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## Sixth Semester B.E. Degree Examination, June/July 2019 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Assume suitable data wherever necessary.*

### Module-1

- 1 a. Explain the importance and need for protected water supply. (06 Marks)  
 b. Enumerate the fire demand in water supply. (03 Marks)  
 c. The population of a city in three consecutive years i.e. 1991, 2001 and 2011 in 80,000, 2,50,000 and 4,80,000 respectively. Determine: (i) The saturation population (ii) The equation of logistic curve (iii) The expected population in 2021. (07 Marks)

OR

- 2 a. What is meant by per capita demand? (02 Marks)  
 b. Explain geometrical and incremental increase method of population forecasting. (07 Marks)  
 c. The following population data are available for a town. Estimate the probable population in the year 2031 by geometrical and incremental increase methods:

Year	1971	1981	1991	2001
Population	80,000	1,20,000	1,68,000	2,28,000

(07 Marks)

### Module-2

- 3 a. Explain the objectives of water treatment. (06 Marks)  
 b. List the physical water quality characteristics. (03 Marks)  
 c. Discuss the complete sequence of water treatment plant with a flow diagram. (07 Marks)

OR

- 4 a. What are the objectives of water quality management? (05 Marks)  
 b. Discuss the effect of excess concentration of hardness, nitrogen and fluoride in drinking water. (06 Marks)  
 c. Explain the importance of bacteriological tests in determining the quality of drinking water. (05 Marks)

### Module-3

- 5 a. Define surface flow rate and detention period for a sedimentation tank. (04 Marks)  
 b. Describe briefly the various constituents of coagulation sedimentation tank. (06 Marks)  
 c. A rectangular settling tank without mechanical equipment is to treat 1.8 MLD of raw water. The sedimentation period is to be 4h, the velocity of flow is 8 cm/min, and the depth of the water and sediment is 4.2 m. If an allowance of 1.2 m for sediment is made, what should be (i) the length of the basin (ii) the width of the basin? (06 Marks)

OR

- 6 a. Explain with a neat sketch the working and back washing of rapid gravity sand filter. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



- b. Find the area and number of units required for rapid sand filtration to serve a population of 2,00,000. Take average rate of demand = 160 lpcd and maximum demand as 1.8 times.  
Rate of filtration =  $5 \text{ m}^3/\text{h}/\text{m}^2$   
Size of each filter =  $10 \text{ m} \times 5 \text{ m}$  (06 Marks)

**Module-4**

- 7 a. List the requirement of good disinfectant. (03 Marks)  
b. Explain the theory of chlorination of water with chemical equations. (08 Marks)  
c. Enumerate the treatment of swimming pool water. (05 Marks)

**OR**

- 8 a. What is softening of water? Discuss the lime soda process of water softening with chemical equations. (10 Marks)  
b. Explain the reverse osmosis process of softening of water. (06 Marks)

**Module-5**

- 9 a. Discuss the factors governing the selection of source of water for water supply scheme. (04 Marks)  
b. Explain with a neat sketch a wet intake tower structure. (06 Marks)  
c. For water supply of a town, water is pumped from a river 3 km away into a reservoir. The maximum difference of levels of water in river and the reservoir is 20 m. The population of the town is 50000 and per capita demand is 120 c/d. If pumps are to operate for a total of 8 hr and the efficiency of pumps is 80%, determine the horse power of the pumps. Assume average daily demand as 1.5 times the average,  $f' = 0.03$  and  $v = 2\text{m}/\text{sec}$ . (06 Marks)

**OR**

- 10 a. Discuss the various methods of distribution of water and give the advantages and disadvantages of any two systems. (08 Marks)  
b. What is service reservoir? Explain with a neat diagram. (08 Marks)

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