

**INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech VII SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2022

Regulation: R18

ENVIRONMENTAL ENGINEERING

Time: 3 Hours

(CE)

Max Marks: 70

Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) What are the various types of infiltration galleries and infiltration wells? Explain with the help of neat sketches. [7M]
- (b) Explain in detail about the various methods of distributing water system and discuss the advantages and disadvantages of each system. [7M]
2. (a) List the importance and necessity of protected water supply system. Explain in brief various factors that affect population growth. [7M]
- (b) In two periods each of 20 years, a city has grown from 40,000 to 1, 60,000 and then 2, 80,000. Determine
 - i) Saturation population
 - ii) Equation of logistic curve
 - iii) Expected population after the next 15 years. [7M]

MODULE – II

3. (a) What do you understand by sedimentation? Describe the design principles of a settling tank. [7M]
- (b) If rectangular sedimentation tank is treating 2.5×10^6 litres /day. The size of the tank is 17.5x5.5x3.5m. If 80ppm suspended solids are present in the water, assuming the 75% removal in the basin and the average specific gravity as 2.0 determine the following,
 - i) Average flow of water through tank
 - ii) Detention time
 - iii) Over flow rate [7M]
4. (a) Explain about various methods used for detection of leakage in the distribution system. [7M]
- (b) Design a rectangular sedimentation tank to supply water for a population of 50,000 with an assured average supply of 135 lpcd. Detention time of the tank is 4 hours. Assume data needed suitably. [7M]

MODULE – III

5. (a) Differentiate sewage and storm water and discuss the rational formula and its limitations in calculating the quantities of storm sewage. [7M]
- (b) A city with a population of 100000 has an area of hectares. Calculate the DNF and storm water flow for the sewer line for the following data:
Rate of water supply=200 LPCD.
Average run off coefficient for the entire area=0.5
Time of concentration=50 min
Assume 75% of water supplied reaches sewage [7M]
6. (a) Explain the terms BOD and COD. Differentiate first and second stage of BOD. [7M]
- (b) The BOD of a sewage incubated for one day at 30°C has been found to be 120 mg/l. Identify the 5 day BOD at 20°C. Assume BOD rate of constant (K=0.21) per day at 20°C and temperature correction coefficient is 1.056 [7M]

MODULE – IV

7. (a) Write about sewer and explain its types based on material used for making sewer. Distinguish between the loss of head and negative head [7M]
- (b) Calculate the velocity of flow and the discharge through a sewer of diameter 1m laid at a gradient of 1 in 500. Assume the sewer running full. Using Manning's formula with $N = 0.012$ [7M]
8. (a) Give the details of design principles of screens, grit chambers, skimming tanks and sedimentation tanks in WWTP. [7M]
- (b) Explain the following with sketches i) Nitrogen cycle ii) Carbon cycle [7M]

MODULE – V

9. (a) Explain how the algae – bacterial symbiosis helps in waste stabilization pond. [7M]
- (b) Design and sketch an oxidation pond of a colony of population 40,000 in a tropical country like India, assuming necessary data. Determine detention time also. [7M]
10. (a) Explain the activated sludge process with a flow diagram [7M]
- (b) Design an oxidation pond for treating sewage for a town of 20,000 persons and consider the following details Sewage flow = 200 lpcd, BOD of raw sewage = 300 mg per liter, Organic loading rate = 300 kg per hectare per day and depth of pond = 1.2 m [7M]

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