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BIME-005

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

00023

June, 2018

BIME-005 : MATERIAL SCIENCE

Time : 3 hours *Maximum Marks : 70*

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

1. (a) Describe briefly the classification of materials. Distinguish between an alloy and a compound. 7

(b) Define Plasticity. Describe the elastic or inelastic behaviour of materials with the help of a stress-strain diagram. 7

2. (a) Describe in brief the time-temperature transformation curve for steel. 7

(b) Describe the behaviour of electrical conductivity in ceramics. Also explain the behaviour of superconductivity in metals and alloys. 7

3. (a) What is Atomic Packing Factor ? Calculate the atomic packing factor for a hexagonal closed packed and face-centred cube crystal system. 7

(b) Distinguish between fatigue failure and fatigue strength. Briefly explain the measures that may be taken to increase the resistance dto fatigue failure of a metal/alloy. 7

4. (a) Distinguish between the structure and properties of thermosetting and thermoplastic resins. 7

(b) Explain thde mechanism of crack initiation and growth when a metal is subjected to cyclic loading. 7

5. With the help of a neat sketch, explain the working of a ablast furnace. Also list out its applications, advantages and limitations. 14

6. (a) Describe the phenomenon of superconductivity. Discuss the features of Type-I and Type-II superconductors. 7

(b) State how carbon content influences the strength and ductility of plain carbon steels. 7

7. (a) Define Toughness. Explain how the toughness of a material is measured. 7

(b) How do mechanical pdroperties change during the hardening and tempering process ? 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Chemical Bonding

(b) Annealing

(c) Cold Workinag Process

(d) Non-destructive Testing

(e) Doping in Semiconductors

(f) Applications of Nano Materials