Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Examination June 2022 (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) Differentiate between dry weather flow and storm water flow. (3)

b) What is meant by COD? (2)

c) Design a sewer running 0.7 times full at maximum discharge for a town provided with the separate system, serving a population 80,000 persons. The water supplied from the water works to the town is at a rate of 190 LPCD. The manning's n = 0.013 for the pipe material and permissible slope is 1 in 600. Variation of n with depth may be neglected. Check for minimum and maximum velocity assuming minimum flow 1/3 of average flow and maximum flow as 3 times the average. (for d/D = 0.7, q/Q = 0.838, v/V = 1.12) (10)

2 a) Explain the classification of sewers based on shape and materials. (7.5)

b) What is meant by first stage BOD?. (2.5)

c) In a test for relative stability, the period of incubation comes out to be 8days. Determine the relative stability, if the test temperature is a)20°C b) 37°C 84.2 98.2. (5)

3 a) List and explain any four physical characteristics of sewage. (4)

b) The BOD of sewage incubated for 1 day at 30° C is found to be 110mg/l. What will be the 5 day BOD at 20° C. Assume deoxygenation constant at 20° C as 0.1 per day. (9)

c) Write notes on time of concentration (2)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Discuss the various conditions favouring disposal by dilution (2.5)

b) A town discharges 80 m^3/s of sewage into a stream having a rate of flow of 1200 m^3/s during lean days, at a 5-day BOD of sewage at the given temperature is (10)

250mg/l. Find the amount of critical DO deficit & its location in the downstream portion of the stream. Assume deoxygenation coefficient as 0.1 and coefficient of self-purification (f_s) as 3.5. Assume saturation DO at given temperature as 9.2mg/l and DO of effluent as 0.

c) Write notes on activated sludge process. (2.5)

5 a) What is meant by sewage sickness? Discuss the various methods for its prevention. (7.5)

b) What is meant by Ponding nuisance in a trickling filter? How to prevent it? (4.5)

c) Explain the working of a grit chamber (3)

6 a) Write notes on DO sag curve.. (4)

b) Explain the features and operation of contact beds with neat sketch. (6)

c) Compare the characteristics of conventional or standard trickling filters with high rate trickling filters. (5)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Design an Imhoff tank to treat the sewage from a small town with 25000 population. The sewage flow rate is 180 litres per capita per day. Assume any other data, if required. (10)

b) Discuss the different stages of sludge digestion process (6)

c) Discuss the advantages and disadvantages of aerating lagoons. (4)

8 a) Explain the functioning of an oxidation ditch with neat sketch. (5)

b) Explain the working of an Upflow anaerobic sludge blanket reactor. (5)

c) List and explain any five methods for the final disposal of sludge. (10)

9 a) Explain the classification of oxidation ponds.. (4)

b) Design a sludge digestion tank for the primary sludge for the following data (12)

i) Average flow =250 million litres per day, ii) Total suspended solids in raw sewage=350mg/l, iii) raw sludge has a moisture content of 95% and specific gravity 1.02. iv) Moisture content of digested sludge=85%.

c) Explain sludge drying beds with neat sketch. (4)

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