

Material Science Tutorial Sheet

1. Explain the difference between a unit cell and a single crystal.
2. Iron is listed to have both FCC and BCC structure. Why?
3. What effect does recrystallisation has on the properties of materials.
4. What is strain hardening and what effects does it has on metals.
5. Make a list of imperfections in the crystal structure of metals.
6. What influence does grain size has on the mechanical properties of metals.
7. What is a slip system and what is its significance.
8. Explain the difference between cold, hot and warm working of metals.
9. Distinguish between engineering and true stress.
10. What is ductility and how is it measured?
11. What property of a material does modulus of elasticity measure?
12. List five test measuring hardness and briefly summarize how each test is carried out.
13. What conditions lead to fatigue failure?
14. Describe the difference between elastic and plastic behaviour.
15. List reasons why density and melting point are important material properties in manufacturing.
16. What factors lead to corrosion of a metal?
17. List application where the following properties would be desirable; high and low density, high and low melting point, high and low thermal conductivity.
18. What is a solid solution?
19. What are the conditions for obtaining substitutional and interstitial solid solutions?
20. Describe the features of a phase diagram.
21. Describe the properties of the various types of cast irons.
22. Describe the characteristics of ferrite, cementite and austenite.
23. What are the difference in properties obtained from the various heat treatment processes.