

2021

**BIOCHEMISTRY — HONOURS**

**Paper : CC - 8**

**Full Marks : 50**

*The figures in the margin indicate full marks.*

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

1. Answer **any five** questions : 2×5
- (a) A culture of bacteria growing at 37° centigrade was shifted to 25° centigrade. How would you expect this shift to alter the fatty acid composition of the membrane phospholipids?— Explain.
  - (b) What are liposomes?
  - (c) Differentiate between Flippase and Floppase.
  - (d) Name two inhibitors of Na<sup>+</sup> – K<sup>+</sup> ATPase.
  - (e) Sodium Nitrite can be used immediately as an antidote for cyanidepoisoning. Suggest a mechanism.
  - (f) What is thermogenin?
  - (g) What is meant by lipid rafts?
  - (h) How lipid bilayer fluidity varies with temperature?
  - (i) Name two energy rich phosphorylated compound other than ATP.
  - (j) What is meant by P/O ratio?
2. Answer **any two** questions :
- (a) Show the site of each of the following inhibitors on ETC and ATP formation in a schematic respiratory chain.
    - (i) Azide 1×5
    - (ii) Atractyloside
    - (iii) Rotenone
    - (iv) 2,4 DNP
    - (v) Antimycin A.
  - (b) On which factors does membrane fluidity depend? How does cholesterol affect membrane fluidity? Explain with graph. 3+2
  - (c) Name two major integral proteins of RBC. What are ionophores? Explain their functions with two examples. 2+1+2
  - (d) ‘Inhibition of either complex-I or complex-II does not stop the electron transport completely’ — Justify briefly. What is valinomycin? Mention its effect in the mitochondrial electron transport. 2+(2+1)

**Please Turn Over**

3. Answer *any three* questions taking at least *one* from each of **Unit-I** and **Unit-II**.

**Unit - I**

- (a) (i) What is FRAP? How is it used to study membrane dynamics? Explain with schematic diagram. 2+3
- (ii) What are the main classes of lipid present in bio-membranes? Differentiate between voltage gated channels and ion gated channels. 2+3
- (b) (i) What is CFTR? Name two inhibitors of acetyl choline receptor. Differentiate between CMC and critical packing parameters. (1+2)+2
- (ii) Write down biological role of aquaporins. Explain the mechanism of  $\text{Na}^+\text{-K}^+$  ATPase with suitable diagram. 2+3
- (c) (i) What are the two important properties of lipid bilayer? Explain the biological significance of  $\text{Na}^+$ -glucose symport with suitable diagram. 2+3
- (ii) Name the different types of membrane protein. How can these proteins be separated from membrane? What are ABC transporters? (1+2)+2

**Unit - II**

- (d) (i) What is the function and location of  $\text{F}_1\text{F}_0$  ATPase? Write down the mechanism of carbon monoxide poisoning. How does gramicidin acts as an uncoupler of oxidative phosphorylation? 2+2+1
- (ii) What is ATP cycle? Why is ATP a high energy compound?  $\Delta G_0'$  is  $-7.3$  kcal/mole for ATP hydrolysis and that of glycerol 3 phosphate is  $-2.2$  kcal/mole. What inference will you draw regarding the phosphoryl transfer potential of ATP from the above data? 1+2+2
- (e) (i) What is PMF? Write down the terminal enzyme catalysed reaction of ETC showing how does it contribute to the PMF. What do you mean by standard redox potential? (1+2)+2
- (ii) Name the components of ATP synthase and explain their functions with a suitable diagram. What is the thermodynamic efficiency of ATP generation by NADH and  $\text{FADH}_2$  oxidation in ETC? 3+2
- (f) (i) Write down the mechanism of oligomycin sensitivity. Describe briefly the transport systems for NADH across the inner mitochondrial membrane. Which one is less efficient and why? 1+4
- (ii) How is oxidative phosphorylation regulated? How is ROS production controlled during oxidative phosphorylation? 3+2
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