BIOPOLYMERS
(BIOT 4182)

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) Which one of the following is a co-polymer of mannuronic acid and guluronic acid?
(a) Pectin (b) Alginate
(c) Chitin (d) Starch.

(ii) Dacron is a du Pont's trade name for
(a) Pyrolytic carbon (b) Polyethylene terephthalate
(c) Platinum-iridium alloy (d) Nickel-titanium alloy.

(iii) Biopolymer extracted from cell wall of terrestrial plants is _____ .
(a) Pectin (b) Alginate
(c) Chitin (d) Chitosan

(iv) PHB accumulation is enhanced in
(a) High oxygen and high carbon source
(b) High oxygen and low carbon source
(c) Low oxygen and high carbon source
(d) Low oxygen and low carbon source

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

(vi) Hyaluronic acid can be produced from
(a) Rooster's Comb (b) Cocoons of Bombyx mori
(c) Spider webs (d) Bee hives

(vii) Resilon is composed of
(a) PHB (b) Polylactic acid
(c) Polycaprolactone (d) Polyphenol.

(viii) Which of the following is a natural biodegradable polymer?
(a) Thermoplastic starch (b) Polylactic acid
(c) Polyglycolic acid (d) All the above.

(ix) A direct parameter for mineralization is
(a) Evolution of water vapour (b) Evolution of methane or CO_2
(c) Decrease in temperature (d) Increase in pH.

(x) Biodegradation is influenced by
(a) the presence of microorganisms (b) the availability of oxygen
(c) the amount of available water (d) All of the above.

Group – B

2. (a) Why do naturally derived biomaterials have been demonstrated to show several advantages compared to synthetic biomaterials?

(b) What are the different types of Biopolymers?

(c) Discuss the applications of Fibroin as drug carriers and as sutures.

3 + 3 + 6 = 12

3. (a) What is a Collagen?

(b) Describe the process of Collagen synthesis.

(c) Controlled drug release is another biomaterial application that is receiving considerable attention - Explain.

3 + 6 + 3 = 12

Group – C

4. (a) Discuss the various approaches to crosslink alginate to form hydrogels.

(b) Describe the spinning processes of chitin fibers.

6 + 6 = 12

5. (a) Describe the processes of pectin purification.

(b) Discuss the applications of Pectin in/as
(i) 3D Bioprinting
(ii) Wound healing

4 + (4 + 4) = 12

Group – D

6. (a) What is a bioplastic? Give one example.

(b) Write down the pathway for the degradation of polyhydroxybutyrates (PHB).

(c) What are the properties of hyaluronic acid?

(2 + 1) + 5 + 4 = 12

7. (a) What are the factors affecting the PHB accumulation in the bacterial cells?

(b) What are the properties of BIOPOL?

(c) Briefly describe the role of *Escherichia coli* as the source of PHA.

3 + 4 + 5 = 12

Group – E

8. Write short notes on the following:
   (i) Plate test
   (ii) Biological degradation of polymers

6 + 6 = 12

9. (a) What are the approaches available for studying biodegradation processes?

(b) How gas evolution test can be used to monitor biodegradation of polymers?

4 + 8 = 12

Department & Section	Submission Link
CHE	https://classroom.google.com/c/MjQyMDQzMjIzNTEy/a/Mjc4ODY2NjIwMjM5/details