

II B.Tech II Semester Supplementary Examinations, Apr/May 2006
METALLURGY AND MATERIAL SCIENCE
(Common to Mechanical Engineering, Mechatronics and Production Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw the close packed planes and directions in simple cube, BCC and FCC crystals and find out the Miller indices of the planes. [8]
(b) Explain briefly about the various types of crystal imperfections, with the help of neat sketches. [8]
2. (a) What is allotropy? Explain with suitable examples? [6]
(b) Distinguish between crystal structure microstructure and macrostructure give examples. [10]
3. (a) Define and explain the structural phases. [3x3=9]
 - i. Ferrite
 - ii. Austenite
 - iii. Cementite.
(b) Describe the construction of the phase diagram for 2 metals completely soluble in liquid state and insoluble in solid state. [7]
4. (a) What is the disadvantage of too high a first stage annealing temperature for Malleable Cast Iron? Explain. [8]
(b) Why are alloying elements added to steels? Give some examples of common alloying elements and their effect on the properties of steel. [8]
5. (a) What are the requirements of an age-hardenable alloy. [4]
(b) Give a typical heat treatment schedule for duralumin and explain the relevant microstructural changes. [12]
6. (a) Explain why copper is a suitable material for Automobile radiators. [5]
(b) What is dezincification? How it may be minimized. [5]
(c) How does the addition of lead to brass improve its machinability. [6]
7. (a) Describe how the strength of glass can be increased? [5]
(b) Why annealing and tempering operations are performed on glass? Describe. [5]
(c) Discuss glass forming in detail. [6]
8. (a) Explain the terms: Matrix, Reinforcement and Interface. Write their respective functions. [6]

- (b) Distinguish between natural composites and man-made composites. [6]
- (c) Classify the composites according to
 - i. The geometry of the load-bearing components.
 - ii. The materials used i.e., type of reinforcement and type of matrix. [2+2=4]

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