Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PBT6J003

6th Semester Regular Examination 2017-18
BIOMATERIALS
BRANCH : BIOTECH
Time : 3 Hours
Max Marks : 100
Q.CODE : C415

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

a) Collagen is a _____.
(a) carbohydrate (b) protein
(c) polysaccharide (d) fat.

b) Polymers that can not be recycled are_____.
(a) Thermoplasts (b) Thermosets
(c) Elastomers (d) All polymers

c) What is meant by Frenkel defect?
(a) defect in which interstitial position is occupied by missing atoms.
(b) defect in which positive and negative ions are missing.
(c) defect in which interstitial position is occupied by extra atom in the crystal without disorganizing the parent atom.
(d) none of the above.

d) The bioactive dental material is
(a) stainless steel (b) aluminium
(c) titanium (d) gold.

e) The reason for lowest λ (ratio of film thickness and average interface roughness) for ceramic-on-ceramic hip joint is?
(a) Its high hardness
(b) Its high wear resistance
(c) Possibility to polish it very smooth
(d) Possibility for it to be toughened by adding Zirconia

f) Hydrogels can also be used as scaffolds for
(a) cell growth (b) cell delivery
(c) cell growth and cell delivery (d) none of these.

g) The coefficient of friction of metal-on-metal hip joints is x time higher than natural joints, where x is?
(a) 1 (b) 10
(c) 100 (d) 1000

h) Which of the following implant is MR safe?
(a) Otologic implants (c) Heart valves
(b) Ocular implants (d) None of the above

i) Biomedical signals differ from other signals only in terms of .
(a) Application, i.e. the biomedical signals are used in the biomedical field.
(b) Measurement, which is obtained using specific imaging equipment.
(c) Signal processing with different software.
(d) Signal analysis with different software.

j) Polyglycolic Acid (PGA) scaffold is
(a) biotolerant (b) bioactive
(c) bioinert (d) biodegradable

Q2 **Answer the following questions : *Short answer type :*** **(2 x 10)**

a) Among silicon and titanium which is not used to build the ball section of hip-joint and Why?
b) What are PMMA and its uses?
c) Name two mechanical properties of biomaterials?
d) List the three major mechanisms of adhesion.
e) Define fracture toughness and impact strength?
f) What do you mean by synthetic polymers? Give two examples.
g) What factors influence the dentin bond?
h) What are Ti-based alloys?
i) What do you mean by artificial tissue?
j) List three general methods for the reinforcement of ceramics.

Part – B (Answer any four questions)

Q3 **a)** Discuss about structure and properties (mechanical, thermal, optical, electrical and surface) of biomaterials? **(10)**
b) Discuss a few methods to test the biological performance of implant materials **(5)**

Q4 **a)** What are soft tissue implants? Categorize them and explain the properties of any three. **(10)**
b) How would you design vascular prosthesis? What will be your choice of material and why? **(5)**

Q5 **a)** Discuss the design strategies of 2D and 3D matrices (scaffolds) of biomaterials for tissue engineering? **(10)**
b) Differentiate between fibrous and particulate biomaterials. **(5)**

Q6 **a)** How does corrosion affect medical implants? Give examples. How do biological entities influence corrosion? How is corrosion prevented in implant devices? **(10)**
b) What are hydroxyapatite glass ceramics? **(5)**

Q7 **a)** What are the primaries uses of metallic implant materials? Mention the uses of Co-Cr alloy, Ti and its alloys in orthopedic and dental surgery. **(10)**
b) What are the nanopolymers used in drug delivery? **(5)**

Q8 **a)** Discuss each aspect of the designing principles and methods of 2D and 3D matrices (scaffolds) of biomaterials for tissue engineering? **(10)**
b) How the hydrogels cross-linking can be achieved permanently and how it can be prepared reversibly? Explain with example **(5)**

Q9 **a)** What are the various types of tissue responses to implants and what are the various factors affecting the performance of implants? **(10)**
b) State the advantage and disadvantage of polymers used in bone cement **(5)**