Deparment: Civil Engineering	Semester : 5th Sem SEC A	Name of the Teaching faculty: Manas Ranjan Sahoo	
Subject :- Th4. Water Supply & Waste Water Engineering	No.of Days/ week class allotted : 05/week	Semester from date: 15/09/2022 to 22/12/2022 No. of Weeks :15 Topics to be covered:-	
Week	**Class Day**	**Topics**	**Remarks**
1 st Week: (15 th Sept- 17th Sept)		**1.Introduction to Water Supply, Quantity and Quality of water**	
	1st	1.1 Necessity of treated water supply	
	2nd	1.2 Per capita demand, variation in demand and factors affecting demand	
2nd Week: (18th sept-24 th sept)	1st	1.3 Methods of forecasting population, Numerical problems using different methods	
	2nd	1.3 Methods of forecasting population, Numerical problems using different methods	
	3rd	1.4 Impurities in water – organic and inorganic, Harmful effects of impurities	
	4th	1.4 Impurities in water – organic and inorganic, Harmful effects of impurities	
	5th	1.5 Analysis of water –physical, chemical and bacteriological	
3 rd Week: (26 th Sept-1st Oct)	1st	1.5 Analysis of water –physical, chemical and bacteriological	
	2nd	1.6 Water quality standards for different uses	
	3rd	1.6 Water quality standards for different uses	
		2.Sources and Conveyance of water	
	4th	2.1 Surface sources – Lake, stream, river and impounded reservoir	
	5th	2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well	
4th week	**vacation**		
5 th Week: (10 th Oct- 15 th Oct)	1st	2.3 Yield from well- method s of determination, Numerical problems using yield formulae (deduction excluded)	
	2nd	2.3 Yield from well- method s of determination, Numerical problems using yield formulae (deduction excluded)	
	3rd	2.4 Intakes – types, description of river intake, reservoir intake, canal intake	

5 th Week: (10 th Oct- 15 th Oct)	4th	2.5 Pumps for conveyance & distribution – types, selection, installation.	
	5th	2.6 Pipe materials – necessity, suitability, merits & demerits of each type	
6 th Week: (17 th Oct- 22 nd Oct)	1st	2.7 Pipe joints – necessity, types of joints, suitability, methods of jointing Laying of pipes - method	
		3.Treatment of water	
	2nd	3.1 Flow diagram of conventional water treatment system	
	3rd	3.2 Treatment process / units : 3.2.1 Aeration ; Necessity	
	4th	3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance	
	5th	3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance	
6 th Week: (24 th Oct- 30 th Oct)	2nd	3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)	
	3rd	3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)	
	4th	3.2.4 Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features	
	5th	3.2.4 Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features	
8 th Week: (31st oct- 5th Nov)	1st	3.2.5 Disinfection : Necessity, methods of disinfectionChlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super- chlorination	
	2nd	3.2.5 Disinfection : Necessity, methods of disinfectionChlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super- chlorination	
	3rd	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)	

8 th Week: (31st oct- 5th Nov)	4th	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)	
		4.Distribution system And Appurtenance in distribution system:	
	5th	4.1 General requirements, types of distribution system-gravity, direct and combined	
9 th Week: (7 th Nov -12 th Nov)	1st	4.1 General requirements, types of distribution system-gravity, direct and combined	
	3rd	4.2 Methods of supply – intermittent and continuous	
	4th	4.2 Methods of supply – intermittent and continuous	
	5th	4.3 Distribution system layout – types, comparison, suitability	
10 th Week: (14 th Nov -19 th Nov)	1st	4.3 Distribution system layout – types, comparison, suitability	
	2nd	4.4 Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, Fire hydrants, Water meters	
	3rd	4.4 Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, Fire hydrants, Water meters	
		5.W/s plumbing in building :	
	4th	5.1 Method of connection from water mains to building supply	
	5th	5.2 General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.	
11 th Week: (21st Nov - 26 th Nov)		**SECTION B: WASTE WATER ENGINEERING**	
		6.Introduction	
	1st	6.1 Aims and objectives of sanitary engineering	
	2nd	6.2 Definition of terms related to sanitary engineering	
	3rd	6.2 Definition of terms related to sanitary engineering	
	4th	6.3 Systems of collection of wastes– Conservancy and Water Carriage System – features, comparison, suitability	
	5th	6.3 Systems of collection of wastes– Conservancy and Water Carriage System – features, comparison, suitability	
12 th Week: (28 th Nov -3 rd) Dec		**7.Quantity and Quality of sewage**	
	1st	7.1 Quantity of sanitary sewage – domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage.	
	2nd	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring	
	3rd	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring	
	4th	7.3 General importance, strength of sewage, Characteristics of sewage- physical, chemical & biological	

	5th	7.3 General importance, strength of sewage, Characteristics of sewage-physical, chemical & biological	
13 th Week: (5 th Dec -10 th Dec)	1st	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD	
	2nd	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD	
		8.Sewerage system	
	3rd	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability	
	4th	8.2 Shapes of sewer – rectangular, circular, avoid-features, suitability	
	5th	8.2 Shapes of sewer – rectangular, circular, avoid-features, suitability	
14 th Week: (12 th Dec -17 th Dec)	1st	8.3 Laying of sewer-setting out sewer alignment	
	2nd	8.3 Laying of sewer-setting out sewer alignment	
		9.Sewer appurtenances and Sewage Disposal:	
	3rd	9.1 Manholes and Lamp holes – types, features, location, function	
14 th Week: (12 th Dec -17 th Dec)	4th	9.2 Inlets, Grease & oil trap – features, location, function	
	5th	9.3 Storm regulator, inverted siphon – features, location, function	
15 th Week: (19 th Dec-22nd Dec)	1st	9.4 Disposal on land – sewage farming, sewage application and dosing,sewge sickness-causes and remedies	
	2nd	9.4 Disposal on land – sewage farming, sewage application and dosing,sewge sickness-causes and remedies	
	3rd	9.5 Disposal by dilution – standards for disposal in different types of water bodies, self purification of stream	
	4th	9.5 Disposal by dilution – standards for disposal in different types of water bodies, self purification of stream	
		10.Sewage treatment :	
		10.1 Principles of treatment, flow diagram of conventional treatment	
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EXTRA CLASSES	10.2 Primary treatment – necessity, principles, essential features, functions	
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	10.3 Secondary treatment – necessity, principles, essential features, functions	
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	11. Sanitary plumbing for building :	
	11.1 Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage	
	11.2 Plumbing arrangement of single storied & multi storied building as per I.S. code practice	
	11.3 Sanitary fixtures – features, function, and maintenance and fixing of the fixtures – water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe	

Manas Ranjan Sahoo

Signature of Faculty