

U.G. 3rd Semester Examination - 2021

MICROBIOLOGY

[HONOURS]

Course Code : MB-H-CC-L-06

(Bioenergetics and Microbial Metabolism)

Full Marks : 40

Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

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

1. Answer any **five** of the following questions:

2×5=10

- i) What are the purposes of pentose phosphate pathway in the cell?
- ii) Name an inhibitor of TCA cycle. Show the step inhibited with chemical structure.
- iii) Show the glycolytic step where reversal of aldol condensation takes place.
- iv) What is the importance of ubiquinone in ATP synthesis?
- v) Calculate the net ATP count in Glycolysis.

- vi) What are photoheterotrophs? Give example.
- vii) Distinguish between assimilatory nitrate reduction and dissimilatory nitrate reduction.
- viii) What is anaplerotic reaction? Give example.

2. Answer any **two** from the following: 5×2=10

- i) Write the function of PFK I and PFK 2 in biological system. Show the irreversible steps of glycolysis. 2+3
- ii) What are the components of pyruvate dehydrogenase complex? Elaborate the mechanism of this complex. 2+3
- iii) Mention the names of the genes involved in biological nitrogen fixation by *Rhizobium* and discuss the function of each. 2+3
- iv) What is meant by high energy bond? Give example. What is the relation between ΔG and ΔG° in thermodynamics? (2+1)+2

3. Answer any **two** from the following: 10×2=20

- i) What is the key enzyme in Entner-Doudoroff pathway? Schematically represent the steps of this pathway with respective enzyme in each step. Compare this pathway with EMP pathway. 1+6+3

- ii) How can you differ facilitated diffusion from active transport? Describe the difference between channel mediated transport and carrier mediated transport. What are the location and mechanism of group translocation? Which class of active transporter is involved in entry of H^+ during oxidative phosphorylation? How can you uncouple this process? 2+2+(1+2)+1+2
- iii) How do Cyanobacteria differ from the other photosynthetic bacteria in their metabolic point of view? Elaborate the reduction phase of the C3 cycle. Discuss the reactions and significance of methanogenesis in environment with example from representative organisms. 3+3+4
- iv) What is Pasteur effect? What are the usual sites of fermentation in human body? Show that fermentation reaction. How is the ETC in typical human cell differ from that of an aerobic bacterial cell? Distinguish between oxidative and substrate level phosphorylation. 2+2+2+2+2
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