Exam.Code:1034
Sub. Code: 7579

2122

M. E. (Bio-Technology)

Third Semester

ME-BIO-302(a): Biological Waste Water Engineering

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section. State Clearly assumptions.*

x-x-x

1) Write briefly: *(2×5=10)*
   a) Oxidation Ponds
   b) Define DO, COD and Ultimate BOD.
   c) Engineered in situ bioremediation.
   d) Biosorption.
   e) Aerated lagoons.

SECTION – A

2) Write a critical review on:

"Waste to Energy"

OR

"Production of valuable product from waste using biocatalyst" *(10)*

3 a) Calculate the 10 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 θ =1.056

b) Discuss activated sludge process and trickling filter with neat and clean diagram and explain merit and demerit of ASP and TF. *(4, 6)*

4.a) Design a trickling filter to treat waste water released from fruit-processing unit. The following data are given:

Flow rate of waste water = 25,000 m^3/d
Influent BOD = 500 mg/L
Effluent BOD = 25 mg/L
Temperature Data: a) summer = 30°C
b) Winter = 15°C

The following data have been experimentally determined:

BOD removal rate constant at 25°C = 0.1 d^{-1}.
Temperature correction coefficient = 1.08
Specific area of conventional filter packing material = 100 m^3/m^2
Filter height = 12 m
Any other data may be assumed if required, give reasons. *(4)*

b) Explain the following:
   a) Waste water characteristics.
   b) BOD Kinetics.
   c) Purpose of sedimentation in sewage treatment. *(2× 3= 6)*

P.T.O.

SECTION - B

5) Describe the merits and demerits about anaerobic waste water treatment and discuss the mechanism of anaerobic treatment processes. Explain the different type of anaerobic reactors with neat and clean diagram. *(10)*

6.a) Explain biogas production and discuss the factors affecting on biogas production.

b) Calculate the digester capacity required for the sewage treatment of city with following data:

Raw sludge solid produce	730 kg/ day
Volatile solids in Raw sludge	70 Per cent
Raw sludge moisture content	95 Per cent
Digestion Period	25 days
Solid Reduction during digestion	50 Per cent
Digested solid moisture content	90 Per cent
Digested sludge storage required	90 days

(5, 5)

7) Write a notes on:

a) Biosorption of heavy metals.
b) Ex-Situ Bioremediation.
c) Bio-filtration.
d) Bio augmentation. *(2½ × 4 = 10)*

x-x-x