MICROBIOLOGY
(BIOT 2104)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Leghaemoglobin mainly protects the enzyme
(a) Nitrogenase (b) Peroxidase
(c) Catalase (d) None of the above.

(ii) Surface sterilization mainly occurs due to presence of
(a) X-ray (b) UV ray
(c) Gamma ray (d) None of the above.

(iii) Divalent calcium is mainly attached with
(a) Protein coat (b) Peptidoglycan
(c) Dipicolinic acid (d) All of the above.

(iv) The following substances are used in Gram staining except
(a) Iodine (b) Crystal violet
(c) Congo red (d) Alcohol.

(v) Phosphoketolase pathway is used in the fermentation of
(a) Lactic acid (b) Mixed acid
(c) Acetic acid (d) None of the above.

(vi) Lithotrophs utilize inorganic compound as source of
(a) Electron (b) Energy
(c) Carbon (d) All of the above.

(vii) Heat resistance of bacterial endospore is due to
(a) Protein coat (b) Peptidoglycan
(c) Dipicolinic acid (d) All of the above.

(viii) Methyl red indicator is used to detect the fermentation of
(a) Lactic acid (b) Mixed acid
(c) Acetic acid (d) None of the above.

(ix) Cell membrane of psychropiles contain
(a) Unsaturated fatty acid (b) Amino acids
(c) Propionic acid (d) All of the above.

(x) Which of the following is sequenced during the study of phylogenetic analysis?
(a) mRNA (b) tRNA
(c) rRNA (d) All of the above.

Fill in the blanks with the correct word

(xi) The outer membrane of gram negative cell wall is anchored to the underlying peptidoglycan by _____.

(xii) Horizontal filaments connecting groups of sporangiophore are known as _____.

(xiii) The flat and appressed lichens are known as _____.

(xiv) The short twisted strands of hyphae which serve as anchors is known as _____.

(xv) Resolution of the microscope can be increased by decreasing _____.

Group - B

2. (a) Describe the structure and functions of bacterial pilli. *[(CO1)(Analyse/HOCQ)]*
(b) Comment on bacterial spores. *[(CO1)(Understand/LOCQ)]*
(c) Explain the lysogenic cycle of Bacteriophage. *[(CO1)(Explain/IOCQ)]*
4 + 4 + 4 = 12

3. (a) Comment on Euglenoids. *[(CO1)(Comment/IOCQ)]*
(b) Why are viruses referred as obligate intracellular parasites? *[(CO1)(Analyze/IOCQ)]*
(c) Mention the criteria for algal classification. *[(CO1)(Remember/LOCQ)]*
5 + 2 + 5 = 12

Group - C

4. (a) Describe the working principle of Transmission Electron Microscope (TEM)? *[(CO2)(Describe/HOCQ)]*
(b) Discuss the mode of action of iodine. *[(CO4)(Remember/LOCQ)]*
(c) Define growth factors with example. *[(CO2)(Apply/IOCQ)]*
5 + 4 + 3 = 12

5. (a) Illustrate the effect of pH on bacterial growth. *[(CO3)(Illustrate/IOCQ)]*
(b) Discuss the mode of action of fractional sterilization. *[(CO4)(Discuss/IOCQ)]*
(c) Define chemolithotrophs. *[(CO4)(Remember/LOCQ)]*
6 + 4 + 2 = 12

Group - D

6. (a) Comment on assimilatory sulphate reduction. *[(CO3)(Comment/IOCQ)]*
(b) Briefly describe Phosphoketolase pathway. *[(CO4)(Remember/LOCQ)]*

(c) What is acetylene reduction assay? *[(CO2)(Remember/LOCQ)]*

4 + 6 + 2 = 12

7. (a) Illustrate the mechanism of cyclic photophosphorylation. *[(CO3)(Analyse/HOCQ)]*
   (b) Discuss the function of heterocysts. *[(CO4)(Analyze/IOCQ)]*
   (c) What is generation time and growth rate? *[(CO2)(Remember/LOCQ)]*

4 + 5 + 3 = 12

Group - E

8. (a) Comment on nitrogen incorporation in bacteria. *[(CO3)(Analyse/HOCQ)]*
   (b) Mention the mode of action of bacterial neurotoxin and give example. *[(CO4)(Apply/IOCQ)]*
   (c) Define the methyl red test. *[(CO2)(Apply/IOCQ)]*

5 + 4 + 3 = 12

9. (a) Briefly discuss the nitrification and denitrification process. *[(CO6)(Analyse/IOCQ)]*
   (b) Define symbiotic relation with example. *[(CO2)(Apply/IOCQ)]*
   (c) Define bio fertilizer. *[(CO5)(Apply/IOCQ)]*

5 + 5 + 2 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	33.33	54.16	13.54

Course Outcome (CO):

After completing this course, students will be able to:
1. Describe different cell structures with subcellular functional organelles.
2. Describe the working principles of different types of microscopes.
3. Isolate pure culture from different environmental sources.
4. Preserve and maintain pure culture.
5. Understand various microbial identification processes.
6. Apply their knowledge of microbes in different environmental aspects.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*