



**Instructions:** Briefly answer the following questions.

1. What is Material Science? Briefly explain the classification of materials and its applicability? (2+1)
2. Describe the classification of bonding types, with examples? (1.5)
3. Briefly explain the lattice parameters for seven crystal systems? (3)
4. Write a short note on (3X0.5=1.5)
  - (a) Imperfections
  - (b) Anisotropy
  - (c) Dislocations
5. Sketch a tetragonal unit cell, and within that cell indicate locations of the  $[1\ 1\ -1]$  and  $[\frac{1}{2}\ \frac{1}{4}\ \frac{1}{2}]$  point coordinates. (2)
6. (a) Determine the ASTM grain size number of a metal specimen if 45 grains per square inch are measured at a magnification of  $100\times$ . And for this same specimen, how many grains per square inch will there be at a magnification of  $85\times$ ? (2)  
(b) Molybdenum has a BCC crystal structure, an atomic radius of 0.1363 nm, and an atomic Weight of 95.94 g/mol. Compute its theoretical density and compare it with the experimental value found inside the front cover. (2)