



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 × 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,  $V_{\theta}$  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  $10\ \mu\text{m}$       b) larger than  $10\ \mu\text{m}$
  - c) larger than  $15\ \mu\text{m}$       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.



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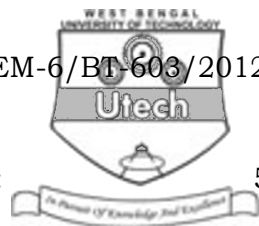
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6. Write short notes any *four* of the following :

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 )

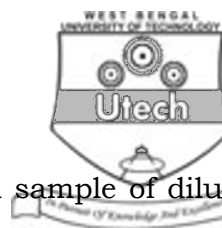
Answer any *three* of the following.  $3 \times 15 = 45$

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

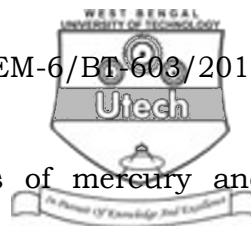
- a) Vermicomposting
- b) Composting
- c) High volume sampler
- d) Nitrification
- e) Denitrification.

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

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