

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

Duration: 3 Hrs.

Marks: 70

{ Part : A (Objective) = 20 }  
{ Part : B (Descriptive) = 50 }

[ PART-B : Descriptive ]

Duration: 2 Hrs. 40 Mins.

Marks: 50

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

1. Discuss in detail the biochemical aspects of biomethanation. (10)
2. What are the major objectives to be achieved in bioremediation? Discuss the importance of genetic engineering in bioremediation with special reference to heavy metals. (3+7=10)
3. What do you understand by *in-situ* and *ex-situ* MEOR? Discuss the role of biosurfactants in the enhanced recovery of oil using microbes. (3+7=10)
4. Define biofertilizer. Discuss the important characteristics a micro-organism need to have to be considered as a biofertilizer. Mention the important categories of biofertilizer with suitable example for each type. (2+4+4=10)
5. Explain the role of microbes in the production of hydrogen gas and fuel alcohol. (10)
6. Mention the important factors affecting the remediation of oil spill. How microorganisms can be helpful in removing the petro-pollutants from marine or terrestrial environment? (3+7=10)
7. Describe in detail the methods involved in liquid waste management. (10)
8. Add brief explanatory notes on any two of the following: (5+5=10)
  - a) In-situ bioleaching
  - b) Vermicomposting
  - c) SCP

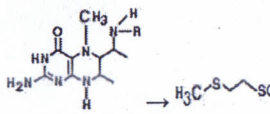
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[ PART-A : Objective ]

Choose the correct answer from the following:

1X20=20

1. \_\_\_\_\_ is an in-situ bioremediation strategy that involves controlled stimulation of airflow by delivering oxygen to unsaturated zone in order to increase activities of indigenous microbes.
- a. Bioventing                      b. Biosparging  
 c. Bioaugmentation              d. Biostimulation
2. Screening and sedimentation is related to \_\_\_\_\_.
- a. primary waste water treatment  
 b. secondary waste water treatment  
 c. tertiary waste water treatment  
 d. All of the above
3. \_\_\_\_\_, widely used in the medical industry, are linear polymers produced in nature by bacterial fermentation of sugar or lipids.
- a. Polyhydroxyalkanoates  
 b. Poly-3-hydroxybutyrates  
 c. Polyhydroxyvalerates  
 d. Polyhydroxyhexanoates
4. The biological component in a biosensor interacts specifically to the analyte which produces a physical change close to the transducer surface. If the physical change is in the form of change in mass of the biological component, it is the working principle of \_\_\_\_\_ biosensor.
- a. conductimetric                      b. potentiometric  
 c. amperometric                      d. acoustic wave
5. Microbial technique used in producing organic manure is:
- a. Composting                      b. Vermicomposting  
 c. Pyrolysis                      d. All the above
6. Blastofiltration is an important process of phytofiltration in which the metals are absorbed or adsorbed by the use of \_\_\_\_\_.
- a. seedlings  
 b. floral buds  
 c. excised plant shoots  
 d. plant roots

7. The characteristic of wastewater are measured in terms of \_\_\_\_\_.
- a. BOD method  
b. COD method  
c. DO method  
d. None of the above
8. The combination of primary and secondary treatment reduces the original sewage BOD by \_\_\_\_\_.
- a. 80-90%  
b. 30-40%  
c. 50-60%  
d. 60-70%
9.  Enzyme initiating this reaction is \_\_\_\_\_.
- a. Methyl CoM reductase I or II  
b. Methyl Tetrahydromethanopterin Methyl Transferase  
c. Methyl Tetrahydromethanopterin Cyclohydrolase  
d. F<sub>420</sub>
10. Hyperkeratosis is a common problem associated with chronic or lower levels of exposure of \_\_\_\_\_.
- a. Arsenic  
b. Lead  
c. Mercury  
d. Cadmium
11. \_\_\_\_\_ used to dissipate oil slicks is either a non-surface active polymer or a surface active substance that improves the separation of particles and to prevent settling or clumping.
- a. Dispersant  
b. Solidifier  
c. Skimmer  
d. Boom or Barrier
12. The thermoalkaliphilic catalase which is extremely stable compared to other catalases at high temperatures and pH was isolated from the extremophilic organism \_\_\_\_\_.
- a. *Thermus brockianus*  
b. *Thermus barophilus*  
c. *Thermus aquaticus*  
d. *Thermus thermococcus*
13. Among the following bioremediation techniques, \_\_\_\_\_ is more effective for removal of volatile compounds from contaminated soil.
- a. bioaugmentation                      b. biosparging  
c. bioventing                      d. biopile

14. Ferrous and sulphur oxidizing bacterium *Leptospirillum ferrooxidans* is commonly used for bioleaching of \_\_\_\_\_.
- a. iron  
 b. gold  
 c. copper  
 d. all of the above
15. Aerobic oxidation is caused by \_\_\_\_\_.
- a. aerobic bacteria in presence of excess of oxygen.  
 b. anaerobic bacteria in presence of insufficient oxygen.  
 c. aerobic bacteria in absence of oxygen.  
 d. Both aerobic and anaerobic bacteria in any condition.
16. Among the following archaea, \_\_\_\_\_ has been traced in the gut of human.
- a. *Methanococcus smithii*  
 b. *Metallosphaera sedula*  
 c. *Acidianus infernus*  
 d. *Acidianus brierleyi*
17. Among the following \_\_\_\_\_ are biodegradable waste.
- a. Rubber, plastic  
 b. Vegetable peels, paper  
 c. Glass, wood cuttings  
 d. Metal, plastic
18. The main sources of pathogens in water are \_\_\_\_\_.
- a. Sewage  
 b. Bacteria  
 c. Protozoans  
 d. All of the above
19. A synergistic chemical is that which \_\_\_\_\_.
- a. does not pose a major danger.  
 b. poses danger in combination with certain other chemicals.  
 c. poses danger in combination with water.  
 d. All the above.
20. In soil bioremediation, the nutrients for inducing the indigenous microbes should in the molar ratio of C:N:P= \_\_\_\_\_.
- a. 100:20:10  
 b. 120:10:1  
 c. 100:10:1  
 d. 120:20:10

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**UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA**



Question Paper CUM Answer Sheet

**[PART (A) : OBJECTIVE]**

Serial no. of the main Answer sheet

Course : .....

Semester : ..... Roll No : .....

Enrollment No : ..... Course code : .....

Course Title : .....

Session : ..... 2016-17 ..... Date : .....

**Instructions / Guidelines**

- The paper contains twenty (20) / ten (10) questions.
- The student shall write the answer in the box where it is provided.
- The student shall not overwrite / erase any answer and no mark shall be given for such act.
- Hand over the question paper cum answer sheet (Objective) within the allotted time (20 minutes / 10 minutes) to the invigilator.

Full Marks	Marks Obtained	Remarks
20		

Scrutinizer's Signature

Examiner's Signature

Invigilator's Signature