

## Lesson Plan:

**(5 periods per week, total 75 periods in SEM)**

<b>Discipline:</b> Civil engineering	<b>Sem.:</b> 5 <sup>TH</sup>	<b>Name of teaching faculty:</b> Laxmidhara Sahoo (PTGF)
<b>Sub:</b> WS&WWE	<b>No. of days/per week class allotted:</b> 5	<b>Sem. From date:</b> 16.08.2024 <b>To date:</b> <b>No. of weeks:</b> 15
<b>Week</b>	<b>Class Day</b>	<b>Topics</b>
<b>Introduction to Water Supply, Quantity and Quality of water (10 hours)</b>		
1 <sup>st</sup>	1 <sup>ST</sup>	1.1 Necessity of treated water supply, 1.2 Per capita demand
	2 <sup>ND</sup>	1.2 Per capita demand, variation in demand and factors affecting demand
	3 <sup>RD</sup>	1.3 Methods of forecasting population, Numerical problems using different methods
	4 <sup>TH</sup>	1.3 Methods of forecasting population, Numerical problems using different methods
	5 <sup>th</sup>	1.3 Methods of forecasting population, Numerical problems using different methods
2 <sup>nd</sup>	1 <sup>st</sup>	1.3 Methods of forecasting population, Numerical problems using different methods
	2 <sup>nd</sup>	1.3 Methods of forecasting population, Numerical problems using different methods
	3 <sup>rd</sup>	1.4 Impurities in water – organic and inorganic, Harmful effects of impurities, 1.5 Analysis of water –physical, chemical and bacteriological
	4 <sup>th</sup>	1.5 Analysis of water –physical, chemical and bacteriological
	5 <sup>th</sup>	1.6 Water quality standards for different uses
<b>2 Sources and Conveyance of water (8 hours)</b>		
3 <sup>rd</sup>	1 <sup>st</sup>	2.1 Surface sources – Lake, stream, river and impounded reservoir
	2 <sup>nd</sup>	2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
	3 <sup>rd</sup>	2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
	4 <sup>th</sup>	Yield from well- method s of determination, Numerical problems using yield formulae

	5 <sup>th</sup>	Yield from well- methods of determination, Numerical problems using yield formulae
4 <sup>th</sup>	1 <sup>st</sup>	Yield from well- methods of determination, Numerical problems using yield formulae
	2 <sup>nd</sup>	2.4 Intakes – types, description of river intake, reservoir intake, canal intake 2.5 Pumps for conveyance & distribution – types, selection, installation.
	3 <sup>rd</sup>	2.6 Pipe materials – necessity, suitability, merits & demerits of each type 2.7 Pipe joints – necessity, types of joints, suitability, methods of jointing Laying of pipes – method
	<b>3 Treatment of water 12hrs</b>	
	4 <sup>th</sup>	3.1 Flow diagram of conventional water treatment system 3.2 Treatment process / units : 3.2.1 Aeration ; Necessity
	5 <sup>th</sup>	3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance
5 <sup>th</sup>		3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance
		3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)
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	4 <sup>th</sup>	3.2.4 Filtration: Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features
	5 <sup>th</sup>	3.2.4 Filtration: Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features
6 <sup>th</sup>	1 <sup>st</sup>	3.2.5 Disinfection: Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine,

		residual chlorine, pre-chlorination, break point chlorination, super-chlorination
	2 <sup>nd</sup>	3.2.5 Disinfection: Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super chlorination
	3 <sup>rd</sup>	3.2.5 Disinfection: Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super-chlorination
	4 <sup>th</sup>	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)
	5 <sup>th</sup>	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)
	<b>4 Distribution system and Appurtenance in distribution system 8hours</b>	
7 <sup>th</sup>	1 <sup>st</sup>	4.1 General requirements, types of distribution system-gravity, direct and combined
	2 <sup>nd</sup>	4.1 General requirements, types of distribution system-gravity, direct and Combined 4.2 Methods of supply – intermittent and continuous
	3 <sup>rd</sup>	4.2 Methods of supply – intermittent and continuous
	4 <sup>th</sup>	4.3 Distribution system layout – types, comparison, suitability
	5 <sup>th</sup>	4.3 Distribution system layout – types, comparison, suitability
8 <sup>th</sup>	1 <sup>st</sup>	4.4 Valves-types, features, uses, purpose-slucice valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	2 <sup>nd</sup>	4.4 Valves-types, features, uses, purpose-slucice valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	3 <sup>rd</sup>	4.4 Valves-types, features, uses, purpose-slucice valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	<b>5 W/s plumbing in building 2hrs</b>	
	4 <sup>th</sup>	5.1 Method of connection from water mains to building supply

