ENV-12 **Roll No.** | | | | | | | | | | |

M. Tech.
(SEM I) ODD SEMESTER EXAMINATION 2015-16
WATER TREATMENT AND DISTRIBUTION

Time:-3 Hours **Max Marks: 100**

*Note: Attempt **all** questions. Assume any data, not given, suitably.*

1. Attempt any TWO parts of the following: [10 x 2 = 20]

.

a. Discuss the factors that influence per capita demand. Show fluctuations in hourly demand for Indian conditions. What is maximum hourly water demand and explain how does it affect the design of water supply system?

b. What are 'Infiltration galleries' and 'Infiltration wells'? Explain both with neat sketches. Also discuss use of streams and rivers as surface sources of water supply.

c. Determine the future population of a satellite town by the Geometric increase and Incremental increase method for the year 2021, as per following data:

Year	1961	1971	1981	1991	2021
Population in thousand	93	111	132	161	……

2. Attempt any TWO parts of the following: [10 x 2 = 20]

a. Mention the physical, chemical and biological water quality parameters. What are the harmful effects caused by various toxic inorganic elements present in water when consumed beyond permissible limits?

b. What are the concepts used for designing plain sedimentation tanks. Two primary settling basins are 26 m in diameter with a 2.1 m side water depth. Single effluent weirs are located on the peripheries of the tank. For a water flow of 26,000 m^3/d, Calculate: (i) Surface area and volume (ii) Overflow rate in m^3/m^2.d (iii) Detention time in hours (iv) Weir loading in m^3/m .d.

c. Enumerate the chemicals which are used for coagulation. Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum dose is required. Also determine the amount of CO_2 gas which will be released per litre of water treated.

3. Attempt any TWO parts of the following: [10 x 2 = 20]

a. What is meant by 'disinfection' in treating public water supply? What is its importance? What are the chemicals which are used as disinfectants and what are their comparative merits and demerits?

b. Explain briefly the following processes:

(i) Dechlorination and super chlorination

(ii) Lime soda process and zeolite process in water softening

c. Explain the backwashing mechanism of rapid sand filter. Design a rapid sand filter unit for 5 million litres per day of supply with all its principle components.

4. Attempt any TWO parts of the following: [10 x 2 = 20]

a. Draw a neat sketch of a slow sand filter and describe its construction and working. What are the advantages of rapid sand filter over slow sand filter?

b. Illustrate with sketches the different types of layouts of pipe systems in distributing water and compare their merits and demerits.

c. (i) State the functions of a service reservoir and draw a neat sketch, showing the various appurtenances.

(ii) Explain the Hardy Cross method used for pipe network analysis in water distribution system.

5. Write short notes on any FOUR of the following: [5 x 4 = 20]

a. Desalination

b. Adsorption and Ion Exchange

c. Reverse Osmosis

d. Waste detection and prevention

e. Dissolved Solids Removal

f. Fire hydrants