Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/BT/OLD/SEM-6/BT-603/2013

2013

POLLUTION CONTORL AND ENVIRONMENTAL BIOTECHNOLOGY

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 any *ten* of the following : $10 \times 1 = 10$

   i) The unit of hydraulic loading rate is

      a) $m^3/m^2/day$ b) $kg/m^3/day$

      c) $m^2/m^3/day$ d) $kg/m^2/day$.

   ii) Full form of EPA is

      a) environmental protocol academy

      b) environmental protection agency

      c) ecology protection agency

      d) ecology protection authority

   iii) Centrifugal scrubber is used for removal of

      a) Mist

      b) Fog

      c) Particulate matter

      d) Gaseous air pollutants.

iv) Bacterial-Algal symbiosis is observed in
   a) Aerobic pond
   b) Activated sludge process
   c) Facultative pond
   d) Both (a) and (c).

v) Mist is a
   a) liquid with droplet size less than 10μm
   b) gas with molecule size less than 10μm
   c) liquid with droplet size greater than 10μm
   d) gas with molecule size greater than 10μm.

vi) Full form of MLVSS is
   a) mixed liquid vaporized suspended solid
   b) mixed liquor vaporized settable solid
   c) mixed liquor volatile suspended solid
   d) mixed liquid volatile settable solid.

vii) PAN is a
   a) underground water pollutant
   b) an reserve water pollutant
   c) a primary air pollutant
   d) a secondary air pollutant.

viii) Clause method is designed for the removal of
   a) carbon monoxide b) nitric oxide
   c) hydrocarbon d) sulphur dioxide.

ix) Minamata disease is associated with
   a) mercury pollution b) arsenic pollution
   c) cadmium pollution d) lead pollution.

x) Example of a persistent organic pollutant is
   a) phenol b) cellulose
   c) mercury d) phosphomolybdic acid.

xi) Metallothionein is a protein specialised in

a) degradation of toxic organic compounds
b) pumping out toxic compounds
c) synthesis of antibiotics
d) binding with heavy metals.

xii) For a good sludge in activated sludge process is have SVI

a) < 40 b) > 200
c) between 40 and 200 d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Describe five physical characteristics wastewater.
3. What are the different steps involved in anaerobic digestion of biodegradable organic matter present in wastewater ?
4. What is tape sampler and how does it work ?
5. What is biosorption ? Discuss the mechanism of biosorption by fungi. 2 + 3
6. Define Simpson's index and Shannon-Weiner index for biodiversity. $2 \times 2\frac{1}{2}$

GROUP – C

(Long Answer Type Questions)

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

7. a) What are the different forms of nitrogen likely to be found in wastewater ? Describe the Kjehldahl method for measurement of nitrogen in wastewater.

b) Compare the relative advantages and disadvantages of BOD and COD measurement with respect to get an idea of the pollution level in wastewater.

c) Write short notes on activated sludge process for treatment of wastewater. (2 + 5) + 3 + 5

8. Write short notes on : Cyclone separator, High volume sampler, Electrostatic precipitator. 3×5

9. a) What do you mean by first stage BOD and second stage BOD ? Deduce the expression of kinetics of first stage BOD removal.

b) Write the working principle of trickling filter process.

c) Define BOD, COD, MLSS (2 + 5) + 5 + 3

10. a) Describe different modifications in air supply in activated sludge process that can be used in industry to overcome the inequality between oxygen supply and oxygen demand.

b) Describe different pond systems used in biological treatment of wastewater.

c) Define HLR of Trickling filter. 8 + 6 + 1

11. Write down the different forms of mercury that are present in nature. Arrange them according to their toxicity level. What are broad spectrum and narrow spectrum mer operon ? What are the genes present in a broad-spectrum mer operon ? Discuss their roles in conferring mercury resistance to bacteria. 2 + 1 + 4 + 3 + 5