

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Semester Examination (Dec. 2006)
MS-118 (Materials Processing)

Time : 3 Hours

M. M. 45

Note: Attempt all questions in a sequence

1. (a) What are the various stages adopted in drop forging operation?
(b) What is the basic difference between direct and indirect extrusion process?
(2, 3)
2. (a) How tube extrusion operation is performed?
(b) Explain the process of wire drawing.
(2, 3)
3. (a) Explain the following terms related to metal joining
(i) Root (ii) Weld Pass (iii) Filler Metal (iv) Electrode
(b) Briefly explain the gas cutting process.
(2, 3)
4. (a) What is the difference between brazing and soldering?
(b) Structurally explain the different zones existing at weld joints.
(2, 3)
5. (a) Deduce the following expression for heterogeneous nucleation
$$\cos \theta = \frac{V_{LS} - V_{CS}}{V_{LS}}$$

(b) Name different defect structures observed in casting and give the basic cause of their origin.
(3, 2)
6. (a) Explain the continuous casting process.
(b) What is investment casting? Explain.
(2, 3)
7. (a) Why grain boundary segregation is considered as aggressive one?
(b) What is coring? Why it appears and how it can be eliminated?
(2, 3)
8. (a) What do you mean by directional solidification? Explain.
(b) What is triple eutectic? Give example of their reaction and draw the microstructure of it.
(3, 2)
9. (a) Calculate the critical radius of nucleation of copper if it nucleates homogeneously at 980°C . Melting point of $\text{Cu}=1083^{\circ}\text{C}$, Enthalpy of fusion= 1.88 G J m^{-3} and liquid solid interfacial energy= 0.144 J/m^2 .
(b) In a given molten mass when nucleation takes place, α parameter changes from 0.5 to 3.5. Comment on the variation of structure due to this.
(3, 2)