

Tech. Civil (Construction Management)

Term-End Examination

June, 2008.

ET-204(A) : MATERIALS SCIENCE

Time: 3 hours

Maximum Marks: 70

Attempt any seven questions. All questions carry equal marks. Marks for sub-divisions of questions are as indicated. Answers should be brief and to the point. Use of calculator is allowed.

1. (a) Distinguish between an alloy and a compound.
- (b) Can the same material exist in crystalline and amorphous form? Give examples. 5+5
2. (a) Determine Packing Fraction (PF) for BCC and FCC structure.
- (b) Iron at 20°C is BCC with atoms of atomic radii 0.124 nm . Calculate lattice constant 'a' for the cube edge of iron cell. 5+5
3. Briefly describe the various types of bonding in solids with the aid of neat sketches and with some suitable examples. 10

4. List the various types of heat treatment processes and discuss the effect of heat treatment on the mechanical properties of the steel. 10
5. (a) What are the main categories of defects and imperfections?
(b) Explain briefly, edge dislocation and screw dislocation. 5+5
6. In an experiment to measure Young's modulus, a load of 5000 N, hanging from a steel wire of length 3 m and cross section 0.20 cm^2 , was found to stretch the wire 0.4 cm above its no-load length. What were the stress, the strain and the value of Young's modulus for the steel of which the wire was composed? 10
7. Describe the phenomenon of superconductivity. Discuss the features of Type I and Type II superconductors. 10
8. (a) State how carbon content influences the strength and ductility of plain carbon steels.
(b) Explain briefly what you understand about the TTT curves. 5+5
9. (a) What is corrosion? How does it affect the life span of a building?
(b) Explain the techniques used in preventing corrosion of metals. 5+5

10. Write short notes on any *five* of the following :

5×2=10

- (a) Case hardening
- (b) Unit-cell
- (c) Fatigue
- (d) Degradation of polymers
- (e) Resilience
- (f) Burgers circuit
- (g) Recyclability
- (h) Creep

