

FITTING VIVA QUESTIONS

1. What is the necessity of Fitting shop ?

Ans : Fitting shop is required in some of the Industries where the assembly of parts are carried out and also in workshops where press fits are involved.

2. What is Fitting ?

Ans : Fitting is a process of assembly of various parts by removing extra material by some means to secure the necessary relative positioning.

3. Name the tools used in Fitters shop.

Ans : 1) Vice, (2) Files, (3) Marking Pin, (4) Chisels, (5) Hammers, (6) Taps and Die, (7) Drilling machines and (8) Drill bits.

4. What are the different types of vice ?

Ans : Bench Vice, Leg Vice, Machine Vice, Pipe Vice, Pin Vice, Tool makers vice.

5. What are the different types of Hammers ?

Ans : Cross peen hammer, Straight peen hammer, Ball peen hammer, Soft faced hammer.

6. Name different types of chisels.

Ans : Flat chisel, crosscut chisel, Diamond point chisel, Half round chisel.

7. Name the different types of marking tools and their purpose.

Ans : *Scriber* : To draw the lines on metal parts and for marking.

Surface gauge : It carries scriber and is used to scribe a line on a work piece at a predetermined distance from the surface plate.

Dividers : It is used for marking circle and arcs and for transferring dimension.

Punch : Punch is used to make indentation on scribed lines to make the markings clearly visible.

Angle Plate : It carries two surfaces at right angles and is used with surface plate to hold the work for marking.

V-block and clamps : V-blocks are used for drilling and layouting the circular bar.

Clamps are used to hold cylindrical objects firmly.

8. Name the different measuring instruments used in fitting.

Ans : Steel Scale : For linear measurement, steel scale is used.

Try square : it is used to check flatness of the surfaces and also perpendicularity of the surface.

Inside and outside caliper : Inside caliper is used for measuring inside diameter of circular part and outside caliper is used for measuring outside diameter of circular part.

Height gauge : It is used for measuring height to an accuracy of 0.02 mm.

Micrometer : It is used to for measuring external dia and thickness of plates.

Pitch gauge : It is used for testing the pitch of the threads.

Surface plate : It is used for testing the flatness of the work.

Radius gauge : It is used for checking inside and outside radius.

Depth gauge : it is used for measuring depth of holes.

9. What is sawing ?

Ans : Sawing operation involves cutting the metal to the desired size and shape by using hack saw blades.

10. Classify the Hack saw blade according to its pitch ?

- Ans :** i) Fine blade - 1.0 mm
- ii) Medium blade - 1.4 mm
- iii) Coarse blade - 1.8 mm

11. How are Hack saw blades specified ?

Ans : Hack blades are specified by their (i) pitch of teeth, (ii) length, (iii) width, (iv) thickness, (v) material of the blade.

12. What is chipping ?

Ans : Chipping is the process of removing thick layers of metals by means of cold chisel.

13. Which type of vice is used for chipping ?

Ans : Leg Vice is used for chipping.

14. Distinguish between Hot chisel and cold chisel.

Ans : Hot chisel is used for cutting metal at elevated temperatures and do not possess sharp cutting edge as in cold chisel.

Cold chisel is used for cutting metal at room temperature and has sharper cutting edges.

Q. What is Filing ?

Ans : Filing is a process of removing extra materials, burrs and clean the face of cutting edges by using files to give final finish to a work piece.

16. How are files classified according to the coarseness and spacing between the rows to teeth ?

- Ans :**
- i) Super smooth (SS)
 - ii) Dead smooth (DS)
 - iii) Smooth (S)
 - iv) Second cut (SC)
 - v) Bustard (B)
 - vi) Rough (R).

17. What are the methods of filing ?

- Ans :**
- i) Straight filing
 - ii) Cross filing
 - iii) Draw filing.

