ENVIRONMENTAL BIOTECHNOLOGY
(BTC3132)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Which of the following particulate matter have size ranging from 1-200 μm?
(a) Dust (b) Smoke (c) Fumes (d) Mist

(ii) The mechanism by which the particulates in a dust-laden gas are trapped on to the fibers are:
(a) Inertial Impaction (b) Direct Interception
(c) Diffusion (d) All of the above

(iii) Ultimate NBOD = _____x Total Kjeldahl Nitrogen.
(a) 5.8 (b) 4.6 (c) 6.8 (d) 9.2

(iv) Ammonium molybdate is used to analyze _____ content of waste water.
(a) Phosphorus (b) Nitrogen
(c) Calcium (d) Carbon

(v) Which one of the following is an example of starch crops biomass feed stocks?
(a) Sugar cane (b) Wheat straw
(c) Corn stover (d) Orchard pruning

(vi) End product of benzene biodegradation is
(a) acetyle CoA (b) toluene
(c) catechol (d) none of these

(vii) A process using microbes to convert toxic industrial wastes to less toxic or non-toxic compounds is
(a) Precipitation (b) Complement fixation
(c) Bioconversion (d) Bioremediation

(viii) Which of the following is not an organic pollutant?
(a) Insecticides (b) Dioxins
(c) Polychlorinated biphenyls (d) Oxygen

(ix) In-situ based bio remediation involves introducing _____ to contaminated areas.
(a) Oxygen and nutrients (b) Carbon dioxide and methane
(c) Nitrogen and CO2 (d) CO and methane

(x) Waste water treatment which uses microorganisms to reduce the BOD of waste water
(a) Primary Treatment (b) Secondary Treatment
(c) Tertiary Treatment (d) All of these

Fill in the blanks with the correct word

(xi) _____ is a liquid with droplet size less than 10 μm.

(xii) Addition of microbe to a cleanup site is called as _____.

(xiii) The phytoremediation technique uses plant roots to take up contaminated groundwater or surface water is called _____.

(xiv) One example of PAH is _____.

(xv) Typical baghouse is used to remove _____.

Group - B

2. (a) Enumerate the various processes of collecting gaseous air pollutants. *[(CO1)(Enumerate/IOCQ)]*

(b) A conventional cyclone with a diameter 1 m handles 3 m^3/s of standard air.Using $N_e = 6$, determine the cut size of particles of density [a] 1500 Kg/m^3. Given: $\mu_g = 1.8 \times 10^{-5}$ Kg/m-s. *[(CO1)(Numericals/HOCQ)]*

(c) What do you mean by Combustion? *[(CO1)(Remember/LOCQ)]*

6 + 4 + 2 = 12

3. (a) Explain the process of separating the particulate matters from air by Spray Towers. *[(CO1)(Describe/IOCQ)]*

(b) Enumerate the process of analyzing carbon monoxide present in the air. *[(CO1)(Analyse/IOCQ)]*

(c) Classify the particulate matters. *[(CO1)(Classify/IOCQ)]*

4 + 4 + 4 = 12

Group - C

4. (a) Briefly describe the role of Oxygen demanding wastes as water pollutants. *[(CO2)(Describe/IOCQ)]*

(b) Explain with a diagram the different steps used in a Primary treatment of waste water. *[(CO2)(Illustrate/HOCQ)]*

4 + 8 = 12

5. (a) Explain the removal of dissolved solids by Electrodialysis. *[(CO2)(Analyse/HOCQ)]*

(b) How can you model BOD as a first order reaction? *[(CO3)(Derive/IOCQ)]*

(c) Write notes on Ammonia Stripping. *[(CO2)(Understand/LOCQ)]*

5 + 4 + 3 = 12

Group - D

6. (a) Describe two process for bioenergy production. *[(CO5)(Describe/IOCQ)]*
   (b) Write short note on vermicomposting? *[(CO4)(Remember/LOCQ)]*

6 + 6 = 12

7. (a) Write short note on composting process? *[(CO4)(Understand/LOCQ)]*
   (b) Compare between aerobic and anaerobic process. *[(CO5)(Compare/IOCQ)]*

6 + 6 = 12

Group - E

8. (a) Mention the structural features that make recalcitrant xenobiotic compounds resistant to microbial degradation. *[(CO5)(Understand/IOCQ)]*
   (b) What are the major categories/types of recalcitrant xenobiotic compounds present in the environment? *[(CO6)(Remember/LOCQ)]*

6 + 6 = 12

9. (a) Describe the biodegradation pathway of cyclohexane. *[(CO6)(Understand/HOCQ)]*
   (b) Differentiate between Co-Metabolism and Gratuitous Metabolism of xenobiotic compounds with examples. *[(CO6)(Analyse/IOCQ)]*
   (c) What are POPs? *[(CO6)(Remember/LOCQ)]*

4 + 6 + 2 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	26.04	52.08	21.88