

6. a) Explain the ‘Solidification of pure metals and alloys’ in detail. **8**
- b) What is ‘Solid solution’? What are the different types of solid solutions? Explain them in detail with suitable example. **8**
7. a) Draw a Fe – Fe₃C equilibrium phase diagram showing critical lines, temperatures, composition and respective phases. **8**
- b) What are the different invariant reactions involved in Fe – Fe₃C equilibrium phase diagram? Calculate the amount exact amount of phases present at equilibrium temperatures. **8**

OR

8. a) From the data given below for Cu-Ni system, plot the equilibrium diagram to scale and label the diagram. **8**

Weight % Ni	0	20	40	60	80	100
Liquidus temperature (°C)	1084	1200	1275	1345	1440	1455
Solidus temperature (°C)	1084	1165	1235	1310	1380	1455

Answer the following for 70% Ni alloy:

- i) What is the composition of first solid crystallizing out of liquid?
- ii) What is the composition of last solid formed at the end of solidification?
- iii) What are the amount of solid and liquid at 1360°C?
- b) Give a composition of ‘High speed tool steel’. Explain the heat treatment cycle with suitable sketch. **8**
9. a) Classify cast iron in brief. Explain their microstructures in detail. **8**
- b) Explain the following: **8**
- i) Martempering
- ii) Ausforming

OR

10. a) Explain how malleable cast irons are produced from white cast iron with the help of neat sketch? **8**
- b) Give composition and application for following: **8**
- i) Muntz metal
- ii) High tensile brasses
- iii) Phosphor bronze
- iv) Aluminum bronze
