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10CV61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Environmental Engineering – I

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each*
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. Discuss the importance and need for a planned water supply scheme to a city. **(06 Marks)**

b. What is meant by per capita demand? Discuss the factors that affect per capita demand. **(06 Marks)**

c. The following population data are available for a town. Estimate the probable population in the year 2021 by geometrical and incremental increase method.

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

(08 Marks)

2 a. Discuss the factors governing the selection of source of water for water supply scheme. **(06 Marks)**

b. What is meant by tube wells? Describe the strainer type of tube well with a neat sketch. **(06 Marks)**

c. From a clear water reservoir 2.5m deep and maximum water level at 42.00m, water is to be pumped at a reservoir at 80.00m at a constant rate of 8,10,000 l/h. The distance is 1600m. Give the economical diameter of the rising main and the water horse power of the pump. Neglect minor losses and like $f' = 0.01$. **(04 Marks)**

3 a. Explain the significance of the following from the point of view of water quality critiera with permissible values.
i) turbidity ii) hardness iii) nitrogen content iv) colour. **(08 Marks)**

b. Explain the significance of e-coli in water analysis. **(06 Marks)**

c. What are the water borne diseases? Explain the control measures for it. **(06 Marks)**

4 a. Explain briefly the treatment of river water with a flow chart indicating the impurities removal at each unit. **(06 Marks)**

b. What is aeration process? List the objective of aeration to water. **(06 Marks)**

c. A coagulation – sedimentation plant treats 40 million litre of water every day. The quality of filter alum required at the plant in 18 mg/L. If the raw water is having an alkalinity equivalent to 5mg/L of $CaCO_3$, determine the quality of filter alum and the quick lime (containing 85% of CaO) required per year by the plant (molecular weight as Al = 27, S = 32, O = 16, H = 1, Ca = 40, C = 12). **(08 Marks)**

PART – B

5 a. Explain the mechanism of filteration. **(06 Marks)**

b. Explain with neat sketch working and cleaning of rapid sand filters. **(08 Marks)**

c. A filter unit in 4.5m by 9.0m. After filtering 10,000 cubic meter per day in 24 hour period, the filter is back washed at a rate of 10 l/sqm/sec for 15 min. Compute the average filteration rate, quantity, and percentage of treated water used in washing, and the rate of wash water flow in each through. Assume 4 troughs. **(06 Marks)**

6 a. Explain the theory of chlorination of water with chemical equation. (06 Marks)
b. What is softening of water? Discuss the lime-soda process of softening with chemical equation involved in the process. (08 Marks)
c. Explain with figure reverse osmosis process of softening of water. (06 Marks)

7 a. What do you mean by fluoridation and defluoridation? Explain with figure Nalgonda technique of defluoridation. (08 Marks)
b. What are the factors affecting the design of a good distribution system. (06 Marks)
c. Describe the dead end system of water distribution network. (06 Marks)

8 Write short notes on any four of the following :
a. Water piping system in buildings
b. Fire hydrant
c. Air valves
d. Activated carbon treatment
e. Nomograms. (20 Marks)

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