

Roll No. ....

Total Pages : 3

**019602**

**May 2024**

**B.Tech. (ENV) – VI SEMESTER**

**Wastewater Engineering (Design and Application)**

**(PCC-ENV-602)**

Time : 3 Hours]

[Max. Marks : 75

*Instructions :*

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) Explain : Equalization.  
(b) Neutralization.  
(c) Physical Treatment.  
(d) Flootation.  
(e) Detention Time.  
(f) Re circulation.  
(g) Aerated Lagoons.  
(h) Ponds.

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[P.T.O.]

- (i) Sludge Volume Index.
- (j) MLSS.

**PART-B**

2. (a) Explain the terms BOD and COD. Differentiate between 1<sup>st</sup> and 2<sup>nd</sup> stage BOD. (10)
- (b) The BOD of a sewage incubated for one day at 30°C has been found to be 120 mg/l. Identify the 5-day BOD at 20°C. (BOD rate constant  $K = 0.21$  (base e) per day at 20°C. (5)
3. (a) Discuss in brief the biological and chemical methods of removal of phosphorous from wastewater. (5)
- (b) Explain the working of conventional activated sludge process (ASP) with flow diagram. (10)
4. Determine the size of the High rate trickling filters for the following data : (15)
- (a) Sewage flow = 4.5 MLD.
  - (b) Recirculation ratio = 1.5.
  - (c) BOD of Raw sewage = 250 mg/L.
  - (d) BOD removal in primary tank = 30%.
  - (e) Final effluent BOD desired = 30 mg/L.
5. (a) Explain the importance of screens and types of screens in the sewage treatment process. (5)
- (b) Explain classification of waste water carriage system. (10)

6. (a) Design a primary sedimentation tank of circular cross-section, for a sewage of 10 MLD, detention period of 2 hours and assume the surface loading rate to be 30 m<sup>3</sup>/m<sup>2</sup>/d. (10)
- (b) Define Settling velocity according to Hazen's equation and overflow rate. (5)
7. A stream, saturated with DO, has a flow of 1.2 m<sup>3</sup>/sec, BOD of 4 mg/L and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m<sup>3</sup>/sec having BOD of 20 mg/L, DO 5 mg/L and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/sec. Calculate the DO deficit at point 20 kms and 40 kms downstream. Assume the temperature as 20°C, throughout the BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/L.