Exam.Code:0910
Sub. Code: 33379

B.E. (Biotechnology) Sixth Semester
BIO-615: Biomaterials

Time allowed: 3 Hours | Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

1. Answer the following:

   a. Distinguish between rubbery and glassy state of a polymer.

   b. PDI is an acronym for_____.

   c. Mention two advantages of using titanium based alloys as biomaterial.

   d. What is stress shielding? What is its impact?

   e. Classify polymers based on tacticity.

   f. What are hydrogels? Mention any two applications of hydrogels.

   g. Define pacemaker. Enlist its different components.

   h. Name any four biopolymers' that can be used for biomedical purposes.

   i. What are IOLs? What is the composition of IOLs?

   j. Define Young's modulus and mention its importance in choosing a biomaterial. (10x1)

UNIT - I

2. a) "Biomaterials have revolutionized the area of biomedical research." Justify this statement in light of current developments in the field. (5)

   b) A metal guide wire of 2.5 mm in diameter and 3 m long. When a force of 12N is applied it stretches by 0.4mm. Assuming it to be elastic, calculate the stress, strain and the modulus of the wire. Represent the modulus on GPa. (5)

3. a) Explain the mechanical properties - ultimate tensile strength, toughness and ductility using stress strain curve. Using relevant examples, explain how mechanical properties govern the choice of material for a particular biomaterial application. (5)

   b) Discuss ceramic materials. Mention advantage and disadvantage of ceramics. Give major applications of ceramic materials. (5)

P.T.O.

4.a) Physico-chemical properties of biomaterials play an important role in the selecting appropriate biomaterial of a particular use. Justify this statement using few examples. (5)

b) Elaborate on the advantages and challenges that one faces while using mental implants for biomedical applications. Mention any five applications of metallic implants. (5)

UNIT - II

5. a) Blood is one of the most important components of the human body. Discuss its functions and composition in detail. (5)

b) What are the characteristic features a contact lens should possess? Explain the various materials used for contact lenses. (5)

6. a) Elaborate in the steps of wound healing in detail. Use diagram for each step. (5)

b) Classify sutures based on their origin, absorption profile, filament structure and nature of material used. Give examples for each class. (5)

7. Write short notes on:

a) Blood substitutes

b) Dental braces

c) Orthopedic implants

d) Soft tissue fillers (10)

x-x-x