

Government Polytechnic, Malkangiri

Lesson plan: WATER SUPPLY AND WASTE WATER ENGINEERING

Discipline: Civil engineering	Semester : 5TH	Name of Teaching faculty: BINOD JENA (PTGF)
Subject: WS&W WE	No. of days/ per week class alloted: 5	Semester from Date: 15/ 09/2022 To Date: 21/01/22023
Week	Class Day	Topics
Introduction to Water Supply, Quantity and Quality of water (10 hours)		
1st	1 ST	1.1 Necessity of treated water supply, 1.2 Per capita demand
	2 ND	1.2 Per capita demand, variation in demand and factors affecting demand
	3 RD	1.3 Methods of forecasting population, Numerical problems using different methods
	4 TH	1.3 Methods of forecasting population, Numerical problems using different methods
	5 th	1.3 Methods of forecasting population, Numerical problems using different methods
2nd	1 st	1.3 Methods of forecasting population, Numerical problems using different methods
	2 nd	1.3 Methods of forecasting population, Numerical problems using different methods
	3 rd	1.4 Impurities in water – organic and inorganic, Harmful effects of impurities, 1.5 Analysis of water –physical, chemical and bacteriological
	4 th	1.5 Analysis of water –physical, chemical and bacteriological
	5 th	1.6 Water quality standards for different uses
2 Sources and Conveyance of water (8 hours)		
3rd	1 st	2.1 Surface sources – Lake, stream, river and impounded reservoir
	2 nd	2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
	3 rd	2.2 Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
	4 th	Yield from well- method s of determination, Numerical problems using yield formulae
	5 th	Yield from well- method s of determination, Numerical problems using yield formulae
4th	1 st	Yield from well- method s of determination, Numerical problems using yield formulae

	2 nd	2.4 Intakes – types, description of river intake, reservoir intake, canal intake 2.5 Pumps for conveyance & distribution – types, selection, installation.
	3 rd	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
3 Treatment of water 12hrs		
	4 th	3.1 Flow diagram of conventional water treatment system 3.2 Treatment process / units : 3.2.1 Aeration ; Necessity
	5 th	3.2.2 Plain Sedimentation : Necessity, working principles, Sedimentation tanks – types, essential features, operation & maintenance
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		3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)
		3.2.3 Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, Clarifier (Definition and concept only)
	4 th	3.2.4 Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features
	5 th	3.2.4 Filtration : Necessity, principles, types of filters Slow Sand Filter, Rapid Sand Filter and Pressure Filter – essential features
6 th	1 st	3.2.5 Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, superchlorination
	2 nd	3.2.5 Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, superchlorination
	3 rd	3.2.5 Disinfection : Necessity, methods of disinfection Chlorination – free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, superchlorination
	4 th	3.2.6 Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)
	5 th	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 8hours		
7 th	1 st	4.1 General requirements, types of distribution system-gravity, direct and combined
	2 nd	4.1 General requirements, types of distribution system-gravity, direct and Combined 4.2 Methods of supply – intermittent and continuous
	3 rd	4.2 Methods of supply – intermittent and continuous
	4 th	4.3 Distribution system layout – types, comparison, suitability

	5 th	4.3 Distribution system layout – types, comparison, suitability
8 th	1 st	4.4 Valves-types, features, uses, purpose-slucie valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	2 nd	4.4 Valves-types, features, uses, purpose-slucie valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	3 rd	4.4 Valves-types, features, uses, purpose-slucie valves, check valves, air valves, scour valves, Fire hydrants, Water meters
	5 W/s plumbing in building 2hrs	
	4 th	5.1 Method of connection from water mains to building supply
	5 th	5.2 General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.
SECTION B:WASTE WATER ENGINEERING		
6 Introduction 5hrs		
9 th	1 st	6.1 Aims and objectives of sanitary engineering 6.2 Definition of terms related to sanitary engineering
	2 nd	6.2 Definition of terms related to sanitary engineering
	3 rd	6.3 Systems of collection of wastes– Conservancy
	4 th	Water Carriage System – features, comparison, suitability
	5 th	Water Carriage System – features, comparison, suitability
7 Quantity and Quality of sewage 7hrs		
10 th	1 st	7.1 Quantity of sanitary sewage – domestic & industrial sewage, variation in sewage flow,
	2 nd	numerical problem on computation quantity of sanitary sewage.
	3 rd	numerical problem on computation quantity of sanitary sewage.
	4 th	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring
	5 th	7.2 Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow : self-cleaning and scouring
11 th	1 st	7.3 General importance, strength of sewage, Characteristics of sewage-physical, chemical & biological
	2 nd	7.4 Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD
	8 Sewerage system 5hrs	
	3 rd	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability

	4 th	8.1 Types of system-separate, combined, partially separate , features, comparison between the types, suitability
	5 th	8.2 Shapes of sewer – rectangular, circular, avoid-features, suitability 8.3 Laying
12 th	1 st	8.3 Laying of sewer-setting out sewer alignment
	2 nd	8.3 Laying of sewer-setting out sewer alignment
	9 Sewer appurtenances and Sewage Disposal: 7 hrs	
	3 rd	9.1 Manholes and Lamp holes – types, features, location, function
	4 th	9.1 Manholes and Lamp holes – types, features, location, function
	5 th	9.2 Inlets, Grease & oil trap – features, location, function
	13 th	1 st
2 nd		9.4 Disposal on land – sewage farming, sewage application and dosing,
3 rd		sewage sickness-causes and remedies
4 th		9.5 Disposal by dilution – standards for disposal in different types of water bodies, self purification of stream
10 Sewage treatment : 8hrs		
5 th		10.1 Principles of treatment, flow diagram of conventional treatment
14 th	1 st	10.1 Principles of treatment, flow diagram of conventional treatment
	2 nd	10.2 Primary treatment – necessity, principles, essential features, functions
	3 rd	10.2 Primary treatment – necessity, principles, essential features, functions
	4 th	10.2 Primary treatment – necessity, principles, essential features, functions
	5 th	10.3 Secondary treatment – necessity, principles, essential features, functions
15 th	1 st	10.3 Secondary treatment – necessity, principles, essential features, functions
	2 nd	10.3 Secondary treatment – necessity, principles, essential features, functions
	11 Sanitary plumbing for building : 3hrs	
	3 rd	11.1 Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
	4 th	11.2 Plumbing arrangement of single storied & multi storied building as per I.S. code

		practice
	5 th	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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