

BIOPOLYMER
(BIOT 4126)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) _____ polymers are conserved to possess the property of biocompatibility.
(a) Bioequivalent (b) Man-made
(c) Biodegradable (d) Bio available
- (ii) Which of the following have a structure with three peptide chains bound with each other to form a rope-like structure?
(a) Collagen (b) DNA
(c) RNA (d) Peptidoglycan.
- (iii) The most common compound used for making starch-based and cellulose-based bioplastic is
(a) glycerol (b) water
(c) ethanol (d) acetone
- (iv) How crystallinity affects the degradability of a biopolymer?
(a) Crystalline regions are more readily degradable
(b) Crystalline regions are less readily degradable
(c) Crystalline nature does not affect degradability
(d) None of the statements are true
- (v) The chemical nature of PHB is
(a) Polypeptide (b) Carbohydrate
(c) Polyester (d) Polythene
- (vi) Which one among the following is a Polysaccharide?
(a) Alginate (b) Fibroin
(c) Hyaluronic acid (d) Polyphenol.
- (vii) Humans do not have the enzyme necessary for the hydrolysis of
(a) cellulose (b) glycogen
(c) amylose (d) amylopectin.

- (viii) Protein produced by larvae of Bombyxmori is known as
 (a) Keratin (b) Fibroin
 (c) Collagen (d) All of the above
- (ix) Biodegradation will be more for compounds having
 (a) High molecular weight and high crystalline structure
 (b) High molecular weight and low crystalline structure
 (c) Low molecular weight and high crystalline structure
 (d) Low molecular weight and low crystalline structure
- (x) Evolution of carbon dioxide is a method for measuring biodegradation. Carbon dioxide is measured by
 (a) Titration with NaOH (b) Infrared spectroscopy
 (c) Gas chromatography (d) All the above methods

Fill in the blanks with the correct word

- (xi) Amylose contains _____ bond.
- (xii) Aliphatic polyesters are _____ polymers.
- (xiii) Chitin is a long chain polymer of _____.
- (xiv) The chemical nature of collagen is _____
- (xv) _____ is used as a common plasticizer for making starch based bioplastics.

Group - B

2. (a) Analyse the various properties of biomaterials. [[CO1)(Analyse/IOCQ]]
 (b) Give a comparison between various types of biomaterials in terms of its advantages, disadvantages and its examples. [[CO1)(Understand/LOCQ]]
 (c) What are the unique properties of HA that makes it appropriate as skin and anti-aging. [[CO1)(Apply/IOCQ]]
4 + 4 + 4 = 12
3. (a) Evaluate how can you stabilise/reconstruct the collagen fibres. [[CO2)(Evaluate/HOCQ]]
 (b) Illustrate the production of silk from Bombyxmoricocoons? [[CO2)(Illustrate/IOCQ]]
 (c) Give a comparative analysis between contact lens and topical eye drops? [[CO2)(Compare/HOCQ]]
3 + 5 + 4 = 12

Group - C

4. (a) How are collagen fibres synthesized? [[CO3)(Analyse/HOCQ]]
 (b) Discuss about the acid extraction method of collagen extraction. [[CO3)(Remember/LOCQ]]
 (c) Write on any two of the following: (i) Pharmaceutical Excipient , (ii) Plasma volume expander, (iii) Artificial RBC's . [[CO3)(Apply/IOCQ]]
4 + 4 + (2 + 2) = 12

5. (a) What do you understand by chemical modification of starch? *[[CO3](Understand/LOCQ)]*
 (b) How starch is chemically modified? *[[CO3](Understand/LOCQ)]*
 (c) Explain the concept of carboxymethyl starch as a biopolymer? *[[CO1](Analyse/IOCQ)]*
2 + 4 + 6 = 12

Group - D

6. (a) Discuss the problems for the usage of the conventional plastics. How these problems can be solved with bioplastics? *[[CO4](Analyse/HOCQ)]*
 (b) Classify bioplastics according to their sources. *[[CO4](Remember/LOCQ)]*
(4 + 2) + 6 = 12
7. (a) What are cellulose and lignocellulose? *[[CO4](Remember/LOCQ)]*
 (b) State three applications of cellulose as bioplastics. *[[CO4](Remember/LOCQ)]*
 (c) The properties of starch as a bioplastic can be improved by mixing it with cellulose and cellulose derivative. Justify the statement. *[[CO4](Reasoning/HOCQ)]*
 (d) What is Biopol? State two properties of Biopol. *[[CO2](Apply/IOCQ)]*
2 + 3 + 3 + (2 + 2) = 12

Group - E

8. (a) Discuss the deterioration step for biodegradation. *[[CO5](Remember/LOCQ)]*
 (b) Discuss the role of amylase for degradation of a starch-based bioplastic. *[[CO5](Remember/LOCQ)]*
 (c) Soil quality affects biodegradation of a biopolymer. Justify the statement. *[[CO5](Justify/HOCQ)]*
4 + 4 + 4 = 12
9. (a) What is hydrolysis? State the two levels of degradation of polymers by hydrolysis. *[[CO5](Remember/LOCQ)]*
 (b) Hydrophobic biodegradable polymers are less degraded by hydrolysis process. Comment on the statement. *[[CO5](Comment/HOCQ)]*
 (c) State the difference between surface erosion and bulk erosion for hydrolytic degradation of biopolymers. *[[CO5](Understand/LOCQ)]*
(2 + 3) + 3 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	43.75	34.38	21.87

