Quiz

1. What is critical resolve shear stress? Derive the expression for CRSS.

2. Calculate the resolved shear stress for an Ni single crystal on the (111) [0 $\bar{1}$ 1] slip system if a stress of 15 MPa is applied in [001] direction.

3. A stress of 5 MPa is applied to a single crystal FCC metal in the [0 0 $\bar{1}$] direction. Calculate the CRSS on (1 1 $\bar{1}$) plane in [$\bar{1}$ 0 $\bar{1}$], [0 $\bar{1}$ $\bar{1}$] and [$\bar{1}$ 1 0] directions.

4. What is the mechanism of grain refinement strengthening?

5. Show that strength is proportional to $D^{-1/2}$ (D = grain dia).

6. An iron rod has a grain size of 0.01 mm and yield strength of 230 MPa. The strength is 275 MPa at a grain size of 0.006 mm. In order achieve a yield strength of 310 MPa what should be the grain size?

7. Why is strain hardening also called cold working?

8. What kind of microstructure develops after cold working?

9. Why does hardness and strength increase on clod working? What is the effect of cold working on ductility?

10. How is dislocation density related to strength?

11. What is the mechanism of strengthening by solid solution?

12. What kind of strain field interstitial atoms generally introduce?

13. What kind of strain fields are associated with dislocations?

14. What are the different stages of precipitation hardening?

15. What kind of alloy system hardens by precipitation?

16. Will precipitation hardening occur if the alloy is cooled slowly from the single phase region?

17. What is supersaturated solid solution?

18. How does the strength increase by precipitation?

19. What is coherent and incoherent precipitate?

20. What is the main strengthening phase in Al-Cu alloys.