



B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2011

MATERIALS SCIENCE AND ENGINEERING BRANCH

SIXTH SEMESTER - (REGULATION 2004)

**ML 381 – BIO AND SMART MATERIALS**

Time: 3 hr

Max. Mark: 100

**PART- A (10X2 = 20 Mark)**

1. What is the difference between smart and structural materials?
2. Define the term biocompatibility.
3. Give an example for electro-rheological fluid and piezo-electric material.
4. What do you mean by smart structures?
5. Give an example for application of shape memory polymer.
6. Why martensitic transformation is known as diffusionless transformation?
7. What is the composition of bone?
8. Give an example material used in total hip replacement.
9. What are the essential properties of biomaterial used for ophthalmology application?
10. What do you mean by third degree burn?

**PART- B (5 X16 = 80 Mark)**

11. Brief on the following:
  - (i) Wolff's Law (4)
  - (ii) Thrombo resistance treatment (8)
  - (iii) Biomimetics (4)
12. (a) (i) Describe the mechanism of Electrorheological fluids. (10)  
(ii) Brief the design parameters of electro-rheological fluids. (6)  
(OR)
  - (b)(i) Explain the mechanism involved in piezoelectric materials. (8)
  - (ii) Brief on the application of smart materials for structural application. (8)
13. (a) (i) Brief on mechanism of shape memory effect exhibited by shape memory alloys.  
(OR)
  - (b) (i) Elaborate on the applications of shape memory materials in various fields.

14. (a) Comment on the choice of replacement/restoration materials of the following:

(i) Heart Valves (8)

(ii) Orthopaedic implants (8)

(OR)

(b) (i) Brief on mechanism of blood clotting and control.

15. (a) (i) Brief on materials used for skin regeneration with suitable examples.

(OR)

(b) (i) Brief on the various type of drug delivery system.