

BIOPOLYMER
(BTC3224)

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) A biopolymer is a polymer that is
 - (a) always biodegradable
 - (b) always non-biodegradable
 - (c) a plastic
 - (d) none of the above
- (ii) Which of the following is an example of Synthetic polymer?
 - (a) Dextran
 - (b) Chitin
 - (c) Amylose
 - (d) Poly-ethylene.
- (iii) Collagen can be used as
 - (a) Heart valve
 - (b) Skin replacement
 - (c) Drug delivery
 - (d) All of the above
- (iv) Alginate is used in
 - (a) making confectioneries
 - (b) making fabric
 - (c) clearing of fruit juice
 - (d) none of the above
- (v) Which statement best describes a biodegradable material?
 - (a) A material made from plant
 - (b) A material that can be degraded by bacteria
 - (c) A material that is organically produced
 - (d) A material that is sustainable.
- (vi) The most abundant amino acid present in the silk fibroin is
 - (a) valine
 - (b) tyrosine
 - (c) glycine
 - (d) alanine.
- (vii) Which statement is NOT correct for bioplastics?
 - (a) Bioplastics are not suitable for recycling of conventional plastics
 - (b) Bioplastics are expensive
 - (c) Bioplastic leads to a better way for solid waste management and support to marine life
 - (d) Bioplastics are easily available

- (viii) Identify the biodegradable polymer from the following
 (a) Polypropylene (b) Poly-vinyl chloride
 (c) polystyrene (d) Poly lactic acid
- (ix) Which enzyme can break a polyester compound?
 (a) Esterase (b) Protease
 (c) Cellulase (d) Amylase
- (x) Which statement is NOT true for anaerobic digestion?
 (a) Anaerobic digestion takes place in absence of oxygen
 (b) Anaerobic digestion produces CO₂
 (c) Anaerobic digestion gives a solid matter which can be used as manure
 (d) Anaerobic digestion is often followed by composting

Fill in the blanks with the correct word

- (xi) Examples of synthetic polymers used as biomaterials _____.
- (xii) Aliphatic polyesters are _____ polymers.
- (xiii) What polymer is used in shape memory _____.
- (xiv) The chemical nature of collagen is _____
- (xv) Full form of PVC is _____.

Group - B

2. (a) How are scaffolds synthesized? [[CO1](Understand/LOCQ)]
 (b) Analyse how are bioreactors used in tissue engineering purposes? [[CO1](Analyse/IOCQ)]
 (c) What are properties of silk fibroin? [[CO1](Remember/LOCQ)]
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) Analyse the different starch based polymers. [[CO3](Analyse/IOCQ)]
 (b) What factors determine degradation of polymer? [[CO6](Remember/LOCQ)]
 (c) Analyse the various medical application of collagen with respect to its advantages and disadvantages of using as a potential biomaterial. [[CO3](Analyse/IOCQ)]
4 + 4 + 4 = 12
5. (a) Enumerate the steps involved in biosynthesis of alginate. [[CO3](Enumerate/IOCQ)]
 (b) Illustrate the process of extraction of commercially viable alginate. [[CO3](Analyse/IOCQ)]
5 + 7 = 12

Group - D

6. (a) Describe the process for making cellulose based bioplastics. *[[CO1](Remember/LOCQ)]*
 (b) What is a plasticizer? Describe the use of glycerol as a plasticizer. *[[CO4](Understand/IOCQ)]*
6 + 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](Reason/HOCQ)]*
 (d) What is Biopol? State two properties of Biopol. *[[CO2](Apply/IOCQ)]*
2 + 3 + 3 + (2 + 2) = 12

Group - E

8. (a) Classify the biodegradable polymers. *[[CO5](Describe/IOCQ)]*
 (b) Discuss industrial composting of bioplastics. *[[CO5](Understand/IOCQ)]*
 (c) Compare industrial composting with home composting. *[[CO5](Compare/IOCQ)]*
6 + 4 + 2 = 12
9. (a) What is biomineralization? Describe the process. *[[CO5](Understand/IOCQ)]*
 (b) Describe the role of radiation and chemical treatment on biodegradation. *[[CO5](Understand/IOCQ)]*
 (c) What is lipase? Degradation of which type of bioplastic can be measured by estimation of lipase? *[[CO5](Remember/LOCQ)]*
(2 + 4) + 3 + (2 + 1) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	27.08	62.5	10.42

