

Time-3 Hours

Total Marks: 80

Note: 1) Question No.1 is compulsory

- 2) Attempt any three questions out of remaining five questions
- 3) Assume the suitable data if necessary and state the same.

Q1 Attempt any four questions out of the following

(5x4=20)

- a) What is population equivalent? Explain its importance in waste water treatment.
- b) Enlist the different layout of water distribution system? Explain with neat sketch Radial distribution system.
- c) Define air pollution? Give the natural sources of air pollution with suitable example.
- d) Explain with a suitable sketch working of roof top rain water harvesting
- e) Differentiate between one pipe system and two pipe plumbing system

Q2 A) What is coagulation? Explain the procedure to determine the optimum dose of coagulant in the laboratory. (5)

B) A circular sewer is to have a slope of 1 in 200 and is to carry a flow of 800 lit/sec when flowing half full, $N=0.013$. Determine the size of the sewer required and velocity of the flow. (5)

C) Design the septic tank for hostel building of 300 students. The rate of water supply is 150 liters per capita per day and assume 80% water is converted to waste water. Assume any suitable data if required and draw the neat sketch. (10)

Q3 A) Explain the process of reverse osmosis. (5)

B) The results of 5day BOD test are as follows (5)

- i) 5 ml waste in 300ml sample
- ii) Initial DO = 7.8 mg/l
- iii) Final DO = 4.8mg/l

Determine the 5day BOD of the sample and ultimate BOD. Take $K= 0.15$ per day

C) Draw the neat sketch of rapid sand filter with all its principle component and under drainage system and explain the function of each component. (10)

Q4 A) Explain the natural forces of self-purification of stream. (5)

B) Explain in detail the 5R's of municipal solid waste management. (5)

C) Explain the different forms of chlorine use in treating the water supply (10)

- Q5 A) Why the removal of iron and manganese is important from water? (5)
- B) Explain the importance of dewatering of sludge in waste water treatment (5)
- C) A high rate activated sludge process with an aeration tank volume of 175 m^3 has an applied load of 1.5MLD with an average BOD of 250mg/l and suspended solids of 160mg/l. The mix liquor in aeration tank held at 4000mg/l. calculate (10)
- i) BOD loading in Kg/ha-m
 - ii) F/M ratio
 - iii) aeration period
 - iv) sludge age
- Q6 A) Differentiate between water carriage system and conservancy system. (5)
- B) write a short note on water borne diseases. (5)
- C) The maximum daily demand of water purification plant has been estimated as 10 MLD. Design the dimension of suitable sedimentation tank. Assuming detention Period of 4 hours and velocity of flow 20cm/minute. (10)
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