

**LESSON PLAN: (WATER SUPPLY & WASTE WATER ENGINEERING)**

<b>Discipline :</b>	<b>CIVIL ENGINEERING</b>	
<b>Faculty :</b>	<b>SUMAN PATEL</b>	
<b>Semester :</b>	<b>5TH</b>	
<b>Duration :</b>	<b>14 WEEKS (15<sup>th</sup> September 2022 to 22<sup>nd</sup> December 2022)</b>	
<b>Work Load :</b>	<b>Lecture :</b>	<b>5 Lectures per week (50 minutes per Class)</b>
<b>Week</b>	<b>Week Day</b>	<b>Theory</b>
1 <sup>st</sup>	1 <sup>st</sup>	Necessity of treated water supply
	2 <sup>nd</sup>	Per capita demand, variation in demand and factors affecting demand
	3 <sup>rd</sup>	Methods of forecasting population
	4 <sup>th</sup>	Methods of forecasting population
	5 <sup>th</sup>	Numerical problems using different methods
2 <sup>nd</sup>	6 <sup>th</sup>	Impurities in water – organic and inorganic,
	7 <sup>th</sup>	Harmful effects of impurities
	8 <sup>th</sup>	Analysis of water –physical,
	9 <sup>th</sup>	Analysis of water chemical and bacteriological
	10 <sup>th</sup>	Water quality standards for different uses
3 <sup>rd</sup>	11 <sup>th</sup>	Surface sources – Lake, stream, river and impounded reservoir
	12 <sup>th</sup>	Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
	13 <sup>th</sup>	Yield from well- method s of determination, Numerical problems using yield formulae ( deduction excluded
	14 <sup>th</sup>	Intakes – types, description of river intake, reservoir intake, canal intake
	15 <sup>th</sup>	Pumps for conveyance & distribution – types, selection, installation
4 <sup>th</sup>	16 <sup>th</sup>	Pipe materials – necessity, suitability, merits & demerits of each ty
	17 <sup>th</sup>	Pipe joints – necessity, types of joints, suitability,
	18 <sup>th</sup>	Methods of jointing Laying of pipes – method
	19 <sup>th</sup>	<i>Design of treatment units excluded.</i>
	20 <sup>th</sup>	Flow diagram of conventional water treatment sys
5 <sup>th</sup>	21 <sup>st</sup>	Aeration ; Necessity
	22 <sup>nd</sup>	Plain Sedimentation : Necessity, working principles,
	23 <sup>rd</sup>	Sedimentation tanks – types, essential features, operation & maintenance
	24 <sup>th</sup>	Principles of coagulation, types of coagulants, Flash Mixer,
	25 <sup>th</sup>	Flocculator, Clarifier (Definition and concept only)
6 <sup>th</sup>	26 <sup>th</sup>	Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features
	27 <sup>th</sup>	Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine,
	28 <sup>th</sup>	Residual chlorine, pre-chlorination, break point chlorination, super- chlorination
	29 <sup>th</sup>	Softening of water – Necessity, Methods of softening –
		30 <sup>th</sup>
7 <sup>th</sup>	31 <sup>st</sup>	General requirements, types of distribution system-gravity,
	32 <sup>nd</sup>	Types of distribution system direct and combined
	33 <sup>rd</sup>	Methods of supply – intermittent and continuous
	34 <sup>th</sup>	Distribution system layout – types, comparison, suitability Valves-types, features, uses
	35 <sup>th</sup>	Purpose-slucie valves, check valves

8 <sup>th</sup>	36 <sup>th</sup>	Air valves, scour valves,
	37 <sup>th</sup>	Fire hydrants, Water meters
	38 <sup>th</sup>	Method of connection from water mains to building supply
	39 <sup>th</sup>	General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.
9 <sup>th</sup>	40 <sup>th</sup>	Aims and objectives of sanitary engineering
	41 <sup>st</sup>	Definition of terms related to sanitary engineering
	42 <sup>nd</sup>	Systems of collection of wastes– Conservancy
	43 <sup>rd</sup>	Water Carriage System
	44 <sup>th</sup>	features, comparison, suitability
10 <sup>th</sup>	45 <sup>th</sup>	Quantity of sanitary sewage – domestic & industrial sewage
	46 <sup>th</sup>	Variation in sewage flow, numerical problem on computation quantity of sanitary sewage.
	47 <sup>th</sup>	Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring
	48 <sup>th</sup>	General importance, strength of sewage, Characteristics of sewage-physical,
	49 <sup>th</sup>	Characteristics of sewage chemical & biological
11 <sup>th</sup>	50 <sup>th</sup>	Concept of sewage-sampling, tests for – solids, pH,
	51 <sup>st</sup>	Dissolved oxygen, BOD, COD
	52 <sup>nd</sup>	Types of system-separate, combined, partially separate
	53 <sup>rd</sup>	Features, comparison between the types, suitability
	54 <sup>th</sup>	Shapes of sewer – rectangular, circular
12 <sup>th</sup>	55 <sup>th</sup>	Avoid-features, suitability
	56 <sup>rd</sup>	Laying of sewer-setting out sewer alignment
	57 <sup>th</sup>	Manholes and Lamp holes – types, features, location, function
	58 <sup>th</sup>	Inlets, Grease & oil trap – features, location, function
	59 <sup>th</sup>	Storm regulator, inverted siphon – features, location, function
13 <sup>th</sup>	60 <sup>th</sup>	Disposal on land – sewage farming, sewage application
	61 <sup>th</sup>	Dosing, sewage sickness-causes and remedies
	62 <sup>th</sup>	Disposal by dilution – standards for disposal in different types of water bodies,
	63 <sup>th</sup>	Self purification of stream
	64 <sup>th</sup>	Principles of treatment
14 <sup>th</sup>	65 <sup>th</sup>	Flow diagram of conventional treatment
	66 <sup>th</sup>	Primary treatment – necessity,
	67 <sup>th</sup>	Principles, essential features of primary treatment
	68 <sup>th</sup>	functions of primary treatment
	69 <sup>th</sup>	Secondary treatment – necessity
	70 <sup>th</sup>	Principles, essential features
	71 <sup>st</sup>	Functions of secondary treatment
	72 <sup>nd</sup>	Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
	73 <sup>rd</sup>	Plumbing arrangement of single storied & multi storied building as per I.S. code practice
	74 <sup>th</sup>	Sanitary fixtures – features, function, and maintenance and fixing of the fixtures – water closets
	75 <sup>th</sup>	Flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe