

II B.Tech II Semester Supplementary Examinations, April/May 2005
MATERIAL SCIENCE
(Common to Mechanical Engineering, Mechatronics and Production Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

1. Draw neat sketches of FCC; CPH unit cells. Calculate the atomic packing factors; Effective number of atoms; in the unit cells. What is the stacking sequence for the same. Give examples of metals which exhibit BCC; FCC & CPH.
2. (a) Compare and contrast: Edge dislocation & screw dislocation with neat sketches.
(b) What is critical resolved shear stress. Explain the significance of critical resolved shear stress. Derive an expression for the critical resolved shear stress in a single crystalline material.
3. (a) Discuss between the terms Recovery and recrystallization involved in the process of heating cold worked metals.
(b) Define Twinning. How does Twinning occur in metals? Name and explain two types of Twinning.
4. (a) What is a semi-conductor: what are the two important types of semi-conductors. How they are affected at elevated temperatures. Explain with neat sketches the P-type and N-type intrinsic semi conductors
(b) Write an essay on Fatigue Fractures.
5. (a) What is DEBYE'S characteristic temperature. Explain its significance.
(b) Distinguish fully between soft and hard magnetic materials.
6. (a) Discuss the properties of crystalline ceramics.
(b) Give the structure and properties of fiber reinforced composite materials.
(c) Explain superconductivity of the materials. Also explain about TYPE I and TYPE II super conductors.
7. Discuss some of the non-destructive methods of testing materials and components with special reference to Radiography test method and ultrasonic flow detection method.
8. Write short notes on the following:
 - (a) Grain boundaries
 - (b) Slipping
 - (c) Creep resistant materials

(d) Schottky defect.
