

Questions for self assessment

1. What is the need to design the weld joint systematically?
2. Describe different modes of failure of weld joints?
3. How are the weld joints designed for realizing different mechanical performances?
4. Explain the factors affecting the mechanical performance of the weld joints?
5. Why does designing of the weld joints for static loading become easier than fatigue loading?
6. What is need to study the welding symbols?
7. A T joint is to be made at the site using SMAW process having intermittent double fillet welds of 90 mm length. The centre distance between the welds is about 160mm. The leg length of the weld is about 10mm. Draw the welding symbol for the joint.
8. Schematically show the different types of weld joints.
9. Explain different types of weld with help of suitable schematic diagram?
10. Explain the following term with suitable sketch:
 - i. Backing
 - ii. Base metal
 - iii. Bead or weld bead
 - iv. Crater
 - v. Deposition rate
 - vi. Puddle
 - vii. Root
 - viii. Toe of weld
 - ix. Weld face
 - x. Weld pass
11. What are the factors that need to be considered for selection of groove geometry?
12. When fillet weld is preferred for developing weld joints?

13. Why do fillet weld joints offer lower fatigue performance than butt weld joints?
14. What for bead weld is used and write the precaution to be taken while developing it?
15. How are welding parameters and weld joint design inter-related for developing sound weld joint?
16. What is the fundamental approach of weld joint design for given external loading?
17. What are the factors that need to be considered for selection of groove geometry?
18. When fillet weld is preferred for developing weld joints?
19. Why do fillet weld joints offer lower fatigue performance than butt weld joints?
20. What for bead weld is used and write the precaution to be taken while developing it?
21. How are welding parameters and weld joint design inter-related for developing sound weld joint?
22. What is the fundamental approach of weld joint design for given external loading?
23. What is objective of designing of fillet and butt weld joint for static loading?
24. What are the important steps of weld joint design for static loading?
25. Describe methodology for developing butt and fillet weld joint design for static loading.
26. Why does approach of weld joint design for fatigue loading differ from that for static loading?
27. Describe procedure of developing butt and fillet weld joint design for fatigue loading.
28. How do we select a class of weld to be designed for fatigue loading?
29. What information must be collected for designing weld joint for fatigue loading?
30. What is fatigue loading of weld joint?

31. Explain the mechanism of fatigue fracture of weld joints?
32. Describe factors affecting different stages of fatigue fracture.
33. How do material properties affect stable crack growth rate?
34. Explain the fatigue crack growth rate vs. stress intensity factor range relationship.
35. Explain the crack growth and number of fatigue load cycle relationship using suitable schematic diagram.
36. What is residual fatigue life?
37. Enlist the factors affecting the fatigue performance of weld joints?
38. Describe effect of following service load related parameters on fatigue life of weld joints.
 - i. Type of stress
 - ii. Maximum stress
 - iii. Stress range
 - iv. Stress ratio
 - v. Mean stress
 - vi. Frequency of loading
39. How do materials properties affect the fatigue performance of a weld joint?
40. Explain the role of physical properties of metal to be welded on fatigue life?
41. Describe effect of following mechanical properties on the fatigue performance of the weld joints
 - i. Tensile strength
 - ii. Hardness,
 - iii. % elongation
 - iv. Fracture toughness
42. How does microstructure of weld joints affect the fatigue strength?
43. What is effect of morphology of micro-constituents of the weld joints?
44. Describe the effect of following types of environment on fatigue life of weld joints
 - i. Temperature

- ii. Vacuum
- iii. Corrosion

45. What is effect of various parameters related with welding on fatigue strength of weld joints?
46. How does edge preparation influence the fatigue behaviour of the weld joints?
47. Why does the fatigue performance of the weld joint developed using different processes vary?
48. Describe role of following welding consumables on fatigue strength of the weld joints?
- i. Electrode
 - ii. Coating materials
 - iii. Shielding gas
49. Does post weld heat treatment affect the fatigue behaviour of weld joints? If yes, how?
50. What are different approaches used for improving the fatigue performance of the weld joints?
51. What is effect of stress raisers on fatigue life? Explain how fatigue life can be increased by reducing the stress raisers in weld joints?
52. How does development of residual compressive stress help in reducing fatigue failure?
53. Explain the principle of following methods of inducing compressive residual stresses for improving the fatigue life of the weld joints?
- i. Shot peening
 - ii. Overloading
 - iii. Shallow hardening