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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S, FE) / S6 (PT) (S, FE) Examination June 2023 (2015 Scheme)

Course Code: CE402

Course Name: ENVIRONMENTAL ENGINEERING – II

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Write a note on the estimation of the quantity of wastewater generated from a city. (5)

b) Design a circular sewer for a discharge of 1000 litres per second running half full. Assume a bed slope of 0.0001 and Manning's n as 0.015. (10)

2 a) Explain manhole and drop manhole. (6)

b) BOD at 20°C after 5 days of a sewage sample has been found to be 260 mg/L. What is its value on the 15th day at 25°C. Assume de-oxygenated constant, $K_{D(20^{o})}$ as 0.12. (9)

3 a) What is self-cleansing velocity? Explain the importance of limiting the minimum and maximum flow velocities in sewers? (7.5)

b) Define the terms (i) First stage BOD (ii) Population equivalent(iii) Relative stability (7.5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain various natural forces of self-purification of streams. (8)

b) Design a screen to treat a peak flow of 65 MLD of sewage. Calculate the head loss through the screen. Assume suitable data wherever needed. (7)

5 a) Determine the size of a high rate trickling filter for a sewage flow of 5 MLD. Assume the BOD of raw sewage = 240 mg/L, BOD removal in primary tank = 35% and the BOD of the final effluent desired is 30 mg/L. Provide a recirculation ratio = 1.5. (10)

b) Give the flow diagram of an activated sludge process and describe the working of an activated sludge plant. (5)

6 a) What is an equalisation tank? What is the necessity of flow equalisation? (7.5)

b) Compare high rate and standard rate trickling filter. (5)

c) What is a rotating biological contactor. (2.5)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Design a septic tank for a small colony of 300 persons provided with a water supply of 150 litres per head per day. Assume a detention period of 30 hours, cleaning interval as 6 months and the rate of deposition of sludge as 30 litres per capita per year. Draw a neat sectional sketch showing all details. (9)

b) Explain the principle and working of an oxidation pond with neat sketch. (6)

c) What is an aerated lagoon? (5)

8 a) What is sludge digestion? Explain the different stages of sludge digestion. (8)

b) Design a sludge digestion tank for the primary sludge for an average sewage flow of 25 MLD. Assume the total suspended solids in raw sewage as 250 mg/L, and 70% solids re removed in primary settling tank. The moisture content of raw sludge and digested sludge can be taken as 95% and 85 % respectively, specific gravity of wet sludge as 1.02 and the digestion period as 30 days. Assume any other data required. (12)

9 a) List any two advantages and disadvantages of Imhoff tank. (4)

b) With a neat diagram, explain upflow anaerobic sludge blanket reactor. (6)

c) Explain (i) methods of sludge thickening (ii) methods of sludge disposal. (10)

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