M.Sc. ENVIRONMENTAL SCIENCE
SECOND SEMESTER
ENVIRONMENTAL BIOTECHNOLOGY
MEV-203

(Use Separate Answer Scripts for Objective & Descriptive)

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. According to WHO the maximum permissible (mg/l) of chloride is
   a. 800 b. 600
   c. 500 d. 450

2. Amoebiasi is a
   a. Protozoan infection b. Bacterial infection
   c. Viral infection d. All the above

3. Minamata disease is caused due to
   a. Mercury b. Cadmium
   c. Silver d. Alluminium

4. Among the following which one is correct
   a. BOD>COD b. BOD<COD
   c. BOD=COD d. BOD≥COD

5. According to WHO the coliform count in water should be
   a. 0 b. <0
   c. >0 d. None of the avove

6. Organophosphates present in the water can cause
   a. Damaging the nervous system b. May cause cancer
   c. Only a is correct d. a& b both correct

7. 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

8. Which of the following elements can reduce the radioactive metals from an oxidized soluble form to a reduced insoluble form?
   a. Virus b. Bacteria
   c. Fungi d. All the above

9. Which on the following species are considered to be suitable for the removal of chlorinated phenolic compounds from the contaminated environments.
   a. Fungal species b. Virus species
   c. Bacterial species d. Protozoan species

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

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

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. Methanogens are obligate anaerobes and are very sensitive to the presence of oxygen even at trace level. *Methanosarcina barkeri* is an exception that can survive longer even in the presence of O_2 by possessing enzyme
    a. glucose oxidase
    b. invertase
    c. superoxide dismutase
    d. peroxidase

14. 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

15. 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

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

17. 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

18. 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*

19. 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

20. The technique of polymerase chain reaction (PCR) was developed by
    a. Mullis *et al.*
    b. Leonard Lerman
    c. Vaneechoutte *et al.*
    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. Discuss the role of microbes in domestic and industrial waste water treatment. 10

2. Discuss the composition of sewage? Define BOD and COD? 6+4=10

3. Define bioremediation? Describe the process of *in-situ* and *ex-situ* bioremediation. 2+8=10

4. Discuss the secondary treatment procedure of waste water treatment. 10

5. Discuss the basic concepts of phytoremediation. 10

6. 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

7. Discuss the working principle of a typical biosensor. Mention the key features of a successful biosensor. Draw a typical diagram of a calorimetric biosensor. 4+3+3 =10

8. What do you understand by "genomics"? Mention the different molecular techniques used to study ecological condition. Discuss briefly the principle of DGGE. 2+4+4 =10

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