3E1632

Roll No. _____ [Total No. of Pages : 3

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B. Tech. III Semester (Main/Back) Examination-2014

Mechanical Engg.

3ME2A Material Science and Engg.

(Common to 3AN2, 3PI2A and 3AE2A)

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) What are crystal imperfections? **(4)**

   b) Differentiate edge dislocation and screw dislocation. **(4)**

   c) What are causes of crystal defects? **(4)**

   d) Differentiate elastic and plastic deformation. **(4)**

OR

1. a) Draw neat and labelled Iron - carbide equilibrium diagram. Explain invariant reactions occur in this diagram. **(10)**

   b) What is solid solution? **(3)**

   c) What is strengthing of metal? **(3)**

Unit - II

2. a) Explain the precipitation strengthing mechanism of aluminium alloys. **(8)**

   b) Discuss constitutents, properties and applications of various copper alloys. **(8)**

OR

2. a) Write a short note on HSLA steel. **(6)**

   b) Discuss effect of various alloying element on the properties of carbon steels. **(6)**

   c) Write a short note on spheroidal cast iron. **(4)**

Unit - III

3. a) Differentiate hardness and hardenability. **(4)**

   b) Distinguish annealing and stress relief process. **(6)**

   c) Explain the following transformation:

      i) Austenite to Bainite

      ii) Austenite to pearlite. **(6)**

OR

3. a) Discuss surface hardening. **(8)**

   b) What is TTT diagram? **(4)**

   c) Discuss Austeropering. **(4)**

Unit - IV

4. a) Differentiate various kinds of hardness test. **(6)**

   b) What is significance of fatigue test? **(4)**

   c) Discuss the stress - strain curve for a ductile material. **(6)**

OR

4. a) What are constituents, properties and engineering applications of PVC, PMMA, ABS, PTFE and PA? **(10)**

   b) Discuss impact test for the materials. **(6)**

Unit - V

5. a) What are the engineering Ceramics? **(4)**

   b) Discuss the properties and applications of Al_2O_3, Si_3N_4 and s_iC. **(6)**

   c) Define composite materials. **(2)**

   d) Distinguish between fibre and particulate reinforced composite. **(4)**

OR

5. a) What are nano materials? **(4)**

   b) Explain with energy level graph quantum well, quantum wire and quantum dots. **(8)**

   c) Discuss various kind approaches for synthesis of nano materials. **(4)**