18. Name the various types of Files and corresponding uses.

- Ans :**
- i) **Flat file :** They are used for removing more material at a time and gives rough finish. It gives a fast cutting edge.
 - ii) **Hand file :** It is used for finishing flat surfaces. Hand files are double cut, parallel in width and tapered in thickness.
 - iii) **Pillar file :** It is similar to flat file except that it is narrower and one or both the edges are safe edges. It is used for filing on slots and key ways and for filing against shoulders.
 - iv) **Square file :** It has square cross section and have double cut teeth on all four sides and can be used for filing square or rectangular holes and for finishing the bottom of slots.
 - v) **Triangular file :** It has a cross-section of equilateral triangle of 60° and is tapered to make it pointed. It is double cut on three sides and single cut on the edges. It is used for filing internal angles which are less than 90° and also for filing taps, cutters etc.
 - vi) **Round file :** It has a circular cross-section and is tapered. It is used for enlarging round holes, rounding irregular holes and finishing fillets.
 - vii) **Half round file :** It is a semicircular cross-section. The rounded half is a double cut file and is used for filing concave surfaces.
 - viii) **Flat rasp :** Flat rasp is similar to file but has coarse teeth raised by a pointed triangular punch.

19. What is Straight filing ?

Ans : In straight filing, the file is pressed in the forward stroke at right angles to the length of the work piece and in the return stroke the file is lifted to avoid blunting of the teeth.

20. What is Cross filing ?

Ans : In cross filing, the files strokes are run alternately from right to left.

21. What is Tapping ?

Ans : Tapping is a process of cutting internal threads on drilled holes by using a tool called taps.

22. What is Dieing ?

Ans : The process of cutting external threads on the round bars like bolts and studs is known as dieing.

23. How the internal and external threads are cut ?

Ans : Internal threads are cut by using taps and tap wrenches.
External threads are produced by using dies and die stock.

24. What are the different types of tap wrenches ?

Ans : i) Solid tap wrench for large taps
ii) Adjustable wrench for medium taps
iii) Chuck wrench for very small taps.

25. What are different types of dies ?

Ans : i) Solid die
ii) Adjustable die
iii) Two piece rectangular die.

26. What is drill ? What are the different types ?

Ans : A drill is a tool for making holes. Different types of drills are (i) Flat drill, (ii) Straight fluted drill and (iii) Twist drill.

27. What is drilling ? How it is carried out ?

Ans : Drilling is the operation of making circular hole. A drilling machine is used which can generate a hole by the rotating edge of a cutting tool known as drill which exerts large force on the work clamped on the table.

28. Name the different types of drilling Machines.

- Ans :**
- 1) Portable drilling machine
 - 2) Sensitive drilling machine
 - a) Bench mounting
 - b) Floor mounting
 - 3) Upright drilling machine
 - a) Plain
 - b) Semi-universal
 - c) Universal
 - 4) Gang drilling machine
 - 5) Radial drilling machine
 - a) Plain
 - b) Semi-universal
 - 6) Multiple spindle drilling machine
 - 7) Automatic drilling machine
 - 8) Deep hole drilling machine
 - a) Vertical
 - b) Horizontal

29. What is Reaming ?

Ans : This is the operation of sizing and finishing a hole already made by a drill. Reaming is performed by means of a cutting tool called reamer having several cutting edges. Reaming serves, to make the hole smoother, Straighter and more accurate in diameter.

30. How is reamer classified ?

Ans : Reamer is classified as solid reamer and adjustable reamer.

31. What is lapping ?

Ans : Lapping is the operation of removing very small amount of material by means of an abrasive. The abrasive material is kept in contact with the sides of a hole that is to be lapped by the use of a lapping tool.

32. What is Boring ?

Ans : This is the operation of enlarging a hole by means of adjustable cutting tools with only one cutting edge. A boring tool is employed for this purpose.

33. What is Counter Boring ?

Ans : This is the operation of enlarging the end of hole, as for the risers for a counter sunk rivet. The tool used is known as counter bore.

