

M.Sc. BIOTECHNOLOGY
FOURTH SEMESTER
ENVIRONMENTAL BIOTECHNOLOGY
MBT – 401

(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:

1X20=20

- Natronobacterium* are growing in the
 - pH 8-10
 - pH 9-11
 - pH 4-6
 - None of these
- Serine protease are derived from
 - Alkaliphiles
 - Acidophiles
 - Extremophiles
 - None of these
- Cellulases are used in
 - Waste water treatment
 - Food additives
 - both a&b
 - all of these
- Optimum temperature of thermophiles
 - 55-65° C
 - 40-50° C
 - 65-75° C
 - 80° C
- Which is NOT methanogenic microorganisms
 - Methanobacterium
 - Methanomonas
 - Methanobacillus
 - Methanosarcina
- Which is NOT acid forming microorganisms
 - Lactospirillum* sp.
 - Lactobacillus* sp.
 - Staphylococcus* sp.
 - None of these
- Which is NOT an Aerobic attached growth systems of sewage treatment
 - Trickling filter
 - Roughing filter
 - Oxidation ditch
 - None of these
- Conversion of ammonia to nitrate is known as
 - Natrofication
 - Nitrification
 - Nitrofication
 - Nitrifraction
- Which are NOT involve in trickling filter
 - Flavobacterium*
 - Stigeoclonium*
 - Chlorella*
 - Escherichia coli*
- Which is caused for Gastroenteritis
 - Salmonella typhi*
 - Vibrio cholerae*
 - Escherichia coli*
 - Shigella* sp.

11. Which is responsible for Amoebic dysentery
 a. *Entamoeba histolytica* b. *Giardia lamblia*
 c. *Balantidium coli* d. None of these
12. Which compound is used for colilert technique
 a. ONPG b. MLFG
 c. Both a & b d. None of these
13. Which is following involve in coliform test
 a. *Enterobacter aerogenes* b. *Aerobacter aerogenes*
 c. *Escherichia coli* d. All of these
14. Which of the following is used as coagulant aid
 a. Activated silica b. Soda ash
 c. Iron salts d. None of these
15. Bioremediation
 a. usage of microbes to create new organisms
 b. usage of anaerobic bacteria to create new antibiotics
 c. usage of microbes to destroy environmental pollutants
 d. usage of aerobic bacteria to create new vaccines
16. A process using microbes to convert toxic industrial wastes to less toxic or non-toxic compounds is
 a. Precipitation b. Complement fixation
 c. Bioconversion d. Bioremediation
17. This cleanup approach includes removal of groundwater or soil from its natural setting to permit for bioremediation
 a. Bioaugmentation b. *in situ* bioremediation
 c. *ex situ* bioremediation d. Phytoremediation
18. Bioaugmentation involves
 a. eliminating sludge b. plants usage for bioremediation
 c. addition of microbes to a cleanup site d. bioventing
19. _____ bacterium can withstand the dosage of radiation, which are several times higher than what human cells can tolerate
 a. *Escherichia coli* b. *Deinococcus radiodurans*
 c. *Conus magus* d. *Staphylococcus aureus*
20. Composition of Denaturing gradient gel in DGGE
 a. acrylamide b. urea
 c. formamide c. All of these

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(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

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

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| 1. What is sewage? Briefs on composition and types of sewage? Give details on measurement of water pollution? | 1+1+8
=10 |
| 2. Give details on the composting method of solid waste management? (with appropriate pictorial representation) | 10 |
| 3. Give details on the primary sewage treatment process (with appropriate pictorial representation)? Briefs on Chemical added sedimentation? | 7+3=10 |
| 4. What is aerobic attached growth treatment? Give details on the trickling filter process? | 3+7=10 |
| 5. Write short notes
a. Biosensor
b. DGGE | 5+5=10 |
| 6. Write a detailed note on bioremediation of oil spill. | 10 |
| 7. What is metagenomic? Give a detailed account on environmental application of metagenomic approach. | 2+8=10 |
| 8. What is phytoremediation? Write a detailed note on utility of various plants in environmental clean-up? | 2+8=10 |

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