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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV-DEC2013

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)

Choose the answer and justify for the following questions.

(i) A only (ii) B only (iii) Either A or B (iv) Neither A nor B (v) Both A & B

1. Evaluation of biocompatibility of materials should be done:
(A) *in vitro* (B) *in vivo*
2. A material which exhibit piezoelectric effect will necessarily have:
(A) non centrosymmetry crystal structure (B) net polarisation
3. The presence of water affects only
(A) Intrinsic Electro rheological fluid (B) Extrinsic Electro rheological fluid
4. The best materials for temporary fixation in orthopaedic application.
(A) biodegradable (B) osteoconductive
5. The desired property of a scaffold for tissue engineering should be:
(A) interconnected porosity (B) biocompatibility

State True or False. Justify.

6. Bone is a piezoelectric material
7. Magnetorheological fluid exhibit slight Electro rheological fluid property.
8. Shape memory effect of polymers is an intrinsic property of the polymer.
9. Autologous Saphenous vein is the gold standard for vascular graft.
10. Mechanical property of enamel is the best among skeleton system.

PART- B (5 X16 = 80 Mark)

11. (a) (i) Brief on the host reaction to biomaterial implantation mentioning cell type, signals and time scale. (12)
- (ii) List the various approaches for thrombo resistance materials development. (4)

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13. a) An analysis of coal in a boiler trial has the following data:
C-81%, H₂- 4.5%, O₂ – 8% and remaining incombustible. The Orsat analysis of dry flue gas contained CO₂- 8.3%, CO-1.4%, O₂-10% and N₂-80.3% by difference. Calculate the weight of air supplied per kg of coal and percentage of excess air supplied. (16)

(OR)

- b)i) Describe the characteristics of various fossil fuels with their energy content. (10)
ii) Explain with a sketch how solar heating can be utilised in winter conditions for warming up the room. (6)
14. a)i) Explain how an induction furnace melts steel in a foundry. Also mention its merits and de-merits over a firing type furnace. (12)
ii) Distinguish between batch and tunnel type furnaces. (4)

(OR)

- b)i) How temperature is controlled in an industrial furnace using a PID controller? Depict a neat sketch of the same. (12)
ii) What are the parameters to be considered in designing a furnace? (4)
15. a) What do you understand by recycling of thermal energy? Elaborate the various avenues for recycling thermal energy. (16)

(OR)

- b) List out the various emissions that cause global warming. What is the significance of global warming? How can we minimise it? (4+4+8)