

SECTION A [30 MARKS]

Answer ALL questions from this Section

1. Choose the phrase from the right column that best fits the term in the left column.

[10 MARKS]

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| a. Autotrophic microorganisms | 1. Ethyl alcohol production |
| b. Antony van Leeuwenhoek | 2. Process of converting substrate to protoplasmic carbon is known as assimilation |
| c. Protozoa | 3. First to rigorously demonstrate that a specific disease was caused by a specific microorganism |
| d. Louis Pasteur | 4. Parasite of bacteria |
| e. Carbon assimilation | 5. Biocontrol agents for fungal pathogens |
| f. <i>Saccharomyces cerevisiae</i> | 6. Developed pure culture technique |
| g. Sergei Winogradsky | 7. Energy generation component |
| h. Bacteriostatic | 8. Invented first microscope |
| i. Bacteriophage | 9. Carbon is obtained from organic compounds |
| j. Aerobic photosynthetic bacteria | 10. Cyanobacteria |
| k. Anabolism | 11. Build-up of macromolecules and cell organelles |
| l. Heterotrophic microorganisms | 12. Oxidation of an organic compound in the absence of external electron acceptor (no oxygen required). |
| m. Robert Koch | 13. Disproved the spontaneous generation theory |
| n. Carbon mineralization | 14. Kills bacteria |
| o. Bactericidal | 15. <i>Beauveria bassiana</i> |
| p. Biopesticide | 16. Conversion of organic Carbon substance to inorganic form of carbon |
| q. <i>Trichoderma harzianum</i> | 17. Derive their nutrition by devouring soil bacteria. |
| r. Catabolism | 18. Carbon is obtained from carbon dioxide |
| s. Anaerobic photosynthetic bacteria | 19. Purple bacteria |
| t. Fermentation | 20. Discovered soil nitrifying bacteria |
| | 21. Inhibition effect on growth of bacterial cells |

2. Although there are several composting techniques, microbial-mediated aerobic decomposition is the preferred method. Why? [2 MARKS]
3. Name the FOUR groups of bacteria involved in biogas (methane) production [2 MARKS]
4. Why nitrogen fixation by legume-*Rhizobium* symbiosis is of considerable agricultural importance? [2 MARKS]
5. Briefly explain in one sentence how does microorganisms play important role in carbon cycle [2 MARKS]
6. Distinguish between PROKARYOTES vs EUKARYOTES; and give an example for each group [4 MARKS]
7. Describe the FOUR steps in Koch's postulates [4 MARKS]
8. Distinguish between NITRIFICATION vs DENITRIFICATION; and give an example of ONE microorganism influencing each of the processes. [4 MARKS]

SECTION B (40 MARKS)

Answer ANY TWO questions in this section

- 9a. Describe the SIX distinct groups of microorganisms based on the phylogenic, morphological and physiological characters. [12 MARKS]
- 9b. EXPLAIN how microorganisms mediate phosphorus availability to plants [8 MARKS]
- 10a. Explain THREE important commercial applications of microorganisms for human health and environmental safety. [10 MARKS]
- 10b. PHYLLOSPHERE MICROBIOLOGY is deals with study of microorganisms found in the interface between the above-ground parts of plants and the air. EXPLAIN how this field of

microbiology can contribute to the field of microbial ecology and to more effective and less environmentally damaging means of plant protection. **[10 MARKS]**

11a. Describe TEN reasons why protozoa are important **[10 MARKS]**

11b. Biopesticides derived from microorganisms such as bacteria and viruses reduce the risks involved with exposure of humans and the environment to the harmful effects of chemical pesticides. *Bacillus thuringiensis (Bt)*, a ubiquitous gram-positive, spore forming bacterium which produces protoxin protein with insecticidal activity is considered one of the most important microorganisms for development of biopesticides. Describe the mode of action of *Bt* in control of insect pests. **[10 MARKS]**