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Invigilator's Signature :	

## CS/B.Tech(FT)/SEM-5/FT-504/2010-11 2010-11

#### WASTE MANAGEMENT OF FOOD INDUSTRIES

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

# GROUP – A ( Multiple Choice Type Questions )

- 1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) The ratio of BOD and COD
    - a) depends on organic load
    - b) depends on both organic and inorganic load
    - c) both (a) and (b)
    - d) always constant.
  - ii) Pollution load of
    - a) distillery waste > tannery waste > waste from vegetable industry
    - b) tannery waste > distillery waste > waste from vegetable industry
    - c) tannery waste > waste from vegetable industry > distillery waste
    - d) waste from vegetable industry > tannery waste > distillery waste.

5419 [ Turn over

#### CS/B.Tech(FT)/SEM-5/FT-504/2010-11



- a) primary processing
- b) secondary processing
- c) tertiary processing
- d) quaternary processing.

#### iv) Biofilter is used for

- a) reduction of pollution load
- b) reduction of bad odor
- c) reuse of waste water
- d) all of these.

#### v) Biosorption process done by

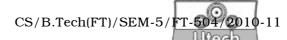
- a) microorganisms
- b) plant material
- c) fruit vegetable wastes d) all of these.
- vi) USAB reactor function best at
  - a) low concentration of soluble wastes
  - b) laminar flow of the fluid stream
  - c) all of these
  - d) none of these.

## vii) For a waste water sample which of the relation holds good?

- a) BOD > COD
- b) BOD < COD
- c) BOD = COD
- d) None of these.

#### viii) A Trickling Filter media should have

- a) high surface area to volume ratio
- b) high strength and reliability
- c) all of these
- d) none of these.



- ix) With respect to energy content of incinerated waste which of the following relations is right?
  - a) PSW > USW
  - b) PSW < USW
  - c) PSW = USW
  - d) They cannot be compared.
- x) Degree of decomposition of solid waste can be measured by
  - a) final drop in temperature
  - b) oxygen uptake rate
  - c) starch-iodine test
  - d) all of these.

#### GROUP - B

#### (Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$ 

- 2. What are the sources of cannery waste? Mention in brief the treatment strategy. 2 + 3
- 3. Briefly describe the sources and treatment strategy of distillery waste. Mention only the disposal method. 4 + 1
- 4. Why BOD test cannot be completed in 5 days? Discuss the significance of BOD satisfaction curve. 2 + 3
- 5. Discuss about the influences of different process conditions on BOD test.
- 6. Point out the advantages and disadvantages of trickling filter over activated sludge process. What do you understand by sloughing of trickling filter? 4 + 1

#### **GROUP - C**

### (Long Answer Type Questions)

Answer any *three* of the following.  $3 \times 15 = 45$ 

7. a) Calculate the *K* value when  $BOD_{5}^{20} = BOD_{2}^{37}$ . 5

#### CS/B.Tech(FT)/SEM-5/FT-504/2010-11

- b) Briefly discuss about primary and quaternary waste process. What are the significance of these processes in waste management.
- c) What are the sources of sugar industrial waste? What is the treatment process of sugar industrial waste? 4
- 8. a) Briely discuss about water purification process and explain the function of each step. 7
  - b) What do you mean by biosorption of heavy metals. What is its role in water purification process? What are the factors, which affect the biosorption process?
- 9. A food processing industry having a production capacity of 200 tons/day and discharging 1000 gallons of waste water per ton of the product having a BOD  $_5$  (  $20^{\circ}\text{C}$  ) of 2500 mg/lit. The amount of waste water produced by individual is 50 gallons/day of 500 mg/lit of BOD  $_5$  (  $20^{\circ}\text{C}$  ) and waste treated in the same plant. Determine the population equivalent and ultimate BOD. It is given that the K-rate for BOD is 0.1/day.
- 10. A 10 m diameter single stage trickling filter at a depth of 6·1 m. Primary effluent with the characteristics given below is applied to the filter. What is the volumetric BOD and TKN loading? Calculate also specific TNK loading.

#### Data given are

- a) Flow rate = 4000 m3/d
- b) BOD = 120 g/m3
- c) TSS = 80 g/m
- d) TNK = 25 g/m3
- e) Specific surface area of the packing material (plastic) = 90 m2/m3.
- 11. What is Rotating Biological Contractors (RBC)? Discuss the performance and design aspect of RBC and its advantages and disadvantages. 3 + 8 + 4

5419 4