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BIME-005

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

Term-End Examination

December, 2015

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) Explain the terms — true stress, true strain, engineering strain and engineering stress. 7

(b) How do you classify the defects in solids ? Explain briefly about the, 7

(i) Burgers' circuit, and

(ii) Significance of Burgers' vector.

2. (a) Describe the behaviour of electrical conductivity in ceramics. Also explain the behaviour of super conductivity in metals and alloys. 7

(b) Draw the planes (0, 2, 0), (1, 2, 0) and (2, 2, 0) in a face-centred cubic structure. 7

3. (a) What is corrosion ? Describe the factors which accelerate the corrosion process. Explain briefly the techniques used in preventing corrosion of metals. 7

(b) Explain the following with the help of suitable examples :

(i) Covalent bonding

(ii) Ionic bonding 7

4. (a) What are the main differences between Van der Waal's and Hydrogen bonding ? Give examples. 7

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

5. (a) What do you understand by the T-T-T curves ? Explain with the help of a neat sketch. 7

(b) Describe the difference between Thermoplastic and Thermosetting polymer in terms of : 7

(i) Applied stress

(ii) Increased temperature

(iii) Atomic structure

6. (a) Define and explain the following terms : 7

(i) Annealing

(ii) Tempering

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

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

$4 \times 3\frac{1}{2} = 14$

(a) Quenching

(b) Ferromagnetism

(c) Degradation of polymers

(d) Creep

(e) Ductility and malleability

(f) Demagnetisation