Discipline: **Civil Engg.**	Semester : **5th**	Name of the Teaching Faculty: **CHITTARANJAN PANDA (LECTURER)**
Subject: Water Supply & Waste Water Engineering(Th-4)	No. of days/per week class allotted: **04**	Semester From date : 15/09/2022To Date: 22/12/2022 No. of Weeks: 15
Week	**Class Day**	**Theory**
1ST	1st	Necessity of treated water supply
	2nd	Per capitademand, variation in demand and factors affecting demand
	3rd	Methods of forcasting population, Numerical problems using different methods
	4th	Impurities in water- organic and inorganic, Harmful effects of impurities
	5th	Analysis of water-physical, chemical and bacteriological
2ND	1st	Water quality standards for different uses
	2nd	Surface sources-Lake,stream,river and impounded resorvoir
	3rd	Underground sources- aquifer type & occurrence- Infiltration gallery, infiltration well, springs, well
	4th	Underground sources- aquifer type & occurrence- Infiltration gallery, infiltration well, springs, well
	5th	Yield from well- methods of determination, Numerical problems using yield formulae (deduction excluded)
3RD	1st	Yield from well- methods of determination, Numerical problems using yield formulae (deduction excluded)
	2nd	Intakes- types, description of river intake, reservoir intake, canal intake
	3rd	Pumps for conveyance & distribution- types, selection, installation
	4th	Pipe materials- necessity, suitability, merits & demerits of each type
	5th	Pipe joints- necessity, types of joints, suitability, methods of jointing laying of pipes-method
4TH	1st	Flow diagram of conventional water treatment system
	2nd	Treatment process/ units: Aeration: Necessity Plain sedimentation: Necessity, working principles, sedimentation tanks- types, essential features, operation & maintenance
	3rd	Treatment process/ units: Aeration: Necessity Plain sedimentation: Necessity, working principles, sedimentation tanks- types, essential features, operation & maintenance

	4th	Treatment process/ units: Aeration: Necessity Plain sedimentation: Necessity, working principles, sedimentation tanks- types, essential features, operation & maintenance
	5th	Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, clarifier (Definition and concept only)
5TH	1st	Sedimentation with coagulation: Necessity, principles of coagulation, types of coagulants, Flash Mixer, Flocculator, clarifier (Definition and concept only)
	2nd	Filtration: necessity, principles, types of filters Slow sand Filter, Rapid sand filter and pressure filter- essential features
	3rd	Filtration: necessity, principles, types of filters Slow sand Filter, Rapid sand filter and pressure filter- essential features
	4th	Disinfection: Necessity, methods of disinfection Chlorination-free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super- chlorination
	5th	Disinfection: Necessity, methods of disinfection Chlorination-free and combined chlorine demand, available chlorine, residual chlorine, pre-chlorination, break point chlorination, super- chlorination
6TH	1st	Softening of water- Necessity, Methods of softening- lime soda process and Ion exchange method (Concept Only)
	2nd	General requirements, types of distribution system: gravity, direct and combined
	3rd	Methods of supply- intermittent and continuous
	4th	Distribution system layout-types, comparison, suitability
	5th	Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, fire hydrants, water meters
7TH	1st	Valves-types, features, uses, purpose-sluice valves, check valves, air valves, scour valves, fire hydrants, water meters
	2nd	Method of connection from water mains to building supply
	3rd	General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code
	4th	General layout of plumbing arrangement for water supply in single storied and multi-storied building as per I.S. code

	5th	Aims and objectives of sanitary engineering
8TH	1st	Definition of terms related to sanitary engineering
	2nd	Systems of collection of wastes- Conservancy and water carriage system- features, comparision, suitability
	3rd	Quantity of sanitary sewage-domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage
	4th	Quantity of sanitary sewage-domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage
	5th	Quantity of sanitary sewage-domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage
9TH	1st	Quantity of sanitary sewage-domestic & industrial sewage, variation in sewage flow, numerical problem on computation quantity of sanitary sewage
	2nd	Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow: self-cleaning and scouring
	3rd	Computation of size of sewer, application of Chazy's formula, Limiting velocities of flow: self-cleaning and scouring
	4th	General importance, strength of sewage, Characteristics of sewage- physical, chemical & biological
	5th	General importance, strength of sewage, Characteristics of sewage- physical, chemical & biological
10TH	1st	Concept of sewage-sampling, tests for- solids, pH, dissolved oxygen, BOD, COD
	2nd	Concept of sewage-sampling, tests for- solids, pH, dissolved oxygen, BOD, COD
	3rd	Concept of sewage-sampling, tests for- solids, pH, dissolved oxygen, BOD, COD
	4th	Types of system-separate, combined, partially separate, features, comparision between the types, suitability
	5th	Types of system-separate, combined, partially separate, features, comparision between the types, suitability
11TH	1st	Types of system-separate, combined, partially separate, features, comparision between the types, suitability
	2nd	Shapes of sewer- rectangular, circular, avoid-features, suitability
	3rd	Laying of sewer-setting out sewer alignment
	4th	Manholes and lamp holes- types, features, location,function

	5th	Inlets, Grease & oil trap- features, location, function
12TH	1st	Strom regulator, inverted siphon- features, location, function
	2nd	Disposal on land- sewage farming, sewage application and dosing, sewage sickness- causes and remedies
	3rd	Disposal on land- sewage farming, sewage application and dosing, sewage sickness- causes and remedies
	4th	Disposal by dilution- standards for disposal in different types of water bodies, self purification of stream
	5th	Disposal by dilution- standards for disposal in different types of water bodies, self purification of stream
13TH	1st	Disposal by dilution- standards for disposal in different types of water bodies, self purification of stream
	2nd	Principles of treatment, flow diagram of conventional treatment
	3rd	Primary treatment- necessity, principles, essential features, functions
	4th	Secondary treatment- necessity, principles, essential features, functions
	5th	Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
14TH	1st	Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
	2nd	Requirements of building drainage, layout of lavatory blocks in residential buildings, layout of building drainage
	3rd	Plumbing arrangement of single storied & multi storied building as per I.S. code practice
	4th	Plumbing arrangement of single storied & multi storied building as per I.S. code practice
	5th	Plumbing arrangement of single storied & multi storied building as per I.S. code practice
15TH	1st	Sanitary fixtures- features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe
	2nd	Sanitary fixtures- features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe
	3rd	Sanitary fixtures- features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-

		syphonage pipe
	4^{th}	Sanitary fixtures- features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe
	5^{th}	Sanitary fixtures- features, function, and maintenance and fixing of the fixtures- water closets, flushing cisterns, urinals, inspection chambers, traps, anti-syphonage pipe