



B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL-MAY 2014

MATERIALS SCIENCE AND ENGINEERING BRANCH

SIXTH SEMESTER - (REGULATION 2008)

ML 9351 – BIO AND SMART MATERIALS

Time: 3 hr

Max. Mark: 100

PART- A (10X2 = 20 Mark)

(Note: Answers without justification will not carry marks)

From the given list, form groups based on appropriate logic:

1. Fibrinolysis, embolization, foreign body reaction, calcification, infection, thrombus, enzymatic degradation
2. Piezoelectric, Electroluminescence, magnetorheological, electrorheological, photovoltaics, Electrostrictive
3. Zero-insertion-force connector, Eyeglass Frames, Thermal Interrupter, NiTi cladding to combat cavitation, Medical tools and devices, ski materials
4. Hydroxyapatite, Zirconia, β - tri calcium phosphate (TCP), Bio-glass, Poly lactic acid, Porous Alumina, Magnesium
5. Hypoblast, Odontoblasts, fibroblast, mesoblasts, cementoblasts, keratinocytes

Define the following and give an example:

6. Wolff's law
7. Passive sensor
8. Training
- Restenosis
10. Targeted Drug Delivery

PART- B (5 X16 = 80 Mark)

11. (i) Classify the different forms of bone and brief on their mechanism of bone formation. (10)
(ii) Comment on alternatives to overcome stress shielding effect of metal implants. (6)
12. (a)(i) What are the intelligent functions of biological materials and how these functions are achieved by biomimetics approach with use of smart and intelligent systems.

(OR)

(b) Brief on the following:

- (i) Biocompatibility evaluation. (4)
- (ii) Host reaction to biomaterial implantation mentioning cell type, signals and time scale. (12)

13. (a) (i) Brief on the significance of electromechanical coefficient, morphotropic phase boundary, dielectric constant and poling of piezoelectric ceramics. (2x4)

(ii) Brief on any TWO applications of piezoelectric ceramics from the list follows: stress sensors, acoustic imaging, resonator & filter, bimorph structure, ultrasonic motor and smart ski. (4X2)

(OR)

(b) (i) List the desired properties for better rheology of ERF and MRF. (3+3)

(ii) Brief on the mechanism of piezoelectricity in polymer like PVDF or P(VDF-TrFE). (6)

14. (a)(i) Describe the mechanism of shape memory alloys(SMA) exhibiting pseudoelasticity, shape memory effect and energy absorption. (10)

(ii) Compare the shape memory effect of Ferromagnetic shape memory alloy with SMA. (6)

(OR)

(b)(i) Brief on the applications of shape memory materials in biomedical field. (6)

(ii) On what basis shape memory polymers are classified and brief on any TWO varieties of them with examples. (2+8)

15. (a) Write short notes on the following: (2X8)

(i) Tissue engineering

(ii) Classification of implants in the field of ophthalmology

(OR)

(b)(i) Brief on any one type of drug delivery used either for diabetics therapy or for cancer therapy. (6)

(ii) On what basis skin defects are classified and brief on choice of materials with examples for regeneration for any TWO defects. (2+8)