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BIME-005

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B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2013

BIME-005 : MATERIAL SCIENCE

Time : 3 hours *Maximum Marks : 70*

*Note : There are **seven** questions. Attempt **any five** questions. All questions carry **equal** marks.*

1. (a) Define the following terms : Atom, Electron, Proton, Nucleus, Atomic Number, Isobars and Isotopes. 7

   (b) A FCC unit cell has a lattice constant $a = 4.0 \times 10^{-10}$ m. Calculate the No. of atoms per unit area on (1,1,0) and (1,1,1) planes and density of atoms per unit length in directions [1,1,0] and [1,1,1]. 7

2. (a) Explain the terms fatigue and creep, giving their significance. 7

   (b) Draw Stress-strains diagram and micro-structure of : 7

   (i) mild steel and

   (ii) gray cast iron

3. (a) What is meant by cast iron ? Explain. Differentiate between gray and white cast iron. 7

(b) Write short notes on the following : 7

(i) T-T-T Curves

(ii) Age-Hardening

4. (a) List the alloys of copper used in Engineering. Describe briefly two of them, giving their composition and uses. 7

(b) What is meant by a phase diagram ? Explain. 7

5. (a) Differentiate between soft and hard magnetic materials. 7

(b) What is Hall effect ? What are the applications of Hall effect ? 7

6. (a) Explain Briefly ***any two*** of the following diffusion mechanism. 7

(i) Vacancy mechanism

(ii) Interstitial mechanism

(iii) Direct Interchange mechanism

(b) Explain briefly the Superconductivity and Meissner effect. Enlist the applications of superconductors. 7

7. Write down short note on ***any four*** : **14**

(a) Glass

(b) Ceramics

(c) Compound semi conductor

(d) Corrosion prevention

(e) Giffith formula for fracture

(f) Composite materials