ENVIRONMENTAL BIOTECHNOLOGY
(BIOT 3132)

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) Infra red radiation is absorbed by
(a) Sulphur dioxide (b) Hydrocarbons
(c) Nitric oxides (d) Carbon monoxide.

(ii) Venturi Scrubber is used for removal of
(a) Waste water (b) Gaseous air pollutants
(c) Particulate matters (d) None of these.

(iii) Sludge Volume Index for a good sludge is
(a) Less than 40 (b) 40-100
(c) 100-200 (d) More than 200

(iv) Activated treatment of waste water is used in _____ of waste water.
(a) Primary Treatment (b) Secondary Treatment
(c) Tertiary Treatment (d) All of these

(v) Which bioremediation approach involves using plants to degrade pollutants?
(a) Biopile (b) Phytoremediation
(c) Bioaugmentation (d) Land farming.

(vi) Production of bioethanol is through fermentation of _____ and starch components
(a) alcohol (b) sugar (c) milk (d) acid

(vii) Foreign substances which are chemical in nature found within an organism which is produced naturally are called as _____.
(a) Xenobiotics (b) Bio-leaching
(c) Bio-remediation (d) Bio-fortification

(viii) Which among the following processes doesn't come under phyto-remediation?
(a) Bio-accumulation (b) Rhazofiltration
(c) Phytoextraction (d) Phytostabilisation.

(ix) Full form of EPA is
(a) Environmental Protocol Academy (b) Environmental Protection Agency
(c) Ecology Protection Agency (d) Ecology Protection Authority.

(x) The conditions for formation of Photochemical Smog are
(a) Air stagnation
(b) Abundant sunlight
(c) High concentration of hydrocarbons and nitrogen oxides
(d) All of these.

Fill in the blanks with the correct word

(xi) Trickling Filter is used in _____of waste water.

(xii) Waste water treatment which mainly reduces the nitrogen and phosphorus from water is known as _____.

(xiii) Nessler's Reagent is used to detect _____ of waste water.

(xiv) The method of preparing compost with the help of earthworms is called _____.

(xv) Prof. Ananda Chakraborty received the first U.S. patent for a GM entity. The organism was _____.

Group - B

2. (a) In a high volume filtration tank sampling is done for 24 hours.Initial flow is 1.7m^3 /minutes and the final flow is 1.4 m^3/minutes. Weight of the clean filter is 5.00gram and at the end of the filtration it is 5.348gm. find out the suspended particulate concentration in micrograms per cubic meter. *[(CO1)(Numericals/HOCQ)]*

(b) Explain the working principle of Howard settling chamber. *[(CO1)(Analyze/IOCQ)]*

6 + 6 = 12

3. (a) Write notes on Direct Combustion. *[(CO1)(Understand/LOCQ)]*

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

(c) Write notes on Catalytic oxidation. *[(CO1)(Illustrate/IOCQ)]*

4 + 4 + 4 = 12

Group - C

4. (a) The dissolved oxygen in an unseeded sample of diluted waste having an initial DO of 9 mg/L is measured to be 3 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? *[(CO3)(Numerical/HOCQ)]*

(b) What do you mean by BOD? State how a Five–day BOD test is carried out in a lab? *[(CO3)(Illustrate/IOCQ)]*

6 + (2 + 4) = 12

5. (a) Comment on Facultative ponds. *[(CO3)(Comment/IOCQ)]*
(b) Illustrate the process of concentrating the sludge before disposal. *[(CO3)(Illustrate/IOCQ)]*
(c) How can you detect the trace elements in the water sample? *[(CO2)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Group - D

6. (a) Compare the different modes of pyrolysis operation. *[(CO5)(Analyse/HOCQ)]*
(b) What are the factors which affects the choice of biomass conversion process? *[(CO4)(Remember/LOCQ)]*
(c) Name any two biofuel. *[(CO5)(Remember/LOCQ)]*

6 + 4 + 2 = 12

7. (a) What should be the ideal values of C: N ratio in composting and why? *[(CO5)(Analyse/HOCQ)]*
(b) State the advantages and disadvantages of Biopile process. *[(CO5)(Compare/IOCQ)]*

6 + 6 = 12

Group - E

8. (a) The xenobiotic compounds may be recalcitrant: Give reasons. *[(CO6)(Analyse/HOCQ)]*
(b) What are the potential hazards that arise from exposure to xenobiotic compounds? *[(CO6)(Remember/LOCQ)]*

6 + 6 = 12

9. (a) Explain any three methods of microbial sequestration of heavy metals from soil or water. *[(CO6)(Analyse/HOCQ)]*
(b) Explain the mechanisms of toxicity of Pb, Hg, Arsenic. *[(CO4)(Understand/IOCQ)]*

6 + (2 + 2 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	22.9	39.58	37.52