This question paper contains **3** printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : **5812**

Unique Paper Code : **2532012302**

Name of the Paper : **Microbial Physiology and Metabolism-I**

Name of the Course : **B.Sc. (H) Microbiology**

Semester : **III**

Duration : **3 Hours** Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

Attempt *all* the parts of a question together.

1. (*a*) Classify bacteria based on their nutritional strategies for obtaining energy, carbon and electrons. Illustrate with relevant examples. 8

(*b*) Provide an example of each of the following (any *five*) : 5

(*i*) Antiport system

(*ii*) Extremophile

(*iii*) Electron transport inhibitor

(*iv*) Halophile

(*v*) Mixotrophic bacterium

(*vi*) Aerotolerant anaerobe.

P.T.O.

(*c*) Comment on the significance of ED pathway and list its key enzymes. 3+2=5

2. (*a*) Write short notes on (any *three*) : 3×5=15

(*i*) Chemostat

(*ii*) Secondary active transport

(*iii*) Glyoxylate cycle

(*iv*) Radiorespirometry.

(*b*) Give the contributions of the following scientists : 2×1.5=3

(*i*) Loomis and Lipman

(*ii*) Monad.

3. (*a*) Draw a diagram showing the organization and sequence of components in the mitochondrial electron transport chain (ETC). Explain the flow of electrons and proton pumping. How does the bacterial ETC differ from the mitochondrial ETC ? 6+2+4=12

(*b*) Expand the following and write their significance (any *three*) : 3×2=6

DCCD, PFK, PEP-PTS, FCCP.

4. (*a*) Differentiate between the following : 3×5=15

(*i*) Diauxie and Synchronous growth

(*ii*) EMP pathway and Pentose Phosphate Pathway

(*iii*) Electrogenic and electroneutral transport processes

(*b*) Mention the assumptions which formed the basis of chemiosmotic hypothesis. 3

5. (*a*) Explain why strict anaerobic microorganisms cannot survive in the presence of oxygen. 6

(*b*) What are compatible solutes ? Give examples and describe the mechanisms by which they help microorganisms adapt to osmotic stress. 2+4=6

(*c*) Write balanced equations for the reactions catalyzed by the following enzymes (any *three*) : 3×2=6

(*i*) Pyruvate kinase

(*ii*) Ribulose-5-phosphate epimerase

(*iii*) Isocitrate dehydrogenase

(*iv*) KDPG aldolase.

6. (*a*) Define the following terms (any *four*) :

Substrate level phosphorylation, Right-side-out vesicle, Batch culture, Balanced growth, Specific growth rate 4×2.5=10

(*b*) Explain the mechanism/s by which bacteria acquire iron in low-iron environments. 5

(*c*) List any *three* adaptations of Psychrophiles. 3