments. Sewer Appurtenances like Manholes, drop manhole, lamp hole, ventilating shafts etc, Use of Manning's Formula, Partial Flow in Sewers, Design of Sewers from Flow Charts, Pumping of Sewage.

Learning Outcomes: upon completion of this course the students will be able to

- Design the Water Treatment plant for a given population and characteristics of raw water.
- Project the population of community for given design period by different methods.
- Design the Sewerage system for domestic waste water.
- To understand the layout of distribution system to supply water to community.

Books & References Recommended :

1. Kshirsagar K.R., *Water Supply Engg*.
2. Kshirsagar K.R., *Sanitary Engg*.
3. Hussain, *Water Supply and Sanitary Engg*.
4. Birdi G.S., *Public Health Engg*.
5. Punmia, B.C. *Water Supply Engineering* - Laxmi Publications (P) Ltd. New Delhi
6. Garg S.K., "Environmental Engineering", Vol 1,Khanna Publishers, New Delhi 2005.
7. Garg S.K., Environmental Engineering", Vol 2, Khanna Publishers, New Delhi
8. Relevant IS Codes.