

**2020**

**BIOCHEMISTRY — HONOURS**

**Paper : DSE-B-1**

**(Advanced Biochemistry)**

**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.*

**Group - A**

1. Answer **any five** questions : 2×5
- (a) What is photophosphorylation?
  - (b) Justify the statement “Cyclic photophosphorylation has both photosystem I and II”— whether True or False.
  - (c) Which enzyme does help in the flow of protons from the thylakoid to the stroma?
  - (d) Name and draw the structure of the first glycolytic intermediate formed in germinating seeds when glycerol is converted to glucose.
  - (e) State the composition of bacterial peptidoglycan.
  - (f) Which enzyme does play the role of a catalyst in CO<sub>2</sub> fixation in C<sub>4</sub> plants?
  - (g) Which is the primary CO<sub>2</sub> acceptor in C<sub>3</sub> and C<sub>4</sub> plants?
  - (h) What is  $\pi - \pi$  stacking interaction? Give an example.
  - (i) State the function of carotenoids.

**Group - B**

Answer **any two** questions.

2. (a) Show the reaction catalyzed by ribulose 1, 5, – bisphosphate carboxylase / oxygenase (rubisco).  
(b) Draw the structure of 3 phosphoglycerate. Circle the atom(s) that would be labelled first in plants grown in CO<sub>2</sub> labelled with radioactive carbon (2). 3+2+5
3. (a) Choose the correct option and justify your answer.  
The synthesis of both starch and sucrose all :
- (i) involve addition of a sugar residue at the reducing end of the growing polymer
  - (ii) take place in liver and muscle of mammals
  - (iii) use a sugar nucleotide as substrate
  - (iv) use glucose-1-phosphate as the only substrate
  - (v) use glucose-6-phosphate as substrate.
- (b) What is CAM pathway? What us its significance? 2½+2½

**Please Turn Over**

4. (a) Which antibiotic does inhibit bacterial cell wall synthesis? State the mechanism.  
(b) Why do C4 plants avoid photorespiration? 2½+2½

**Group - C**

Answer *any three* questions.

5. (a) Explain why photorespiration is necessary for plant cells carrying out photosynthesis.  
(b) Outline the pathway by which sucrose is synthesized from glucose-6-phosphate along with the cofactors.  
(c) Show the reaction in which 3-phosphoglycerate is converted into glyceraldehyde-3-phosphate with required cofactors.  
(d) Mention the names of any two subcellular organelles which are involved in the phosphoglycolate salvage pathway. 3+3+3+1
6. (a) How is cellulose synthesized and where does the synthesis occur?  
(b) Why did the evolution of rubisco produce an active site unable to discriminate well between CO<sub>2</sub> and O<sub>2</sub>?  
(c) State one advantage and one disadvantage of C<sub>4</sub> photosynthesis.  
(d) Why do leaves of some species of desert plant taste sour in early morning but become tasteless later on in the day? (3+1)+2+2+2
7. (a) What is FRET? How can it be used to study protein-protein interaction? Explain.  
(b) What parameters are obtained by performing Isothermal Titration Calorimetry of a protein-ligand interaction?  
(c) How can fluorescence spectroscopy be used to study protein-ligand interactions? Explain.  
(d) How do you identify a DNA binding protein? (1+2)+2+3+2
8. (a) What is the significance of K<sub>D</sub> and K<sub>M</sub> in biomolecular interaction studies?  
(b) What major forces(s) stabilize a bond between DNA and DNA-binding protein?  
(c) What are the forces involved in protein protein interaction?  
(d) What is DNA footprinting? Explain briefly.  
(e) Name any one disease where protein-protein interaction plays an important role. 2+2+2+2½+1½
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