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BIME-005

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B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

December, 2011

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) Briefly explain the model proposed by Rutherford. What were the major deficiencies in Rutherford's atomic model ? 7

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

2. (a) Explain the phenomenon of yielding in mild steel. Why the yield point in copper is not distinct ? 7

   (b) Explain the terms - true stress, true strain, engineering stress and engineering strain. 7

3. (a) Draw neat sketches of (i) an edge dislocation and (ii) Screw dislocation. Derive the relationship between the Burger's vector and dislocation line in each case. 7

   (b) What is critical resolved shear stress ? Derive an expression for it. 7

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

(b) What do you mean by metal fatigue ? How does it differ from creep ? 7

5. (a) Explain TTT curves for eutectoid steel. 7

(b) Define the terms : 7

(i) Annealing (ii) Tempering

6. (a) What are the general properties of polymeric materials ? 7

(b) Describe the difference between thermoplastic and thermosetting polymer in terms of : 7

(i) Applied stress

(ii) Increased temperature

(iii) Atomic structure

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

(a) Magnetisation

(b) Demagnetisation

(c) Paramagnetism

(d) Ferromagnetism

(e) Cold working process

(f) Quenching