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	<b>3E1632</b>	
<p><b>B. Tech. III Semester (Main/Back) Examination-2014</b></p> <p><b>Mechanical Engg.</b></p> <p><b>3ME2A Material Science and Engg.</b></p> <p><b>(Common to 3AN2, 3PI2A and 3AE2A)</b></p>		

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 strengthening of metal? (3)

**Unit - II**

2. a) Explain the precipitation strengthening mechanism of aluminium alloys. (8)
- b) Discuss constituents, 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: (6)
- i) Austenite to Bainite
- ii) Austenite to pearlite.

OR

3. a) Discuss surface hardening. (8)
- b) What is TTT diagram? (4)
- c) Discuss Austero-pering. (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)

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)