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Total number of printed pages – 2

B. Tech
PEBT 5303

Sixth Semester Examination – 2013

BIOMATERIALS

BRANCH : BIOTECH

QUESTION CODE : A 224

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
- (a) Why metals are generally less biocompatible than polymers and ceramics ?
- (b) Name two polymers and two ceramics utilized as biomaterials.
- (c) Name the possible degradation mechanism of polymers in-vivo.
- (d) How many types of collagen present in bone and connective tissues ?
- (e) What is bio-mimetic ceramics ? Name two examples of bio-mimetic ceramics.
- (f) What are the advantages and disadvantages of porous material as vessel substitute ?
- (g) Name two biocompatible implants used in cardiovascular therapy.
- (h) Define the term 'sealant'. How 'sealant' can be used as biomaterial ?
- (i) What are the degradation mechanisms of polymers in vivo ?
- (j) Differentiate between dentin and enamel on the basis of its biomechanical properties.
2. Define Polymer additives. Describe the properties of polymer additives with reference to its biomedical uses. 10

P.T.O.

3. What is Tissue Engineering ? Briefly explain the applications of Chitosan based polysaccharide biomaterials in cartilage tissue engineering. 10
4. (a) Describe its composition, production and use in biomedical science. 5
(b) Briefly explain the role of self assembling peptides in physiology and biomedical applications. 5
5. You have been asked to design a new artificial vascular graft.
(a) Discuss the goals and constraints of this design, the material requirements, and your choice of material. What techniques would need to be developed or what information would need to be gathered for use of this implant in a patient ? 6
(b) Calculate the maximum wall tension (N/mm) due to internal pressure developed for a 0.5 cm diameter arterial graft. Assume the maximum pressure will be 250 mm Hg (33 kPa) and the artery is uniform in the longitudinal direction. If you want a safety factor of 10, would silicone rubber be a possible graft material for a graft with a 1 mm wall thickness. 4
6. Differentiate Between : 2.5×4
(a) PFA and PTFE
(b) Intra aortic ballon pumping and artificial heart valve
(c) Polyethylene and Polypropylene
(d) Atactic and Isotactic-polymer.
7. Briefly explain the metabolism of PHB with its commercial production. What are the medical applications of PHB ? 10
8. Write short notes on : 5×2
(a) Hydroxyapatite glass ceramic carbons
(b) Role of hydrogel polymers in development of soft contact lenses.