

2021

M.E. (Biotechnology) Third Semester

Elective – IV

MEBIO-302 (a): 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 Unit. State clearly your assumptions.

x-x-x

I. Answer the following:-

- Define COD and Ultimate BOD.
- BOD test and its significance.
- Biosorption.
- Aerated lagoons.
- Engineered in situ bioremediation.

(5x2)

UNIT – I

II. a) Give an account of physical and chemical properties of wastewater.

b) Explain the purpose of sedimentation in sewage treatment.

(7,3)

III. a) Give the details about aerobic reactors.

b) Calculate the 20 days BOD of waste water sample at 30 °C if 5 days BOD at 20 °C is 200 mg/lit. Where $K_{20} = 0.23 \text{ d}^{-1}$ and $\theta = 1.056$.

c) Discuss merit and demerit of activated sludge process and trickling filter. (4,3,3)

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

Flow rate of waste water = 18,000 m³/d

Influent BOD = 400 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 m³/ m²

Filter height = 12m

Any other data may be assumed if required, give reasons.

b) Describe the aerobic process of waste water treatment processes.

c) Write design criteria of activated sludge process.

(5,2,3)

P.T.O.

(2)

UNIT – II

- V. What are the industrial wastes? Write in detail their bioremediation methods. (10)
- VI. 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. (10)
- VII. Write a notes on:-
- a) Ex-Situ Bioremediation.
 - b) Bio augmentation.
 - c) Bio-filtration. (3,4,3)

X-X-X