4015 - PUBLIC HEALTH ENGINEERING

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
					Theory		Practical Ex.	Total
Lectures	Practical	Credits						
4	2	6	25	25	3Hrs	100	0	150

Pre-requisite	Source
Nil	CVL

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	—	125

RATIONALE: - The syllabus consist of four parts viz- water supply, sanitary engineering, house plumbing and drainage and solid waste The students should obtain a general exposure to water and waste water treatment and develop detailed understanding of conveyance and plumbing systems. The student is not expected to achieve detailed knowledge of chemical and microbial actions, but only the relevance of controlling parameters. The scope of the syllabus and depth is restricted to prescribed text-books only.

COURSE CONTENTS	Hrs	Mks
1. GENERAL	2	4
Public health- Sanitation, hygiene and pollution. Role of public health engineer. Importance of environment protection.		
2. SOURCES OF WATER	3	4
Surface water and ground water resources. Factors controlling the selection of sources. A brief idea of rural and urban water supply schemes.		
3. WATER QUALITY	5	8
Requirements of wholesome water. Necessity of treatment and aims of purification. Precaution against water borne diseases. Physical, chemical and biological requirements. Common important parameters to understand water quality. (Detailed procedures for conducting tests not expected). Permissible limits of impurities as per I. S. 2296 : 1982.		
4. WATER DEMAND	5	8
Quantity of water for domestic. Industrial and public use. Estimation of water demand. Variation of demand-Monthly, daily and hourly variations. Losses and wastage. Methods of population forecast (No problems)		
5. WATER TREATMENT	8	12
(No designs and problems) [only overview of treatment expected]. Flow diagrams of a water treatment plant, necessity of various units of treatment-principles, function and use of each. Aeration of water, purpose methods. Flocculation and sedimentation- Coagulation-common coagulants used, clari-floculators, sludge removal, detention period. Filtration- Types of filters, description of rapid sand and filters, their advantages and disadvantages, suitability. Disinfection- Chlorination, different methods of application, action of chlorine, breakpoint chlorination, residual chlorine, de-chlorination, introduction to other methods of dis-infection-ozonation, ultraviolet rays.		
6. DISTRIBUTION OF WATER	6	10
Methods of distribution- Description of tree, circular and radial layout of network (no designs). Service reservoirs- Ground level, elevated type, purpose and requirements. Systems of supply: continuous and intermittent, advantages and disadvantages. Types of pipes, laying, jointing and testing of pipes. Appurtenances- Gate valves, check valves. air- relief valves, non-return valves, fire hydrants, location and use of each.		
7. PLUMBING	6	8
House service connections from the street mains. Detailed of internal distribution of water supply in a building, with position of all specials and appurtenances. Details of plumbing, types of pipes and fittings.		

8. SEWAGE Sewage- General considerations and characteristics, definition of sewage, sullage domestic sewage, industrial sewage, septic sewage, dry weather flow. Water carriage system, principles of working, advantages and disadvantages, self - cleansing velocity and gradient, maximum and minimum velocities. Factors affecting size of sewer materials. General layout of sewers [no design]- Lateral, sub-main, main, trunk sewer, interception and out-fall sewer. Manholes-Location and function, sewer ventilation: necessity and methods.	8	12
9. SEWAGE TREATMENT [No designs and problems] [Only overview of treatment expected]. Flow diagram of a sewage treatment plant, necessity of primary, secondary and tertiary treatment, objectives of sewage treatment. Introduction to distinguish between aerobic and anaerobic decomposition, B.O.D. and C.O.D. Definition and relevance. Necessity of various units of treatment- Principle, functions and use of each-clarifiers, detritus tank, trickling filter, sludge digesters, sludge drying beds, introduction to activated sludge process, effluent discharge.	8	12
10. HOUSING DRAINAGE AND SANITATION General principles of house drainage. Details of sanitary plumbing- Single stack system, double stack system, types of pipes and fittings. Different types of traps- Location and function, inspection chamber. Details of internal connections in a building, position of all specials and fittings. Septic tank and soak-pit- Location, functioning and design criteria, use of standard tables for design.	8	12
11. SOLID WASTE AND DISPOSAL Dry refuse, rubbish, garbage, definitions and common constituents. Brief idea of collection and disposal methods of dry refuse.	5	10
Total	64	100

TERM WORK

1) Study of water treatment process including drawing of flowcharts.
2) Study of sewage treatment process including drawing of flowcharts.
3) Design and drawing of a septic-tank, soak pit.
4) Detailed drawings of water supply and sanitary plumbing systems for a two storeyed residential buildings.
5) Study on use of nomograms based on Hazen William formula and Manning`s formula – problem solving exercise to illustrate use of nomograms.
6) Tests on water or waste -water sample to understand the relevance of the following parameters:- Any four) pH, suspended solids, turbidity, residual chlorine, dissolved oxygen, B.O.D., colour, jar test.

REFERENCE BOOKS

1. Environmental Engineering by Kamala & Rao.
2. Water Supply & Sanitary Engineering by S .K. Hussein
3. Sewage Treatment & Sewerage by S. K. Garg.
4. Water Supply Engineering by S. K. Garg.
5. Water Supply & Sanitary Engineering by G.S. Birdi
6. Water Supply & Sanitary Engineering by Gurucharan Singh
7. Water Supply & Sanitary Engineering by S.C. Rangawala.