

Ref. No. : Ex/FTBE/PC/B/T/421/2023(S)

**B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING FOURTH YEAR
SECOND SEMESTER SUPPLEMENTARY EXAM – 2023**

Subject : WASTE TREATMENT ENGINEERING Time : 3 hr Full Marks : 100

Part I (50 marks)

Use Separate Answer scripts for each Group / answer any five questions etc.

Answer any one question from 1 and 2:

1. How COD of a waste water sample is measured by dichromate oxidation method? What are the interfering substances? How the effect of interfering substances can be removed? 8+5+7=20
2. Explain the effect of seeding and acclimation of seed on BOD test? How the presence of algae effect BOD test? What do you mean by Total Oxygen Demand (TOD)? 7+8+5=20

Answer any two question from 3, 4 and 5:

3. Derive a relationship between BOD_5 and BOD_u . What is the effect of temperature and pH on BOD test? 7+8=15
4. What do you mean by nitrification? Derive a relationship of oxygen demand for a combined process of carbonaceous and nitrification. 5+10=15
5. In the process of sedimentation derive an expression of settling velocity. What classes of material are responsible for oxygen demand of wastewater? 10+5=15

[Turn over

**B.E. FOOD TECHNOLOGY AND BIOCHEMICAL ENGINEERING
FOURTH YEAR SECOND SEMESTER SUPPLEMENTARY EXAM-2023**

WASTE TREATMENT ENGINEERING

TIME: 3 hrs

Full Marks: 100

PART-II

(Use separate sheet for each part)

GROUP-A

Answer any one question

1×10 =10

1. What are the different stages of waste water treatment? Write short note on any one stage.
4+6 = 10
2. Derive expression for sedimentation velocity in laminar flow regime.

GROUP-B

Answer any two questions

2×20 = 40

3. (a) Define Sludge Volume Index (SVI). Briefly Describe SVI determination method.
What is the significance of SVI? 2+6+2 = 10
(b) Estimate the volume of primary sludge produced per 103 m³ from a typical medium strength waste water. Assume that the detention time in the primary tank is 2h and that removal efficiency of suspended solid is 60%. Suspended solid concentration in medium strength waste water is 220 mg/L.
4. Write the basic principle of activated sludge reactor. What are the different parts of activated sludge reactor? Derive the mass balance of cell mass and substrate concentration in activated sludge reactor. What are the design criteria of sedimentation tank?
3+3+8+6 =20
5. Write short note on any four 4×5 = 20
 - (a) Rotating Biological contractor (RBC)
 - (b) Flocculating agents
 - (c) Anaerobic digestion
 - (d) Pretreatment of waste water
 - (e) Physical waste water treatment process
 - (f) Trickling filter