

[This question paper contains 4 printed pages.]

1377

Your Roll No.

B.Sc. (Hons.)/III

A

BIOCHEMISTRY – Paper XIII

(Membrane Biochemistry and Bioenergetics)

(Admissions of 2000 and onwards)

Time : 3 Hours

Maximum Marks : 60

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

*Attempt Five questions in all,
including Q. No. 1 which is compulsory.*

1. (a) Comment on the following :
- (i) Most membranous proteins have an α helical structure.
 - (ii) The electrochemical gradient of chloroplast is almost entirely a result of pH gradient.
 - (iii) Glycoproteins are present exclusively on the exoplasmic surface of the plasma membrane.
 - (iv) The phosphate group transfer potential of phosphocreatine is higher than G6P.
 - (v) Lipid anchors provide additional advantage for membrane proteins.
 - (vi) Bioluminescence is a reversal of photosynthesis.

(2×6=12)

P.T.O.

- (b) Give the contribution of the following scientists :
- (i) Jem Skou
 - (ii) Efrain Racker
 - (iii) P.D. Boyer
 - (iv) Peter Agre (1×4=4)
2. (i) Describe the molecular model of PSII and show the flow of e^- from P_{680} to cyt b/f complex. What is the role of antenna system. (4,2)
- (ii) How do the following inhibit the oxidative/photo phosphorylation :
- (a) Amytal (b) Thermogenin
 - (c) Antimycin (d) DCMU
 - (e) Attractyloside (1×5)
3. (i) What is the role of arrestin in visual transduction. (2)
- (ii) Give the cyclic flow of e^- in purple sulphur bacteria. (3)
- (iii) Differentiate 'V' type and 'P' type of ATPases with respect to their nomenclature and function. (4)
- (iv) What is the role of cholesterol in modulating membrane fluidity. (2)
4. (i) What is the role of Extension protein in plant cell wall? (2)

- (ii) How do the following inhibit the bacterial cell wall synthesis (i) phosphonomycin (ii) Ampicillin. (2,2)
- (iii) Give the binding change mechanism for ATP synthesis. (5)
5. (i) Give the detailed mechanism of clathrin mediated endocytosis. (4)
- (ii) Discuss the structure of complex 'IV' in ETC of mitochondria. Why is O_2 unreactive in the absence of the enzyme. (4)
- (iii) What are lipid rafts? Give its significance in the membrane. (3)
6. (i) Give the structure of voltage gated Na^+ channel highlighting on the voltage sensor segment. (3)
- (ii) Give the detailed mechanism of generation and propagation of action potential. (4)
- (iii) Give the mechanism of the release of the neurotransmitter at the synapse.
How does Botulin toxin inhibit this process. (4)
7. (i) The conductance of a lipid bilayer membrane containing a carrier antibiotic decreased abruptly when the temperature was lowered from $40^\circ C$

to 36°C. In contrast there was little change in conductance of the same bilayer membrane when it contained a channel forming antibiotic. Why? (2)

(ii) Differentiate the following pairs

(a) Tight junctions & gap junctions

(b) Lateral & Rotational motion of proteins & lipids in the lipid bilayer

(c) Bilayer & Micelles. (2×3)

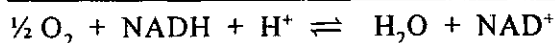
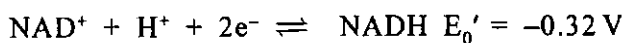
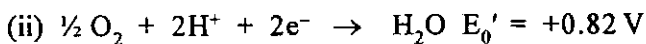
(iii) What are Liposomes? Give their role as drug carriers. (3)

8. (i) Write short notes on any **four** of the following :

(a) FRAP (b) MDR proteins

(c) CMC (d) Chemiosmotic Theory

(e) Phospho transferase system (4×2)



(a) Calculate the standard free energy change of the coupled reaction.

(b) State if the reaction is endergonic or exergonic. (2,1)