BIOPOLYMER
(BIOT 4126)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Protein produced by larvae of Bombyx mori is known as
(a) Keratin (b) Fibroin
(c) Collagen (d) All of the above

(ii) Glass Transition Temperature is
(a) Less than the melting temperature
(b) More than the melting temperature
(c) Equals the melting temperature
(d) None of these

(iii) Which of the following is a type of Collagen extraction process?
(a) Salt precipitation (b) Acid precipitation
(c) Enzyme precipitation (d) All of the above

(iv) Which of the following is known as Shape Memory?
(a) Pyrolytic carbon (b) Polyethylene terephthalate
(c) Platinum-iridium alloy (d) Nickel-titanium alloy

(v) Which one among the following is a Protein?
(a) Alginate (b) Fibroin
(c) Hyaluronic acid (d) Polyphenol

(vi) Which of the following is an example of chemically modified starch?
(a) Amylopectin (b) Carboxymethyl cellulose
(c) Acetylated starch (d) Amylose

(vii) In amylose glucose units are joined by
(a) Alpha (1→4) glycosidic bond (b) Beta (1→4) glycosidic bond
(c) Beta (1→6) glycosidic bond (d) Alpha (1→6) glycosidic bond

(viii) Which of the following is not used for chemical modification of a biopolymer?
(a) Sulphonation (b) Acetylation
(c) Oxidation (d) Polymerization

(ix) Which of the following is not used to chemically modify chitosan?
(a) Phosphorylation (b) Sulfonation
(c) Acylation (d) Reduction.

(x) N-acetyl glucosamine is the other name of
(a) Chitosan (b) Chitin
(c) Agarose (d) CMC

Group - B

2. (a) What is a Dacron? [(CO1) (Remember/LOCQ)]

(b) Design the process of extraction of collagen by salt precipitation? [(CO2) (Design/HOCQ)]

(c) Discuss how can you purify the collagen fibers? [(CO2) (Analyse/IOCQ)]

2 + 5 + 5 = 12

3. (a) Evaluate how can you stabilize/reconstruct the collagen fibers? [(CO2)(Evaluate/HOCQ)]

(b) Illustrate the production of silk from Bombyx mori cocoons? [(CO2) (Illustrate/IOCQ)]

(c) Give a comparative analysis between contact lenses and topical eye drops? [(CO2) (Compare/HOCQ)]

3 + 5 + 4 = 12

Group - C

4. (a) Enumerate the steps involved in biosynthesis of alginate. [(CO3) (Enumerate/IOCQ)]

(b) Illustrate the process of extraction of commercially viable alginate. [(CO3) (Analyze/IOCQ)]

5 + 7 = 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)(Analyze/IOCQ)]

2 + 4 + 6 = 12

Group - D

6. (a) What do you mean by Polylactic acid? [(CO4) (Remember/LOCQ)]
   (b) Comment on the role of Hyaluronic acid in Wound healing. [(CO3) (Comment/IOCQ)]
   (c) Illustrate the process of production of Hyaluronic acid from Roosters Comb. [(CO3) (Illustrate/IOCQ)]

2 + 4 + 6 = 12

7. (a) What is a Collasome? [(CO2) (Remember/LOCQ)]
   (b) Illustrate the pathway for the synthesis of PHB. [(CO4) (Examine/HOCQ)]
   (c) Discuss the properties needed for designing a scaffold. [(CO5) (Discuss/IOCQ)]

2 + 5 + 5 = 12

Group - E

8. (a) Classify biodegradable polymers in a chart form. [(CO4) (Remember/LOCQ)]
   (b) What is thermoplastic starch? [(CO3) (Understand/LOCQ)]
   (c) Mention any five applications of thermoplastic starch. [(CO4) (Remember/LOCQ)]

7 + 2 + 3 = 12

9. (a) Define biodegradability. [(CO1) (Remember/LOCQ)]
   (b) Justify the statement the "complete biodegradation and not mineralization is the measurable goal when assessing removal of organic polymers from the environment". [(CO6) (Justify/HOCQ)]

4 + 8 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	28	46	26

Course Outcome (CO):

At the end of this course:

1. Students will acquire basic knowledge of biopolymer and can classify biopolymer according to their composition.
2. Students will get familiar with the structures, properties and applications of different protein based biomaterial.
3. Students will be able to explain the structures, properties and applications of different carbohydrate based biomaterial.
4. Students will comprehend the knowledge of different type and applications of bioplastics.

5. Students will learn about the different composite material that can be used as biomaterial. They will be familiar with the applications, advantages and disadvantages of bioplastics and composite materials.
6. Students will classify biodegradable polymer and will analyze the biodegradation techniques.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

Department & Section	Submission Link
CE/CHE/CSE	https://classroom.google.com/c/NDI1MjAwMjE5NDY4/a/NDU0OTEwMzAwNDc2/details