34. What is Counter Sinker ?

Ans : This is the operation of making a cone shaped enlargement of the end of a hole, as for the recess for a flat head screw.

35. What is spot facing ?

Ans : This is the operation of removing enough material to provide a flat surface around a hole to accommodate the head of a bolt or a nut. A spot facing tool is very nearly similar to counter bore.

36. What is Tolerance ?

Ans : Tolerance is the difference between the maximum limit of size and minimum limit of size.

37. What is Fit ?

Ans : The relation between the two parts where one is inserted into the other with a certain degree of tightness or looseness is known as fit.

38. What is Clearance ?

Ans : A positive difference between the diameter of the hole and the shaft, the hole diameter being larger than the shaft diameter, allowing relative movement between the two mating parts is called a clearance.

39. What is Interference ?

Ans : A negative difference between the diameters of the hole and the shaft, the shaft diameter being larger than the hole diameter is called interference.

CARPENTRY

40. What is Carpentry ?

Ans : Carpentry is a workshop where the wood working is carried out. Carpentry shop is required to produce wooden patterns to manufacture castings in foundry Industries. It is also useful for preparing wooden prototype models.

41. How are woods classified ?

Ans : Woods are classified as Hard and soft wood. Hard are brittle, heavy in weight and dark in colours. Example : Teak, Sol, Rose wood. Soft wood are light in weight, light in colour. Example : Jack, pine, Deodar.

42. How the wood is identified ?

Ans : Wood is identified based on (i) colours, (ii) weight, (iii) fibre orientation.

43. What is seasoning of wood ?

Ans : Seasoning of wood means removing the moisture.

44. What are the different types of seasoning ?

Ans : i) Natural seasoning,
ii) Artificial seasoning.

45. Name the tools used in Carpentry shop.

Ans : i) Marking tools : Marking pin, Gauge, scriber
ii) Planning tools : Jack Plane, Metal Jack plane
iii) Striking tools : Mallet, Hammer
iv) Cutting chisel : Chisels, saws
v) Boring tools : Ratchet Brace, Gimlet
vi) Holding tools : Bench Vice and clamp

46. What are the different gauges used in carpentry shop.

Ans : i) Marking gauge : It is used to mark lines of uniform distances
ii) Mortise gauge : It is used for marking two parallel lines simultaneously.
iii) Cutting gauge : It cuts the work piece making the marking more visible.
iv) Panel gauge : it is used in construction of door panels.

47. What is sawing ?

Ans : Sawing is a process of cutting wood by using saw.

48. What are the different types of saws ?

Ans : i) Solid frame hack saw
ii) Adjustable hack saw
iii) Power hack saw

Other types of saws are

i) **Hand saw** : It is used for cutting across the fibres of wood. The blade length varies from 55 to 70 cm and the number of teeth are filed to a knife point.

ii) **Tenon saw** : It has a blade with increasing width at the back and has a fine blade. It is used for cutting mortises.

iii) **Coping saw** : The blade is held with the help of a frame and is used for cutting curves, roundings etc.

49. What is a chisel ?

Ans : Chisels are used for removing the wood.

50. What are different types of chisel ?

Ans : i) Firmer chisel - Light work and heavy work.

ii) Paring chisel - It has thinner blade and it is widely used for light work.

iii) Mortise chisel - It is used for cutting rectangular mortises.

iv) Boring tools - Ratchet Brace is the widely used tool for Boring wooden work pieces.

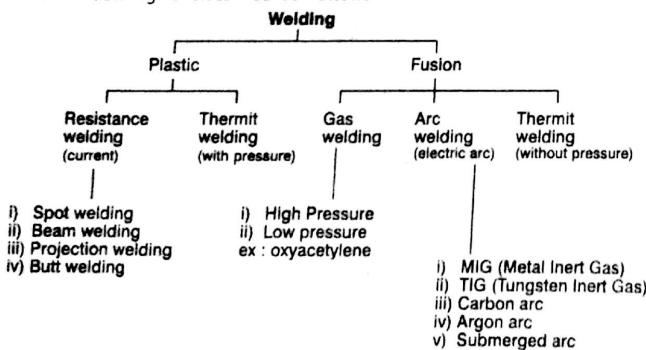
WELDING

51. What is Welding ?

Ans : Welding is a process of joining similar or dissimilar metals by the application of heat and with or without application of pressure and addition of filler material.

