

[This question paper contains 4 printed pages.]

27/12/24
Your Roll No.....

Sr. No. of Question Paper : 1128

I

Unique Paper Code : 2492012302

Name of the Paper : Bioenergetics

Name of the Course : B.Sc. (Hons.) Biochemistry

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. There are **six** questions in this question paper.
3. Attempt any **four** questions. **All** questions carry equal marks. Question No. 1 is compulsory.

1. (a) Explain the following :

(i) Many thermodynamically favorable reactions like hydrolysis of ATP do not occur readily at room temperature.

(ii) Accessory pigments funnel light energy to the reaction center.

P.T.O.

- (iii) Oxygen is not evolved in cyclic photophosphorylation.
- (iv) An inhibitory protein inhibits ATP hydrolysis during ischemia.
- (v) Each cytochrome present in the ETC has a different reduction potential.
- (vi) Bioluminescence is the reverse of photosynthesis.

(b) Define the following terms :

- (i) Standard reduction potential
 - (ii) Action spectrum
 - (iii) Uncoupler
- (12,3)

2. (a) Give the role of the following :

- (i) Isoprenoid chain in ubiquinone
- (ii) Brown fat in newborn mammals
- (iii) ANT in mitochondria

(b) Describe the structure and function of ATP synthase. ... the binding change mechanism of the enzyme.

- (c) Plant mitochondria have an alternate rotenone insensitive NADH dehydrogenase and a cyanide resistant oxidase that constitutes an alternate pathway to oxidize NADH. Comment on the role of this alternate pathway in plants. (6,6,3)
3. (a) What is the role of cytochrome b_6f complex in the photosynthesis carried out by plants. Depict the flow of electrons and protons through this complex.
- (b) A thermodynamically unfavorable reaction can be driven in forward direction by coupling it to hydrolysis of ATP.
- (c) Differentiate between the universal electron carriers and the mitochondrial electron carriers. (6,6,3)
4. (a) With the help of a diagram explain the Z-scheme of photosynthesis.
- (b) Calculate the standard free-energy change for the oxidation-reduction reaction at pH 7.0
- $$\text{Acetaldehyde} + \text{NADH} + \text{H}^+ \rightarrow \text{Ethanol} + \text{NAD}^+$$
- Given that the standard reduction potential of acetaldehyde/ethanol redox pair = -0.197 and the standard reduction potential of NAD^+/NADH redox pair = -0.320V.

P.T.O.