	5 <sup>th</sup>	5.2 General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.
	<b>SECTION B:WASTE WATER ENGINEERING</b>	
	<b>6 Introduction 5hrs</b>	
9 <sup>th</sup>	1 <sup>st</sup>	6.1 Aims and objectives of sanitary engineering 6.2 Definition of terms related to sanitary engineering
	2 <sup>nd</sup>	6.2 Definition of terms related to sanitary engineering
	3 <sup>rd</sup>	6.3 Systems of collection of wastes– Conservancy
	4 <sup>th</sup>	Water Carriage System – features, comparison, suitability
	5 <sup>th</sup>	Water Carriage System – features, comparison, suitability
	<b>7 Quantity and Quality of sewage 7hrs</b>	
10 <sup>th</sup>	1 <sup>st</sup>	7.1 Quantity of sanitary sewage – domestic & industrial sewage, variation in sewage flow,
	2 <sup>nd</sup>	numerical problem on computation quantity of sanitary sewage.
	3 <sup>rd</sup>	numerical problem on computation quantity of sanitary sewage.
	4 <sup>th</sup>	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring
	5 <sup>th</sup>	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring
11 <sup>th</sup>	1 <sup>st</sup>	7.3 General importance, strength of sewage, Characteristics of sewage-physical, chemical & biological
	2 <sup>nd</sup>	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD
	<b>8 Sewerage system 5hrs</b>	
	3 <sup>rd</sup>	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability
	4 <sup>th</sup>	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability
	5 <sup>th</sup>	8.2 Shapes of sewer – rectangular, circular, avoid-features, suitability 8.3 Laying
12 <sup>th</sup>	1 <sup>st</sup>	8.3 Laying of sewer-setting out sewer alignment
	2 <sup>nd</sup>	8.3 Laying of sewer-setting out sewer alignment

	<b>9 Sewer appurtenances and Sewage Disposal: 7 hrs</b>	
	3 <sup>rd</sup>	9.1 Manholes and Lamp holes – types, features, location, function
	4 <sup>th</sup>	9.1 Manholes and Lamp holes – types, features, location, function
	5 <sup>th</sup>	9.2 Inlets, Grease & oil trap – features, location, function
<b>13<sup>th</sup></b>	1 <sup>st</sup>	9.3 Storm regulator, inverted siphon – features, location, function
	2 <sup>nd</sup>	9.4 Disposal on land – sewage farming, sewage application and dosing,
	3 <sup>rd</sup>	sewage sickness-causes and remedies
	4 <sup>th</sup>	9.5 Disposal by dilution – standards for disposal in different types of water bodies, self purification of stream
	<b>10 Sewage treatment : 8hrs</b>	
	5 <sup>th</sup>	10.1 Principles of treatment, flow diagram of conventional treatment
<b>14<sup>th</sup></b>	1 <sup>st</sup>	10.1 Principles of treatment, flow diagram of conventional treatment
	2 <sup>nd</sup>	10.2 Primary treatment – necessity, principles, essential features, functions
	3 <sup>rd</sup>	10.2 Primary treatment – necessity, principles, essential features, functions
	4 <sup>th</sup>	10.2 Primary treatment – necessity, principles, essential features, functions
	5 <sup>th</sup>	10.3 Secondary treatment – necessity, principles, essential features, functions
<b>15<sup>th</sup></b>	1 <sup>st</sup>	10.3 Secondary treatment – necessity, principles, essential features, functions
	2 <sup>nd</sup>	10.3 Secondary treatment – necessity, principles, essential features, functions
	<b>11 Sanitary plumbing for building : 3hrs</b>	
	3 <sup>rd</sup>	11.1 Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
	4 <sup>th</sup>	11.2 Plumbing arrangement of single storied & multi storied building as per I.S. code practice

	5 <sup>th</sup>	11.3 Sanitary fixtures – features, function, and maintenance and fixing of the fixtures – water closets, flushing cisterns, urinals, inspection chambers, traps, antisiphonage pipe
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