53 (FPT 501) FIWM

2013

(December)

FOOD INDUSTRY 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** given.*

1. *(a)* Discuss the various steps involved in vermi-composting technique. Discuss the advantages and dis-advantages of vermicomposting technique. 8+4

   (b) How can you distinguish between Rubbish and Garbage ? 5

   (c) Give some examples of Hazardous waste. 3

2. Write short notes on ***(any four)*** of the following : 5×4

(a) Industrial waste

(b) Pyrolysis

(c) Incineration

(d) Gasification

(e) BOD_5

(f) UASB

3. *(a)* Estimate theoretically the volume of biogas that can be produced by anaerobic treatment of 600*kg* of solid waste, by using the following data :

Chemical formula of BVS $= C_{60}H_{95}O_{40}N$
Organic material (VS) in solid waste $= 75\%$
Moisture content $= 20\%$
Biodegradable volatile solid $= 95\%$ (Dry basis)
Specific wt. of methane is $0 \cdot 7112 kg/m^3$
Specific wt. of CO_2 is $1 \cdot 9607 kg/m^3$

12

(b) A waste contains $300 mg/l$ of simple carbohydrate $C(H_2O)$ and $70 mg/l$ of NH_3. Calculate the theoretical carbonaceous oxygen demand, the theoretical nitrogenous oxygen demand and the total ThOD of the waste. 8

4. (a) Describe briefly the various types of aerobic composting process. 10

(b) Briefly discuss the advantages of anaerobic treatment of liquid waste over Aerobic treatment. 5

(c) In a BOD determination $6ml$ of wastewater in mixed with $294ml$ of diluting water containing $9 \cdot 1 mg/l$ of DO. After 5 days incubation at $20^{\circ}C$, the DO content of the mixture is $2 \cdot 8 mg/l$. Calculate the BODs of the wastewater and ultimate BOD. 5

5. What is Rotating biological contactors (RBC) ? Discuss the performance aspect and its advantages and disadvantages. 20

6. *(a)* Briefly discuss the working principle of Trickle filter technique for secondary treatment of wastewater. 10

(b) A 10*m* diameter single stage trickling filter contains conventional cross-flow plastic packaging at a depth of $6 \cdot 5m$. Primary effluents with the characteristics given below is applied to the filter. What is the volumetric BOD and TKN loading ? Calculate also specific TKN loading. 10

Given data are :

Flow rate $= 4000 m^3/d$

BOD $= 120 g/m^3$

TSS $= 80 g/m$

TNK $= 25 g/m^3$

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

7. Describe the various steps and various methods used in industry to prepare drinking water from wastewater. 20
