

Roll No.

Total Pages : 4

CMDE/M-20

6969

BACTERIAL PHYSIOLOGY AND METABOLISM

Paper-MB-201

Time : Three Hours]

[Maximum Marks : 80

Note : Attempt *five* questions in all. Question no. 1 is compulsory; attempt the other *four* questions from Units I, II, III and IV selecting any *one* question from each Unit. All questions carry equal marks. Marks for sub-questions are appropriately indicated against each sub-question. Write scientific names of organisms correctly- incorrect naming will be a discredit.

Compulsory Question

1. (a) Differentiate between :

- (i) Arithmetic growth / Diauxic growth.
- (ii) Bacterial glycocalyx / Endothelial glycocalyx.
- (iii) Growth of multicellular eukaryons / Growth of unicellular bacteria.
- (iv) Heterolactic fermentation/Mixed acid fermentation.
- (v) Metabolism / Physiology.
- (vi) Proton motive force / Electron transport chain.

(b) Explain the reason for the following :

- (i) Extremophiles survive under highly unfavourable conditions.

- (ii) Penicillins form protoplasts from Gram positive bacteria but spheroplasts from Gram negative ones.
 - (iii) Several bacteria use the less efficient Entner-Doudoroff pathway than glycolysis for metabolism of glucose.
 - (iv) Some bacteria thrive on the oxidation of hydrogen sulphide to elemental sulphur that produces far less energy (50.1 kcal/mol) than the oxidation of elemental sulphur to sulphate (149.8 kcal/mol).
 - (v) Some marine bacteria photosynthesize although they lack chlorophylls.
- (c) Describe the following :
- (i) Atmospheric CO₂ fixation in bacteria.
 - (ii) Bacterial modes of autotrophy.
 - (iii) Effect of ozone, high and low temperature on bacterial growth.
 - (iv) Enzymes those are scanty or absent in obligate anaerobes.
 - (v) 'The major difference between homolactic and heterolactic fermentations is the amount of lactic acid produced'. Comment upon the statement citing pertinent examples. (6,5,5)

UNIT-I

(Note: Attempt any *one* question from this Unit)

2. Explaining the term 'resting bodies' briefly describe those formed by bacteria. Discuss the structure, formation, germination, functions and utility of *Bacillus* resting bodies. (6,10)

3. Enlist the coverings those enclose the cytoplasm of a bacterial cell. Discuss the general structure and functions of Gram positive and Gram negative bacterial cell walls. (2,7,7)

UNIT-II

(Note: Attempt any *one* question from this Unit)

4. (a) Defining the term 'nutrient transport' differentiate among such mechanisms used by bacteria.
(b) Draw and label a bacterial batch culture growth curve. (8,8)
5. (a) Discuss the physiologically most active phase in it. Giving examples explain the term 'steady state growth'.
(b) Explain briefly the methods for measurement of bacterial growth. Describe and evaluate the microscopic methods. (4,6,6)

UNIT-III

(Note: Attempt any *one* question from this Unit)

6. (a) Describe gluconeogenesis and the related energy aspects.
(b) Discuss the mechanism of reverse TCA and its importance. (8,8)
7. (a) Differentiate among the three basic mechanisms of energy derivation. Describe bacterial respiratory mechanisms.

- (b) Elaborately discuss the role the e^- donors and e^- acceptors play in bacterial metabolism. (8,8)

UNIT-IV

(Note: Attempt any *one* question from this Unit)

8. (a) Describe photosynthetic structures of phototrophic organisms. Discuss the regulation and control of the phenomenon in bacteria.
- (b) Discuss the importance of pyruvic acid in bacterial metabolism. (8,8)
9. (a) Evaluate Pasteur's description of fermentation.
- (b) Discussing their role in photosynthesis bring about the differences between photosystem I and photosystem II. (8,8)
-