

1128
M. E. (Bio-Technology)
Third Semester
Elective - IV
ME-BIO-302: Biological Waste Water Engineering

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q 1) Write briefly:

(2×5 = 10)

- a) Define BOD and COD test. What is the significance for the estimation of BOD test?
- b) Write about high rate trickling filter.
- c) What do you mean by step aeration?
- d) Aerobic and anaerobic wastewater treatment.
- e) Design criteria of ASP.

SECTION-A

- Q. 2. a) What do you mean by wastewater? Give an account of physical and chemical properties of wastewater.
- b) Calculate the 15 days BOD of waste water sample at 30 °C if 5 days BOD at 20 °C is 200 mg/lit. Where $K_{20\ 0C} = 0.23\ d^{-1}$ and $\theta = 1.056$
- c) Discuss the characteristics of wastewater. (4, 3, 3)
- Q. 3. a) For the activated sludge unit system is required to reduce the BOD. The following parameter values are given- $Q = 500\ lit./hr$, $V = 1500\ lit.$, $S_0 = 1000\ mg/lit.$, $\mu_m = 1.0\ hr^{-1}$, $K_s = 20\ mg/lit.$, $Y_{X/S} = 0.4\ g\ of\ cell / g\ of\ BOD$, $K_d = 0.05\ hr^{-1}$ and $\Theta_c = 100\ hr$. Calculate Substrate concentration (S), Cell mass concentration (X) in reactor, Food to microorganism ratio (F/M) and Utilization rate (U).
- b) Describe activated sludge process (ASP) and trickling filter (TF) system for waste water treatment. (4, 6)
- Q. 4) Write a critical review on food waste management. (10)

SECTION-B

- Q. 5) Describe the merits and demerits about anaerobic waste water treatment and discuss the mechanism of anaerobic treatment processes. (10)
- Q. 6. a) With a neat sketch explain the working of UASB.
- b) Explain about rotating biological contactors. (7, 3)
- Q.7) Explain any **FOUR** of followings: (4 × 2½ = 10)
- i) Septic tank
 - ii) Stabilization Ponds.
 - iii) Anaerobic contact process.
 - iv) Anaerobic sequencing batch reactor.
 - v) Bio-Towers: Process design considerations.