52. How do you classify welding ?

Ans : Welding is classified as follows



53. What is Plastic welding ? Give example.

Ans : Plastic welding involves heating the metal pieces to be joined to a plastic state and then bonded together by external pressure. Example : Forge welding, Resistance welding.

54. What is Fusion welding ? Give example.

Ans : Fusion welding involves localized heating of the material at the joint to a molten state and allowed to solidify. Example : Electric arc welding, Gas welding and Thermit welding.

55. What is Forge welding ?

Ans : Forge welding involves heating the parts to be joined in the furnace to a plastic state and then forged together by hand or power hammer.

Example : Forging of low and medium carbon steels.

56. What is Resistance welding ?

Ans : Resistance welding involves heating the metal parts to be joined to a plastic state over a localized area by their resistance to the flow of an electric current and the mechanical pressure is applied to complete the weld.

57. What are the different types of Resistance welding ?

- Ans :**
- i) Spot welding
 - ii) Seam welding
 - iii) Butt welding
 - iv) Projection welding.

58. What is Thermit welding ?

Ans : Thermit welding are carried out with or without pressure. Thermit welding involves pouring the super heated liquid thermit steel around the parts to be joined by fusion. It is based on the chemical reaction.

59. What is Weldability ?

Ans : Weldability denotes the relative ease of producing a weld that is free from defects such as cracks, hard spots, porosity or inclusions and is able to perform satisfactorily in its intended service.

60. Mention the various zones of welded part.

Ans :

- i) Fusion zone - The area where the melting of base metal occurs.

- ii) Heat affected Zone (HAZ) - It is the unmelted zone around the fusion zone.
 iii) Unaffected original part - It is the unaffected original part.

61. What is edge preparation in welding ?

Ans : Edge preparation involves bevelling of the edges by filing suitably and cleaning the surface to be welded from any dirt, oil, grease prior to welding to achieve sound and defect free joints.

62. What is electric arc welding ?

Ans : Electric arc welding is a process of joining the metals by using the electric arc produced when two conductors carrying current are brought together in contact forming an electric circuit and then separated for a distance such that the current continues to flow through the gaseous medium between solid conductor. Here the electric energy converted as arc produces a heat upto temperature of 3500°C to 7500°C.

63. What distance should be maintained between work piece and electrode in electric arc welding ?

Ans : The distance between the work piece and electrode must be 2 mm to 4 mm.

64. What is arc length ?

Ans : The arc length is the distance through the centre of the arc from the lip of electrode to the bottom of arc crater. It ranges from 3 mm to 4 mm.

65. What is arc column ?

Ans : Arc column is the visible portion of the arc consisting of hot ionized gases (Plasma) where the voltage drop is not sharp.

66. What are the equipments required during welding ?

Ans : The equipment required includes a source of DC or AC current, an electrode holder and safety equipments such as shield glass, hand gloves and consumables.

67. What is fusion welding ?

Ans : In a fusion welding process, the material around the joint is melted in both the parts to be joined. If necessary, a molten filler material is also added.

68. What are the factors that governs the fusion welding ?

- Ans :** i) the characteristics of the heat source
 ii) the heat flow characteristics in the joint
 iii) the gas metal or slag metal reactions in the fusion zone
 iv) the cooling of the fusion zone with associated contraction residual stresses, and metallurgical changes.

69. What is weld pool ?

Ans : Weld pool is the nature of the deposition of the fuller material in the fusion zone.

70. Name the different zones in an electric arc.

Ans : i) Cathode spot, (ii) Cathode space, (iii) Arc column, (iv) Anode space, (v) Anode spot.

