Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B. TECH (BT)/SEM-6/BT-603/2012

2012

POLLUTION CONTROL 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) CETP is operated and maintained by

a) non-governmental organization

b) co-operative society

c) international body

d) pollution control board.

ii) A cyclone separator handles gas having tangential velocity of particle, V_θ and its radius of rotation, *r*. The separation factor (S) can be expressed as

a) $V_\theta / g.r$ b) $V_\theta / g.r^2$

c) $V_\theta^2 / g.r$ d) $V_\theta^2 / g.r^2$.

iii) Mean cell residence time is the

a) ratio of reactor volume to volumetric flow rate

b) product of reactor volume and volumetric flow rate

c) ratio of biomass to biomass removal rate from the reactor

d) product of biomass and biomass removal rate from the reactor.

iv) Burrowing earthworms are used in Vermiculture for

a) absorption of poisonous substances

b) killing of pathogens and non-pathogens

c) grinding of organic intake by rock, grit and dust

d) none of these.

v) In waste water treatment, skimming tank is used for

a) sedimentation of solids

b) oxidation of organic matter

c) removing suspended solids

d) removing oil and grease.

vi) Anoxic condition is required for

a) nitrification b) denitrification

c) trickling filter d) UASB.

vii) High volume sampler separates particles of size

a) smaller than 10 μm b) larger than 10 μm

c) larger than 15 μm d) none of these.

viii) 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.

ix) PAN is a

a) underground water pollutant

b) reserve water pollutant

c) primary air pollutant

d) secondary air pollutant.

x) Clause method is designed for the removal of

a) carbon monoxide b) nitric oxide

c) hydrocarbon d) sulphur dioxide.

xi) Arsenic contamination in drinking water is most prevalent in

a) East coast of the US

b) Sub-Saharan Africa

c) West Bengal and Bangladesh

d) Mongolia.

xii) Most toxic form of chromium present in nature is

a) Cr (0) b) Cr (III)

c) Cr (IV) d) Cr (VI).

xiii) An example of organophosphorous pesticide is

a) parathion b) DDT

c) metolachlor d) azethrin.

GROUP – B

(Short Answer Type Questions)

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

2. What is COD ? Explain why COD is considered as the most popular alternative test to BOD for establishing the concentration of organic matter in wastewater samples. 2 + 3

3. What are mist and aerosol ? How carbon monoxide comes to the environment and what is the effect of carbon monoxide on human ? 1 + 4

4. What is the principle of West-Gaeke method for the analysis of SO_2 ? What are the interfering agents of this technique and how can you eliminate those ? 3 + 2

5. Describe briefly the trickling filter operation. 5

6. Write short notes any *four* of the following : 5

   a) Dust

   b) Smoke

   c) Fumes

   d) Fly ash

   e) Mist

   f) Spray.

7. Briefly describe the operation of electrostatic precipitator.

GROUP – C

(Long Answer Type Questions)

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

8. Write short notes on any *three* of the following :

   a) Vermicomposting

   b) Composting

   c) High volume sampler

   d) Nitrification

   e) Denitrification.

9. What is EPA ? Write the principles followed by EPA. Write any five statutory functions of EPA. 2 + 8 + 5

10. Draw a sketch of a conventional wet scrubber for removing particles in gas. What is the objective of using wet scrubber ? What is its collection mechanism ? What are the advantages and disadvantages of wet scrubber ? 4 + 3 + 4 + 4

11. a) The dissolved oxygen in an unseeded sample of diluted waste having an initial DO of 9·0 mg/L is measured to be 3·0 mg/L after 5 days. The dilution factor *P* is 0·030 and the reaction rate constant *k* is 0·22/day.

    i) What is the 5 day BOD of the waste ?

    ii) What would be the ultimate carbonaceous BOD ?

    iii) What would be the remaining oxygen demand after 5 days ?

    b) Briefly describe the carbonaceous phase and nitrogenous phase of BOD removal.

    c) Compare the relative advantages and disadvantages of BOD and COD.

    d) What is the ultimate carbonaceous oxygen demand ?

    e) What is the full form of VOC ? 6 + 4 + 2 + 2 + 1

12. a) Briefly describe three classes of dehalogenation in degradation of chlorinated organic compound. 2 + 2 + 2

    b) Write a short note on fungal biosorption ? 4

    c) How *n*-alkanes are degraded and in which step the final product is introduced into the TCA cycle ? 5

13. a) Write different environmental forms of mercury and arsenic ? 2 + 2

b) "Plasmid-encoded metalloid resistances are widespread in bacterial species." Justify this statement. 3

c) How does *Mer* operon affect human physiological system ? Why does it target enzymes and other proteins in living system ? Briefly describe the metabolic pathway involved in the degradation of Cyclohexane. 2 + 1 + 5