R13

Code No: 126AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year II Semester Examinations, May - 2016
ENVIRONMENTAL ENGINEERING
(Civil Engineering)

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A
(25 Marks)

1.a) What are the components of a water supply system? [2]
  b) List four factors affecting per capita water demand. [3]
  c) What is the purpose of coagulation? [2]
  d) List out four coagulants used in treatment of water. [3]
  e) How do you quantify Sewage? [2]
  f) What are the factors affecting the selection of materials for sewer construction? [3]
  g) Distinguish between unit operations and unit processes. [2]
  h) What are the objectives of grit removal? [3]
  i) What is the role of algae in aerobic pond? [2]
  j) What is the role of acetogenic bacteria in anaerobic digestion? [3]

PART - B
(50 Marks)

2.a) What is the importance of public water supply schemes in the present day life?
  b) Draw the flow diagram of a typical water supply scheme using an impounded reservoir as the source of water supply and show there the different works involved. [5+5]

OR

3.a) How the quantity of water required for a town is estimated while designing the water supply scheme for the same?
  b) Given the following data, calculate the population at the end of next three decades by Decreasing rate method. [5+5]

Year	1980	1990	2000	2010
Population	90000	140000	188000	328580

4.a) What is Disinfection? Explain the Break Point Chlorination.
  b) Design a set of rapid sand filters for treating water required for a population of 50000. The rate of supply being 180 lpcd. The filters are rated to work at 5000 liters/hour/sq.m. Assume any other suitable data required. [5+5]

OR

5.a) Compare the design and working features of the slow sand filter and rapid sand gravity filter.
  b) Design coagulation cum sedimentation tank for a population of 1 lakh persons with a water supply of 150 LPCD. Assume any other suitable data required. [5+5]

6.a) What do you mean by variation in flow of sewage? Explain average flow, dry weather flow, and maximum flow.

 b) A 30 cm dia sewer with an invert slope of 1 in 400 is flowing $1/3^{rd}$ of the full depth. Calculate the velocity and the rate of flow in the sewer. Is it self-cleaning velocity? Use n=0.015. [5+5]

OR

7.a) Explain the importance of determination of solids in sewage. How do you determine the suspended solids in a given sample of waste?

 b) The 3 day $37^{0}C$ BOD of a sample of sewage is 300 ppm. What will be its 10 days – $20^{0}C$ BOD and 5 day $30^{0}C$ BOD? [5+5]

8.a) What do you understand by secondary treatment (or biological treatment) of wastewater? Enumerate various treatment techniques used for biological treatment.

 b) A sedimentation tank treats 8 mLd containing 240 mg/l of suspended solids. The tank removes 65% of the suspended solids. Compute the weight and volume of the sludge produced yearly if the moisture content is (i) 97% (ii) 94% [5+5]

OR

9.a) Differentiate between aerobic and anaerobic treatment of sewage, giving major end products. Name one treatment method in each category.

 b) Estimate the solids production from a trickling filter plant treating 1000 m^{3}/day with a BODs of 200 mg/l and SS of 250 mg/l. Assume that primary clarification removes 30 percent of the BOD and 60 percent of the influent solids. [5+5]

10.a) What do you understand by 'digestion of sludge'? Differentiate between anaerobic and 'aerobic digestion'. Explain the mechanism of anaerobic digestion.

 b) Explain, with the help of a flow chart, various processes involved in sludge treatment and disposal. [5+5]

OR

11.a) Write a note on sludge conditioning. Why elutriation is necessary before chemical conditioning?

 b) Design an oxidation pond for treating sewage for a town of 20,000 persons. [5+5]
 Sewage flow = 200 lpcd
 BOD of raw sewage = 300 mg/l
 Organic loading rate = 300kg/hectare/day.
 Depth of pond = 1.2m

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