

B.Sc. BIOTECHNOLOGY
Sixth Semester
ENVIRONMENTAL BIOTECHNOLOGY
(BBT - 26)

Duration: 3Hrs.

Full Marks: 70

PART A (Objective) =20

PART-B (Descriptive)=50

PART-B (Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

1. Answer the following questions (any five):

2×5=10

- a) Mention the two major mechanisms of tertiary oil recovery involving microbes.
- b) Differentiate between trademark and trade-secret.
- c) What is a patent?
- d) Mention the important factors influencing the physical process of sedimentation.
- e) Draw a labeled diagram of sanitary landfill process.
- f) Define plagiarism.
- g) Write the major objectives of preliminary waste treatment.

2. Answer the following questions (any five):

3×5=15

- a) What is suigeneris? Discuss its significance. 1+2=3
- b) What do you mean by risk assessment? Explain briefly.
- c) What is a biosensor? Add a brief note on environmental application of biosensors. 1+2=3

- d) Discuss briefly how halophiles increase the internal osmolarity of the cell to survive under extreme saline condition.
- e) Define bioleaching. Discuss the advantages of this process over the other methods of metal recovery.
- f) What is acute metal toxicity? Discuss the health effects of heavy metals with reference to arsenic.
- g) Mention the four major categories of waste generated through medical applications.

3. Answer the following questions (any five):

5×5=25

- a) What is an oil spill? What are the major causes of oil spillage? Discuss briefly the environmental effects of the pollution caused by petroleum hydrocarbons.
1+2+2=5
- b) Define bioremediation. Distinguish between *ex-situ* and *in-situ* bioremediation. Mention the advantages of bioremediation. 1+2+2=5
- c) Discuss the salient features of Indian Patent Act.
- d) What do you understand by microbial enhanced oil recovery? Discuss the tertiary oil recovery technique involving microorganisms.
- e) Discuss the major phyto-remediation strategies for cleaning up a polluted site.
1+4=5
- f) Define biomethanation. Discuss the biochemical process methanogenesis.
1+4=5
- g) Discuss the major aerobic waste water treatment strategies.

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Duration: 20 minutes

Marks – 20

PART-A (Objective)

Time: 20 mins

Total Marks: 20

I. Choose the correct option:

1×15=15

1. Particles that do not change their size, shape and weight are settled down during primary treatment through
(i) discrete settling (ii) flocculant settling
(iii) zone settling (iv) compression
2. An organism qualifying as an extremophile under more than one category is known as a
(i) polyextremophile (ii) psychrophile
(iii) hypolith (iv) piezophile
3. Preliminary waste water treatment has been designed for the removal of
(i) suspended solids (ii) dissolved organics
(iii) colloidal particles (iv) none of the above
4. The thermoalkaliphilic catalase that initiates the breakdown of H₂O₂ into oxygen and water, was isolated from the extremophile,
(i) *Nocardiopsis Alba* (ii) *Thermus brockianus*
(iii) *Spinoloricus Cinzia* (iv) *Thermus aquaticus*
5. Which among the following is a eukaryotic extremophilic alga?
(i) *Tetragenococcus halophilus* (ii) *Salinibacter ruber*
(iii) *Dunaliella salina* (iv) *Pyrolobus fumarii*
6. Which of the following is not a part of chemical sedimentation process?
(i) coagulation (ii) flocculation

(iii) sedimentation (iv) none of the above
7. Methanogens, belonging to the domain Archaea, are anaerobic organisms and cannot function under aerobic conditions except,
(i) *Methanosarcina barkeri* (ii) *Methanobrevibacter ruminantium*
(iii) *Methanospirillum hungatei* (iv) *Methanococcus vannielii*

8. The process of thermo-chemically decomposition of organic waste materials by heat in absence of oxygen is called as
(i) Landfill (ii) Pyrolysis
(iii) Incineration (iv) Recycling
9. Which of the following is not an *in-situ* bioremediation approach?
(i) bioventing (ii) biosparging
(iii) bioreactor (iv) bioaugmentation
10. Which of the following has been adopted as a measure of relative pollution effects?
(i) The 5-day BOD (ii) Bacterial counts
(iii) Fungal count (iv) Volume of the liquid waste
11. For a pollutant like polycyclic aromatic hydrocarbon (PAH), the best bioremediator is
(i) Phytoremediator (ii) Mycoremediator
(iii) viral remediator (iv) none of the above
12. Among the following organisms which is known as “sewage fungi”?
(i) *Aspergillus fumigatus* (ii) *Streptococcus aureus*
(iii) *Sphaerotilus natans* (iv) *Rhizoctonia solani*
13. The biochemistry of methanogenesis is relatively a complex process involving some unusual coenzymes and cofactors, except
(i) methanofuran (ii) Methanopterin
(iii) F₄₂₀ (iv) none of the above
14. Genetically modified *Pseudomonas fluorescens* strain *HK44* had been engineered for naphthalene catabolism and bioluminescence conferred by
(i) *nah* gene and *lux* gene (ii) *lux* gene and *nah* gene
(iii) *nif* gene and *nod* gene (iv) *nod* gene and *nif* gene
15. Which among the following characteristic feature(s) is/are common among the microbes used for bioleaching?
(i) metal tolerance (ii) acidophiliic
(iii) chemotrophic (iv) all of the above

II. Give the acronym of the following:

1×5=5

1. TRIPS
2. GATT
3. WTO
4. WIPO
5. BSL
