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C020612(020)

B. Tech. (Sixth Semester) Examination, April-May 2022

(AICTE Scheme)

(Civil Engg. Branch) (BT3020)

ENVIRONMENTAL ENGINEERING

(~~Part time~~)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d). Part (a) carries 4 marks and rest parts carries 8 marks each.*

Unit-I

1. (a) What do you mean by per capita demand? 4

   (b) Write physical, chemical and biological characteristics of water in detail. 8

(c) Estimate the population of 2051 by GI method from the following data :

Year	Population (Thousands)
1941	40.2
1951	44.5
1961	60.4
1971	75.6
1981	98.9
1991	124
2001	159

(d) What do you mean by water demand? Discuss in detail about various water demands.

Unit-II

2. (a) What is break point chlorination?

(b) Design a plain sedimentation tank to treat 3 million of water litres per day. So as to settle at least 75% of the particles of grain size 0.002 cm or more. Assume any suitable data required.

(c) A sample of raw water contains, 200 mg/l alkalinity 50 mg/l hardness as $CaCl_2$ and 75 mg/l hardness as

$MgSO_4$. Compute the quantities of lime and soda required to treat 1 million litres of water. If slaked lime of 85% purity is available in place pure lime, what will be the required quantity of slaked lime?

(d) Discuss the common troubles during operation of rapid gravity filter and how they are removed.

Unit-III

3. (a) How will you estimate the quantity of water to be stored in the distribution reservoir?

(b) What are the requirements of a good distribution system? Also explain the different layouts used for distribution network.

(c) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m, laid at a gradient of 1 in 500. The sewer runs at 0.6 depth. Use Manning's formula take N = 0·012.

(d) Explain the treatment mechanism in a septic tank with neat sketches. Wha are the precautions that should be taken while constructing the septic rank to ensure its efficiency.

Unit-IV

4. (a) Define suspended growth process and attached growth process.

   (b) Determine the size of a high rate trickling filter for the following data :

   (i) Sewage flow = 5 MLD

   (ii) Recircular ratio = 1.5

   (iii) BoD of raw sewage = 230 mg/l

   (iv) BoD removal in primary clarifier = 30%

   (v) Final effluent BoD desired = 25 mg/l

   (c) Write short notes on the following : (any **two**)

   (i) Activated sludge process

   (ii) Facultative legoon

   (iii) Oxidation ditch

   (d) Explain the help of a flow chart, various processes involved in sludge treatment.

Unit-V

5. (a) Differentiate "Effluent irrigation" and "Sewage Farming".

[5]

(b) Explain the term deoxygenation, reoxygenation, oxygen deficit and the oxygen sag curve with the help of the neat sketch.

(c) Write a short note on self purification of polluted streams.

(d) Give the characteristics of the waste from a paper and pulp mill. How do you treat the waste water? Explain with the help of a flow diagram.