71. Distinguish between cathode spot and cathode space.

Ans : Cathode spot is relatively very small area on the cathode surface, emitting the electrons.

Cathode space is gaseous region adjacent to the cathode has a thickness of the order of 10^{-3} cm. This region has the positive space charge. So a voltage drop is necessary as the electron are to be pulled across this region.

72. How are electrodes specified ?

Ans : Electrodes are specified by

- i) Diameter, (ii) core wire material, (iii) length, (iv) coating, (v) coating material.

73. What factors are considered while specifying the electrodes ?

- Ans :**
- i) Operating characteristics
 - ii) Type of coating
 - iii) Strength level of the weld.

74. What are the factors to be considered while selecting the polarity of the electrode and the work piece ?

- Ans :**
- i) Type of electrode
 - ii) Base material
 - iii) Position of joint.

75. What is the effect of the electrode being (i) positive polarity and (ii) negative polarity ?

Ans : i) With electrode positive polarity more heat is concentrated at the tip of the electrode and more electrode is usually melted off per minute.

ii) With electrode negative polarity, more heat is concentrated at the base metal than electrode.

76. What is the effect of current on the weld ?

Ans : With too much current tends to burn and scatter the metal. Too little current does not fuse the base material to the welding material.

77. What is arc blow ?

Ans : The arc itself is a flexible gaseous conductor of current and is subjected to deflection by outside magnetic forces. The passing of current creates magnetic lines of force that pass through the base material. When the base material is magnetic (steel for instance) the phenomenon of arc blow occurs.

78. Why the ac current has less arc blow than dc current ?

Ans : The ac current reverses the direction, which in turn reverses the magnetic field. The magnetic field builds up, collapses and rebuilds as current reverses from positive to negative. This phenomenon does not permit the magnetic field strength to build up to a value so as to cause arc blow.

79. What are the characteristics of AC arc welding ?

Ans : i) No load requirements are low.
ii) Low equipment cost.
iii) No load voltage is high.
iv) Overall efficiency is high.

80. What are the characteristics of DC arc welding ?

Ans : i) No load requirements are high.
ii) High equipment cost.
iii) No load voltage is low.
iv) Overall efficiency is low.

81. Name some of the welding defects.

Ans : i) bubbles ii) cracks iii) slag inclusion iv) craters
(v) overweld.

82. How the welding defects are detected ?

Ans : i) Visual examination,
ii) Destructive testing,
iii) Non-destructive testing.

83. What is 'Straight Polarity' and 'Reversed Polarity' in welding ?

Ans : In DC welding the work piece is connected to the positive pole of the DC generator and the electrode to the negative pole in order to melt greater mass of metal in the base material. This set up is called 'Straight Polarity'. When the less heat is required at the base metal, the polarity is reversed, it is called 'Reversed Polarity'.

84. Why there is no choice of Polarity in AC arc welding ?

Ans : In AC arc welding there is no choice of polarity since they change in every cycle. As the AC current acquire zero value twice in every cycle, at these moments potential difference is also zero and hence higher voltage is required to maintain the arc.

85. What is consumable and non-consumable electrodes ?

Ans : Consumable electrodes also melts along with the work piece and fills the joint. The consumable electrodes either will be bare or coated.

When non-consumable electrodes are used, an additional filler materials are used which will enable the metal deposited by the filler rod to be controlled.

86. What is the composition of electrode ?

Ans : The electrodes are made of core which is usually made of same material as that of metal to be joined and is coated with flux material such as manganese, kaolin chalk etc.

87. Name some of destructive testing methods for testing welded joints.

Ans : i) Tensile test,
ii) Impact test,
iii) Fatigue test.

88. Name the non-destructive testing methods used in testing welded joints.

Ans : i) Radiography
ii) Magnetic particle testing
iii) Laser detection
iv) Eddy current.

