

GANPAT UNIVERSITY**B. Tech. Semester – VI (CIVIL)****Regular Examination – May/June : 2014****2CI– 605: Environmental Engineering - II****Time: 3 Hours****Total Marks: 70**

- Instructions:** - (1) Answer to the two sections must be written in separate answer books.
 (2) Figures to the right indicate full marks.
 (3) Assume suitable data if required.

Section - I

- 1 (A) Assuming suitable criteria, design a primary circular sedimentation tank to treat domestic wastewater flow of a town having 6, 00,000 population. (12)

OR

- 1 (A) Assuming suitable data, design an approach channel for 30 MLD maximum flow of domestic wastewater. (5)

- (B) Assuming suitable criteria design a screen chamber to treat a maximum flow of 0.18 m³/s of domestic wastewater in each channel from approach channel of Q-1(A) (7)

- 2 (A) Assuming F/M ratio equal to 0.25 and hydraulic residence time of 6 hours, compute the value of MLVSS to be maintained in the reactor of a conventional activated sludge plant designed to treat 5MLD settled wastewater with 200mg/L of BOD₅. (4)

- o Daily wastewater flow, $Q_0 = 5\text{MLD}$
- o Influent BOD₅ = 200mg/L
- o F/M ratio = 0.25
- o Hydraulic retention time = 6 hours

- (B) If 1.0 MLD flow of domestic wastewater with settled BOD₅ of 250mg/L is treated in the conventional activated sludge plant reactor at 0.3 F/M ratio to obtain 85% BOD removal efficiency, estimate the net surplus sludge produced per day. Assume suitable reaction constants. (5)

- (C) Enlist final disposal methods of sludge. (2)

OR

- 2 (A) Assuming suitable criteria, Design a complete mix activated sludge process unit to treat 24 MLD of domestic wastewater. BOD₅ of settled wastewater to the reactor is 250mg/L and desired BOD₅ of treated effluent is 30mg/L. (11)

- 3 (A) Explain with neat figure sludge dewatering by the use of sludge drying beds. (6)

- (B) Describe the following terms: (6)

- (a) F/M Ratio (b) Yield coefficient (c) Specific Growth Rate (d) Half velocity constant
 (e) Discrete particles (f) Detention time

Section – II

- 4 (A) State the routine tests carried out in the laboratories of wastewater and explain the significance of each of them. (5)

- (B) A 2% solution of a sewage sample is incubated for 5 days at 20°C. The depletion of oxygen was found to be 4 ppm. Determine the BOD of the sewage. (3)

- (C) Describe manholes and drop manholes with neat sketches. (4)

OR

- 4 (A) Explain the importance of determination of solids in sewage. How do you determine the suspended solids in a given sample of waste water? (5)
- (B) In a test conducted for determining the relative conductivity at 20°C, the period of incubation was found to be 12 days. Calculate the percent of relative stability. (3)
- (C) Explain oxygen sag curve in detail. (4)

- 5 (A) Explain, with the help of diagrams, various types of plume behaviors. (4)
- (B) A city discharged 1800 liters per second of sewage into a stream whose minimum rate of flow is 6800 liters per second. The temperature of sewage as well as water is 20° C. the 5 day BOD at 20° C for sewage is 200 mg/l and that of river water is 1 mg/l. The DO content of sewage is zero, and that of stream is 95% of the saturation DO. If the minimum DO to be maintained in the stream is 4.0 mg/l. find out the degree of treatment required. Assume the de-oxygenation coefficient as 0.1 and re-oxygenation coefficient as 0.3. [Saturation DO at 20° C is 9.17mg/l] (4)
- (C) Write a detailed note on composting. (3)

OR

- 5 (A) Explain the source and characteristics of the following air pollutants. (4)
- Hydrogen sulphide
 - Carbon monoxide
 - Hydrogen fluoride
 - Oxides of nitrogen
- (B) The domestic sewage of a town is to be discharged into a stream after treatment. Determine the maximum permissible effluent BOD and the percentage purification required in the treatment plant, given the following particulars: (4)
- Population of town : 50000
 - DWF of sewage : 150 liters per capita per day
 - BOD contribution per capita : 0.075 kg per day
 - Minimum flow of stream : 0.20 m cu. Per sec
 - BOD of stream : 3 mg/l
 - Max. BOD of stream on downstream : 5 mg/l
- (C) Write a detailed note on incineration of refuse. What are its advantages and disadvantages? (3)

- 6 (A) Write a note on: (any four) (12)
- Nitrites and Nitrates
 - Sanitary land fill.
 - Transportation of municipal solid waste
 - Pulverisation
 - Catalytic collectors.
 - Gravitational settling chambers.

END OF PAPER