

(b) Write short notes on the following :

(i) Phycobilisomes

(ii) Uncoupler (10,5)

5. Give the mechanism of the following :

(a) Bacteriorhodopsin as a light driven proton pump.

(b) Light driven water splitting in chloroplast.

(c) Scavenging of reactive oxygen species in mitochondria. (5,5,5)

6. Give the biological role of the following (**any three**):

(a) Alternative respiratory pathways in skunk cabbage.

(b) Thermogenin protein in new born mammals.

(c) Adenine nucleoside translocase in mitochondria.

(d) Malate shuttle in mitochondria. (3×5=15)

(200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5799

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Unique Paper Code : 2492012302

Name of the Paper : Bioenergetics (NEP)

Name of the Course : **B.Sc. (Hons.) Bio-Chemistry**

Semester : III

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Students to attempt 4 Questions in all. Q no. 1 is compulsory.
3. Each question carries 15 marks. Scientific calculator is allowed.

1. (a) Explain the following terms (**any six**) :

- (i) Uncouplers
- (ii) Redox potential
- (iii) Energy charge of the cell
- (iv) Hills reaction
- (v) State function
- (vi) Activation energy
- (vii) Open system

P.T.O.

- (viii) Accessory pigments
- (b) Give the contribution of the following Scientist :
- (i) Albert L. Lehninger
 - (ii) Paul Boyer
 - (iii) Peter Mitchell (12,3)
2. (a) Give the basis of high energy of hydrolysis of the following molecules :
- (i) 1,3-bis phosphoglycerate
 - (ii) Phosphoenol pyruvate
- (b) Write a short note on universal electron carriers.
- (c) The E'° values for the NAD^+/NADH and pyruvate/lactate conjugate redox pairs are -0.32 V and -0.19 V, respectively.
- (i) Which redox pair has the greater tendency to lose electrons, Justify?
 - (ii) Which pair is the stronger oxidizing agent, Justify?
 - (iii) Beginning with 1 M concentrations of each reactant and product at pH 7 and 25°C , in which direction will the following reaction proceed
- $$\text{NADH} + \text{H}^+ + \text{Pyruvate} \rightarrow \text{Lactate} + \text{NAD}^+$$

- (iv) What is the standard free-energy change ($\Delta G^{\circ'}$) for the conversion of pyruvate to lactate? (4,4,7)
3. (a) Give the site of inhibition of the following inhibitors of electron transport chain :
- (i) Rotenone
 - (ii) Antimycin A
- (b) Draw the structural model of $\text{F}_0\text{-F}_1$ ATP synthase. Give the binding change mechanism of ATP synthesis.
- (c) Calculate the proton motive force generated across the inner mitochondrial membrane per pair of electrons transferred through the respiratory chain from NADH to O_2 . Assume $\Delta\Psi$ is 0.20 V and pH difference is 0.25 units. ($R=8.314 \text{ J/mol.K}$ and $F=96485 \text{ C/mol}$).
- (d) Schematically outline the electron transport from NADH to molecular oxygen via the respiratory chain. (2,5,3,5)
4. (a) Differentiate between the following :
- (i) PSI and PSII.
 - (ii) Electron transport in Green sulfur bacteria and Purple Photosynthetic bacteria.