M. Sc. BIOTECHNOLOGY
SECOND SEMESTER
ENVIRONMENTAL BIOTECHNOLOGY
MBT – 203 (REPEAT)

Duration : 3 hrs. **Full Marks : 70**

(PART-A: Objective)

Time : 20 min. **Marks : 20**

Choose the correct answer from the following: ***1×20=20***

1. Among the following, the extremophile that qualifies to survive under multiple extreme environmental condition (polyextremophile) is
   a. *Thermococcus barophilus* b. *Thermus thermophilus*
   c. both a. and b d. *Dodgella priscus*

2. Methanogens capable of obtaining energy for growth by oxydizing compounds like molecular H_2 or formate and utilizing the electrons thus generated to reduce CO_2 to CH_4 are termed as
   a. methanotrophic b. syntrophic
   c. organotrophic d. hydrogenotrophic

3. The thermoalkaliphilic catalase, which initiates the breakdown of hydrogen peroxide into oxygen and water, was isolated from the extremophile
   a. *Thermus brockianus* b. *Thermococcus barophilus*
   c. *Cupriavidus metallidurans* d. *Paracoccus denitrificans*

4. The linear polyesters produced in nature by bacterial fermentation of sugar or lipids are
   a. polyhydroxyalkanoates b. poly-3-hydroxybutyrates
   c. polyhydroxyhexanoates d. All of the above

5. For a successful bio-composting process, the C and N ratio in a compost plant should be
   a. 1:20 b. 15:1
   c. 1:25 d. 25:1

6. The molecular technique that involves an enzymatic amplification using primers directed at the conserved regions at the ends of the 16s gene, followed by digestion using tetracutter restriction enzymes is
   a. FISH b. DGGE
   c. ARDRA d. FAME

7. Methanogens are very sensitive to the presence of oxygen even at trace level; except *Methanosarcina barkeri* that can survive even in the presence of O_2 by possessing enzyme
   a. glucose oxidase b. invertase
   c. superoxide dismutase d. peroxidase

8. Which one of the following method is ecofriendly to decompose solid waste
   a. Incineration b. Decomposing
   c. Landfilling d. All the above

9. Acceptable limit of Arsenic in drinking water is
   a. 0.05 mg/l b. 0.5 mg/l
   c. 0.0005mg/l d. 5 mg/l

10. The biosensor that works based on the movement of electrons due to redox reaction is
   a. calorimetric biosensor b. potentiometric biosensor
   c. conductimetric biosensors d. amperometric biosensor

11. Blastofiltration is an important process of phytofiltration in which the metals are absorbed or adsorbed by the use of
   a. seedlings b. excised plant shoots
   c. floral buds d. plant roots

12. Which of following is a fossil resource based plastic but, biodegradable?
   a. polybuterate (PBAT) b. polyhydroxyalkanoates (PHA)
   c. polylactic acid (PLA) d. PET

13. Xanthan gum, an ideal biopolymer for use in EOR, is produced by fermentation of carbohydrates using
   a. *Xenthomonas citri* b. *Xenthomonas brassicaei*
   c. *Xenthomonas tobaccum* d. *Xenthomonas solanae*

14. Hyperkeratosis is a common problem associated with chronic or lower levels of exposure of
   a. Arsenic b. Mercury
   c. Lead d. Cadmium

15. *Azadirachtin*, a potent plant based pesticide is obtained from
   a. Tulsi b. Neem c.Ginger d.Haldi

16. n diagnostic nuclear medicine, which of the isotope finds its application in treating thyroid cancer?
   a. I-131 b. Cs-137 c. Y-90 d. Sr-89

17. To survive in a saline environment, which of the cellular property is enhanced by the Halophiles?
   a. proton pumping process b. internal osmolarity
   c. cytosolic acidity d. both b) and c)

18. Which of the extremophiles is capable of growth in nutritionally limited environments?
   a. Hypolith b. Osmophile
   c. Oligotroph d. Piezophile

19. Minamata disease is caused due to
   a. Methyl mercury b. Mercurous chloride
   c. Mercuric chloride d. Arsenic

20. Which form of medical waste is constituted by sharps like needles and syringes, discarded surgical instruments like scalpels and lancets
   a. hazardous b. pharmaceutical
   c. infectious d. none of the above

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Contd...

(PART-B : Descriptive)

Time : 2 hrs. 40 min. **Marks : 50**

[Answer question no.1 & any four (4) from the rest]

1. Mention the important aerobic and anaerobic processes involved in secondary treatment of waste water. Under what circumstances tertiary treatment is required in the treatment process. 10

2. What do you understand by a biosensor? Discuss the working principle of a typical biosensor. Mention the key features of a successful biosensor. 2+4+4 =10

3. Define bioremediation? Discuss the important types of *in-situ* bioremediation strategies for environmental cleaning. 2+8=10

4. Define biomethanation. Discuss the important enzymes associated with the process mentioning the functional role for each of them. Add a note on environmental impact of the process. 2+5+3 =10

5. What do you understand by "genomics"? Mention the different molecular techniques used to study ecological condition. 2+8=10

6. What are the major objectives of preliminary sewage treatment? Give a diagrammatic description of sanitary landfilling process for solid waste management. Mention the important factors affecting the process of biocomposting. 3+4+3 =10

7. What is an oil-spill? Mention the major causes of oil-spill. Discuss briefly the important strategies applied for reducing the intensity of oil spillage 4+6=10

8. What is a polyextremophile? Add a brief note on industrial application of extremophiles. Discuss the strategies applied by halophiles to survive under extreme saline environment. 1+3+6 =10

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