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ET-204(A)

B.Tech. Civil (Construction Management)
Term-End Examination
00280 **December, 2014**

ET-204(A) : MATERIALS SCIENCE

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Use of calculators is permitted.*

1. (a) Distinguish between ceramics and glasses. *5*

(b) Explain the general guidelines for selecting a material for a given application. *5*

2. (a) What is the energy, in eV, of the ground state of an electron confined to a cube of side 10 nm ? *5*

(b) What are the characteristics of a conductor and an insulator ? *5*

3. Write short notes on any ***four*** of the following : *10*

(a) Solid Solutions

(b) Allotropy

(c) Space Lattice

(d) Polymorphism

(e) Atomic Radius

4. (a) Draw a phase diagram of pure iron and identify the invariant points on it. *5*

(b) Explain Gibb's phase rule. What do you mean by homogeneous nucleation ? *5*

5. Discuss various types of line defects dislocations. What are their effects on properties of materials ? Illustrate your answer with sketches. *10*

6. (a) State Hooke's law. Why is a material called anisotropic ? *5*

(b) Explain the deformation of polycrystalline materials. *5*

7. (a) Explain the dependence of conductivity on the structure of metals. *5*

(b) What are p-type and n-type semiconductors ? *5*

8. (a) Draw the stress-strain diagram of 0·25% carbon steel and mark the important points on it. *5*

(b) A piece of copper originally 305 mm long is pulled in tension with a stress of 276 MPa. If the deformation is entirely elastic, what will be the resultant elongation ?

(Take E for copper = 11×10^4 MPa). *5*

9. (a) Explain the precipitation hardening process. *5*

(b) Define Weldability. Explain the various sub-zones of Heat Affected Zone (HAZ) of a Weldment. *5*

10. (a) What is chemical corrosion and how is it different from electro-chemical corrosion ? *5*

(b) Explain different surface treatments for corrosion protection. *5*
