Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (BT-NEW)/SEM-6/BT-603/2010

2010

POLLUTION CONTROL & 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) T.L.V. means

a) Thrust Limit Value

b) Threshold Line Value

c) Threshold Limit Value

d) None of these.

ii) Aitken particles are

a) Aerosols

b) Biosols

c) Dust materials

d) None of these.

iii) PAH stands for

a) Polycyclic Aromatic Hydrocarbons

b) Peroxy Aromatic Hydrocarbons

c) Para Aromatic Hydrocarbons

d) None of these.

iv) A lake in oligotrophic condition means

a) contaminated body of water

b) polluted body of water

c) clear body of water

d) none of these.

v) *ppm* stands for

a) parts per minute

b) parts per million

c) parts per meter

d) none of these.

vi) E.I.A. means

a) Environmental Internal Assessment

b) Environmental Inorganic Assessment

c) Environmental Impactment Assessment

d) Environmental Impact Assessment.

vii) Carboxyhaemoglobin happens when

a) CO_2 attacks haemoglobin

b) C attacks haemoglobin

c) CO attacks haemoglobin

d) none of these.

viii) RSPM means

a) Restricted Suspended Particulate Matter

b) Respiratory Suspended Particulate Matter

c) Random Suspended Particulate Matter

d) none of these.

ix) UASB stands for

a) Upward Anaerobic Sludge Blanket

b) Upflow Aerobic Sludge Blanket

c) Upflow Anaerobic Sludge Blanket

d) none of these.

x) Trickling filter is

a) an aerobic process

b) an anaerobic process

c) both aerobic and anaerobic processes

d) none of these.

xi) MPN stands for

a) Maximum Probable Number

b) Most Probable Number

c) Minimum Probable Number

d) None of these.

xii) NTU means

a) Normal Turbidity Units

b) Nephelometry Turbidity Units

c) Neutrients Testing Units

d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Describe with mathematical equations, how deoxygenating and re-aeration process affects the critical dissolved oxygen concentration in DO sag curve.

3. Describe the mechanism of first stage and second stage of BOD removal.

4. Mention the cause and effect of photochemical smog in air.

5. State the operating principle of cyclone separator for removal of air pollutants.

6. Discuss the metabolic degradation of open chain alkanes by bacteria.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) State the use of bag filter system for particulate matter removal form air.

   b) State two methods by which NO_X emission to air can be reduced.

   c) How is NDIR system used for measuring carbon monoxide level in air ? 5 + 5 + 5

8. a) Describe Kjehldahl method for nitrogen measurement in wastewater.

   b) How is biological characteristics of wastewater measured by MPN method ?

   c) Determine ultimate BOD for a raw sewage having 5 day BOD at 20° C as 160 ppm. Assume the deoxygenation constant as 0·12 per day. Determine the 2 day BOD.

   d) Name three physical unit operations for wastewater treatment. 5 + 3 + 4 + 3

9. An air stream with a flow rate of 7 m/s is passed through a cyclone of standard proportions. The diameter of the cyclone is 2·0 m and air temperature is 77° C.

   a) Determine the diameter of the particle that is collected with 50% efficiency.

   b) Determine the particle diameter collected with 50% efficiency if 64 cyclones with 24 cm diameter (cyclones) are used.

   Given, number of effective turns = 5, particle density = 1·5 g/cm, gas (air) viscosity = $2{\cdot}1 \times 10^{-5}$ kg/m.s. 15

10. What are the objectives of composting ? What are the end products of it ? How are different substrates converted into products through aerobic and anaerobic microbial activities in a compost heap ? 3 + 1 + 11

11. Describe with schematic and the chemical reaction involved in the process of SO_2 removal by lime or lime stone slurry scrubber. 9 + 6