89. What are two tools and equipments required for Arc welding ?

- Ans : (i) Electrode
 (ii) Electrode holder
 (iii) Earthing clamp
 (iv) Chipping hammer and tongs
 (v) Wire brush
 (vi) Hand shield
 (vii) Helmet with safety goggles
 (viii) Aprons, shoes, sleeves
 (ix) Cables and cable connectors
 (x) AC or DC electric current source.

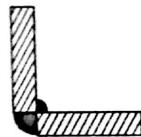
90. Name some of the welded joints.

Ans :

(i) Butt joint



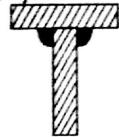
(iv) L-joint



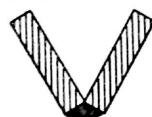
(ii) Lap joint



(iii) T-joint



(iv) L-joint



91. What steps are taken during welding ?

- Ans : i) The edge of the work piece must be prepared by filing and greasing, oil or dust is removed.
 ii) Template is prepared for welding angle joint, T-joint or L-joint.
 iii) While welding protective hand shield with shield glasses must be used to prevent eyes from exposed to ultra violet and gamma rays etc.

92. What are the gases used in gas welding ?

- Ans : Gas combination used in gas welding are (i) oxygen-acetylene
 (ii) oxygen-hydrogen, (iii) oxygen and other fuel gas.

93. What is neutral flame and what is its temperature ?

Ans : When oxygen and acetylene are supplied to the torch in nearly equal volumes, a neutral flame is produced. The temperature of neutral flame is 3200°C.

SOLDERING AND BRAZING

94. What is soldering ? Explain in detail.

Ans : Soldering is a method of joining two or more pieces of metal by means of fusible alloy or metal called solder applied in the molten state.

Before soldering the surface to be joined is cleaned, the flux is applied at the joint.

95. What is flux ?

Ans : Flux is used prior to soldering for preventing oxidation of the surface to be joined when heated. Various types of flux are available and suitable flux must be employed depending upon the type of the metal to be joined.

96. Give few types of flux used.

Ans :

Type of flux	Metals to be joined	Commercial name
Zinc chloride	Copper	Resin or salmannia
Zinc chloride	Steel	Sal-ammonia
Hydrochloric acid	Lead	Resin or Tallow and Resin

97. What are solder ?

Ans : Alloy of tin and lead used for soldering as fusible metal is called solder.

98. Classify soldering.

- Ans : (a) Soft soldering and
 (b) Hard soldering.

99. What is soft soldering ?

Ans : Soft soldering is used in joining sheet metal, wires, parts that are not exposed to high temperature and are not subjected to excessive loads and forces. The solder used in this case will have melting point of 150°C to 350°C.

100. Give an example of soft soldering process.

Ans : In joining aluminum alloy parts, the zinc is spread on the surface to be joined and the surface is heated by a blow pipe to a temperature of 200°C. The flux is also applied to prevent oxidation.

101. What is Hard soldering ?

Ans : Hard soldering employs solder which melts at higher temperatures and are stronger than those used in soft soldering. The temperature of the hard solder varies from 600°C to 900°C.

102. Give examples of solder.

Ans : Soft solder - lead 37% and Tin 63%

Medium solder - lead 50% and Tin 50%

Plumb solder - lead 70% and Tin 30%

Electrician's solder - lead 58% and Tin 42%

103. What is Brazing ?

Ans : Brazing is a method of joining two similar or dissimilar metals using a special fusible alloy.

104. How is soldering different from Brazing ?

Ans : In Brazing the harder filler material known as spelter which fuses at some temperature below the melting temperature of the parts to be joined is used. In Soldering, filler material known as solder is used to join the parts. Brazing produces stronger joint than that of soldering.

105. What are the filler materials used in brazing ?

Ans : Copper base and silver base alloys.

106. What are different types of brazing ?

- Ans :**
- i) Torch brazing,
 - ii) Furnace brazing,
 - iii) Resistance brazing,
 - v) Immersion brazing.