53 (FPT 501) FIWM

2016

FOOD INDUSTRIES WASTE MANAGEMENT

Paper : FPT 501

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions out of **seven**.*

1. *(a)* What are the major sources of Dairy Waste? What are the important characteristics of dairy waste? 2+3

   (b) Discuss briefly some major characteristics of Tannery Waste and Distillery Waste. 2·5+2·5

   (c) Describe briefly the major steps involved in Activated sludge process. What is active sludge? 8+2

2. *(a)* Discuss the principle of the landfill bioreactor. What do you understand by landfill gas ? 8+2

(b) Discuss briefly about the Vermi-composting technique. What are the advantages of Vermi-composting ? 8+2

3. *(a)* How can Ion Exchange treatment is successfully implemented in effluent treatment technique ? 10

(b) 0·6 *ton* of solid waste from the market place is treated to produce compost in an in-vessel composting system. If forced aeration is provided, determine the quantity of air required for composting. Data are given below :

(i) Composition of solid waste : $C_{60}H_{95}O_{40}N$

(ii) Moisture content = 30·1

(iii) VS = 0·8 × TS

(iv) BVS = 0·6 × VS

(v) Air contain 23% O_2 by mass

(vi) Sp. wt of air = $1{\cdot}2 kg/m^3$

A factor of 1·8 times the quantity of theoretical air require is needed. 10

4. *(a)* Discuss the significance of BOD satisfaction curve. 5

(b) What is dissolve oxygen (DO) sag? 5

(c) The 5-days BOD at 20°*C* of a waste water is 195*gm/lit.* What will be the ultimate BOD? What will be the 10-days demand? If the bottle had been incubated at 33°*C*, what would be the 5-days BOD? 10

5. *(a)* Anaerobic composting (degradation) of waste bears a high fuel value — Justify it. 8

(b) Using the data provided here, estimate theoretically the volume of biogas that can be produced by anaerobic treatment of 200*kg* of solid waste.

Organic material (VS) in SW = 80%

Moisture in VS = 30%

BVS = 95% (dry basis)

Chemical formula of BVS = $C_{60}H_{95}O_{40}N$

Specific weight of Methane and CO_2 are 0·7112 and 1·9607, respectively.

12

6. *(a)* What is RBC (Rotating biological contactor)? Discuss the working principle of RBC. 8

(b) A 10m diameter single stage trickling filter at a depth of 6·1m. Primary effluent with the characteristic given below is applied to the filter. What is the volumetric BOD and TKN loading? Also calculate specific TKN loading.

Data given are :

Flow rate = $4000 m^3/d$

BOD = $120 g/m^3$

TSS = $80 g/m^3$

TKN = $25 g/m^3$

Specific surface area of the packing material = $90 m^2/m^3$. 12

7. *(a)* Describe the UASB reactor. What are the design criterial of UASB? 10

(b) Briefly explain Incineration process. 10