53 (FPT 501) FIWM

2017

FOOD INDUSTRIES WASTE MANAGEMENT

Paper : FPT 501 (Back)

Full Marks : 100

Time : Three hours

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

Answer ***any five*** *questions.*

1. *(a)* Find out the mathematical relationship between BOD_0 and BOD_5. 4

   (b) With a neat diagram, briefly describe the major steps involved in Activated Sludge Process (ASP). 9

   (c) Determine the 2-day BOD and ultimate first stage BOD for a wastewater whose 5-day 20°*C* BOD is 300*mg/L*. The reaction constant *K* (base) – $0{\cdot}23°d^{-1}$. What would have been the 5-day BOD, if the test had been conducted at 25°*C* ? 7

2. Differentiat between : 5×4=20

(a) Pyrolysis and Incineration

(b) BOD and COD

(c) Coagulation and Flocculation

(d) Aerobic and Anaerobic composting.

3. (a) Explain the working principle of Trickling filter technique for treatment of wastewater. 10

(b) Calculate the volumetric BOD, TKN loading and specific TKN loading of a 10m diameter single state trickling filter having filter at a depth of 6·1m. Primary efficient with the characteristics given below are applied to the filter.

Given data :

Flow rate $= 5000 m^3/d$

BOD $= 150 g/m^3$

TSS $= 80 g/m^3$

TKN $= 25 g/m^3$

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

10

4. *(a)* Briefly explain the Rotating Biological Contactor (RBC) process with a neat diagram. 10

(b) What is vermicomposting write. Discuss the various steps involved in vermicomposting technique. 10

5. *(a)* Anaerobic composting (degradation) of waste material bears a high fuel value; justify it. 8

(b) Estimate theoretically the volume of biogas and their percentage that can produced by anaerobic treatment of 2000*kg* of solid waste by using the following data :

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

VS (Volatile solid) in solid waste = 85%

Moisture content = 20%

Biodegradable *VS* = 90% (dry basis)

Specific weight of methane

$= 0{\cdot}7112 kg/m^3$

Specific weight of CO_2 = $1{\cdot}9607 kg/m^3$

12

6. *(a)* Discribe the various steps and methods used in industry to prepare drinking water from wastewater. 14

(b) Discuss the advantages and disadvantages of vermicomposting technique. 6

7. *(a)* Discuss the principle of the landfill bioreactor. Discuss the various steps involved in landfill methods of solid waste treatment. 12

(b) Explain about the lagoon and UASB process for waste-water treatment. 8