QUESTION BANK
SUBJECT NAME: MATERIALS ENGINEERING
SUBJECT NAME: BTME-404-18

SHORT ANSWERS

1. What is heat tratment?
2. What is phase and state of materials.
3. What is phase transformation.
4. What are alloys.
5. Describe phase rule.
6. what are the binary systems
7. What is meant by Tempering & austempering?
8. What are the hypo eutectoid and hyper eutectoid cast iron?
9. What is induction hardening?
10. Describe the composition of pearlite and ledeburite.
11. What is oxyacetylene hardening?
12. Why heat treatment is necessary?
13. What are the applications of TTT diagram?
14. What is quenching?
15. What are diffusion and its types?
16. What are solid solutions?
17. Define the terms: - Pearlite & Leadburite?
18. Define Recovery & recrystallisation.
19. What is the difference between α-ferrite and δ-ferrite?
20. What is the effect of alloying elements on the structures of steel?
21. What are the eutectic and eutectoid reactions?
22. What is the effect of carbon on adding in iron?
23. Describe the composition of the bainite and martensite structures.
24. Define carbonitriding.
25. What are miller indices in a Crystal System
26. What is meant by Co-ordination number?
27. What are crystal imperfections?
28. What is effect of alloying steel with nickel and chromium?
29. What is the difference between annealing and normalizing?
30. Draw the following planes and directions in a F.C.C structure:
    a. (0 1 0), (1 1 1)
    b. (0 1 1) and (0 0 1)

LONG QUESTIONS

1. What is heat treatment? What are different types of heat treatment?
2. Explain in details solid solutions & different types of solid solutions?
3. Describe the defects in materials due to the heat treatment and their remedies.
4. Explain in details CCT curve with diagrams.
5. Define diffusion and what are Fick's laws of diffusion?
6. Define quenching and what are different mediums of quenching?
7. Explain in detail Recovery, recrystallisation & grain growth.
8. What are the different types of reactions in Iron-Carbon Diagram?
9. What is the difference between Iron-Carbon and TTT diagrams?
10. Explain briefly the carburizing, nitriding and, cyaniding.
11. Explain the working and importance of TTT diagram
12. Describe and explain the surface hardening and its types with suitable examples.
13. Describe the principles and applications of heat treatment.
14. Draw and explain the Iron Carbon phase diagram?
15. State Gibbs Phase rule & Hume Rothery's rules for solid solutions
16. Define Equilibrium Diagram. What are different types of Equilibrium Diagrams?
17. How martensite and bainite transformation is occurs?
18. What are the effects of alloying elements (like Si, Mn, Ni, Cr, Mo, W, Al) on the structures of steel?
19. Explain different microstructures formed in Iron-Carbon Diagram?
20. What is case hardening and what are different types of case hardening methods?
21. Draw BCC, FCC, and HCP crystal lattice and find the number of atoms per unit cell in each crystal lattice.
22. Find the coordination number in BCC, FCC, and HCP crystal lattice.
23. Compare the atomic packing factor (A.P.F.) for Simple cubic, BCC, FCC, HCP crystal structures.
24. Name various types of imperfections in the crystals and explain two dimensional defects in detail with diagrams.
25. Write short notes on Recovery, Recrystallisation, and Grain Growth.
26. Explain the mechanism of plastic deformation of single crystals. Give brief with diagrams
27. Explain various types of defects produced due to heat treatment and their remedies.
28. Explain the theories of plastic deformation
29. Which alloying elements of steel combines with carbon forms simple and complex carbides and which properties are affected by their formation?
30. Explain the various types of imperfections in crystalline materials in detail