GOVERNMENT POLYTECHNIC, BALANGIR

DEPARTMENT OF CIVIL ENGINEERING

LESSION PLAN

SESSION 2022-23

SUBJECT: WATER SUPPLY AND WASTEWATER ENGINEERING	BRANCH: CIVIL ENGINEERING
NAME OF THE FACULTY: KSHIROD BIHARI RANA & RAJ KRISHNA NANDA	SEMESTER: 5TH
SEMESTER FROM DATE: 15/9/2022 to DATE: 22/12/2022	

SL NO.	CHAPTER	HOURS	LECTURE NO.	TOPIC TO BE COVERED
1	CHAPTER 01	10		SECTION A: WATER SUPLLY ENGINEERING Introduction to Water Supply, Quantity and Quality of Water
			1	Introduction
			2	Necessity of treated water supply, Per capita demand
			3	variation in demand, factors affecting demand.
			4	Methods of forecasting population: a. Arithmetic Increase Method b. Geometric Increase Method
			5	Methods of forecasting population: c. Incremental Increase Method
			6	Impurities in water – organic and inorganic, Harmful effects of impurities
			7	Physical Analysis of water
			8	Chemical Analysis of water
			9	Bacteriological Analysis of water
			10	Water quality standards for different uses
2	CHAPTER 02	8		Sources and Conveyance of water
			1	Surface sources – Lake, stream, river, and impounded reservoir
			2	Underground sources – aquifer type & occurrence – Infiltration gallery, infiltration well, springs, well
			3	Yield from well- method s of determination, Numerical problems using yield formulae (deduction excluded)
			4	Intakes – types, description of river intake, reservoir intake, canal intake
			5	Pumps for conveyance & distribution – types, selection, installation.
			6	Pipe materials – necessity, suitability, merits & demerits of each type
			7	Pipe joints – necessity, types of joints, suitability

			8	Methods of jointing Laying of pipes – method
3	CHAPTER 03	12		Treatment of water
			1	Flow diagram of conventional water treatment system
			2	Treatment process / units: Aeration ; Necessity
			3	Plain Sedimentation: Necessity, working principles
			4	Sedimentation tanks – types, essential features, operation & maintenance
			5	Sedimentation with coagulation: Necessity
			6	Principles of coagulation, types of coagulants, Flash Mixer
			7	Flocculator, Clarifier (Definition and concept only)
			8	Filtration: Necessity, principles, types of filters, Slow Sand Filter
			9	Rapid Sand Filter and Pressure Filter – essential features
			10	Disinfection: Necessity, methods of disinfection Chlorination – free and combined chlorine demand
			11	Available chlorine, residual chlorine, pre-chlorination, break point chlorination, super chlorination
			12	Softening of water – Necessity, Methods of softening – Lime soda process and Ion exchange method (Concept Only)
4	CHAPTER 04	8		Distribution system And Appurtenance in distribution system:
			1	General requirements, types of distribution system, gravity distribution system
			2	Direct distribution system and combined distribution system
			3	Methods of supply – intermittent
			4	Methods of supply –continuous
			5	Distribution system layout – types
			6	Comparison, suitability,
			7	Valves-types, features, uses, purpose-sluice valves
			8	Check valves, air valves, scour valves, Fire hydrants, Water meters
5	CHAPTER 05	2		Water Supply Plumbing in Building
			1	Method of connection from water mains to building supply
			2	General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code.

6	CHAPTER 06	5		SECTION 02: WASTEWATER ENGINEERING Introduction
			1	Aims and objectives of sanitary engineering
			2	Definition of terms related to sanitary engineering
			3	Systems of collection of wastes
			4	Conservancy and Water Carriage System
			5	Features, comparison, suitability
7	CHAPTER 07	7		Quantity and Quality of sewage
			1	Quantity of sanitary sewage – domestic & industrial sewage, variation in sewage flow
			2	Numerical problem on computation quantity of sanitary sewage
			3	Computation of size of sewer, application of Chazy's formula
			4	Limiting velocities of flow: self-cleaning and scouring
			5	General importance, strength of sewage, Physical Characteristics of sewage
			6	Chemical and Biological Characteristics of sewage
			7	Concept of sewage-sampling, tests for – solids, pH, dissolved oxygen, BOD, COD
8	CHAPTER 08	5		Sewerage system
			1	Types of system-separate, combined, partially separate
			2	Features, comparison between the types, suitability
			3	Shapes of sewer – rectangular and avoid-features, suitability
			4	Shapes of sewer – Circular and avoid-features, suitability
			5	Laying of sewer-setting out sewer alignment
9	CHAPTER 09	7		Sewer appurtenances and Sewage Disposal:
			1	Manholes and Lamp holes – types, features, location, function
			2	Inlets, Grease & oil trap – features, location, function
			3	Storm regulator, inverted siphon – features, location, function
			4	Disposal on land – sewage farming, sewage application
			5	Sewage dosing, sewage sickness-causes and remedies

			6	Disposal by dilution – standards for disposal in different types of water bodies
			7	self-purification of stream
10	CHAPTER 10	8		Sewage treatment
			1	Principles of treatment
			2	Flow diagram of conventional treatment
			3	Primary treatment – necessity, principles
			4	Essential features and functions of Primary treatment
			5	Necessity of Secondary treatment
			6	Principles of Secondary treatment
			7	Essential features of Secondary treatment
			8	Functions of Secondary treatment
11	CHAPTER 11	3		Sanitary plumbing for building
			1	Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
			2	Plumbing arrangement of single storied & multi storied building as per I.S. code practice
			3	Sanitary fixtures – features, function, and maintenance and fixing of the fixtures – water closets, flushing cisterns, urinals, inspection chambers, traps, antisyphonage pipe