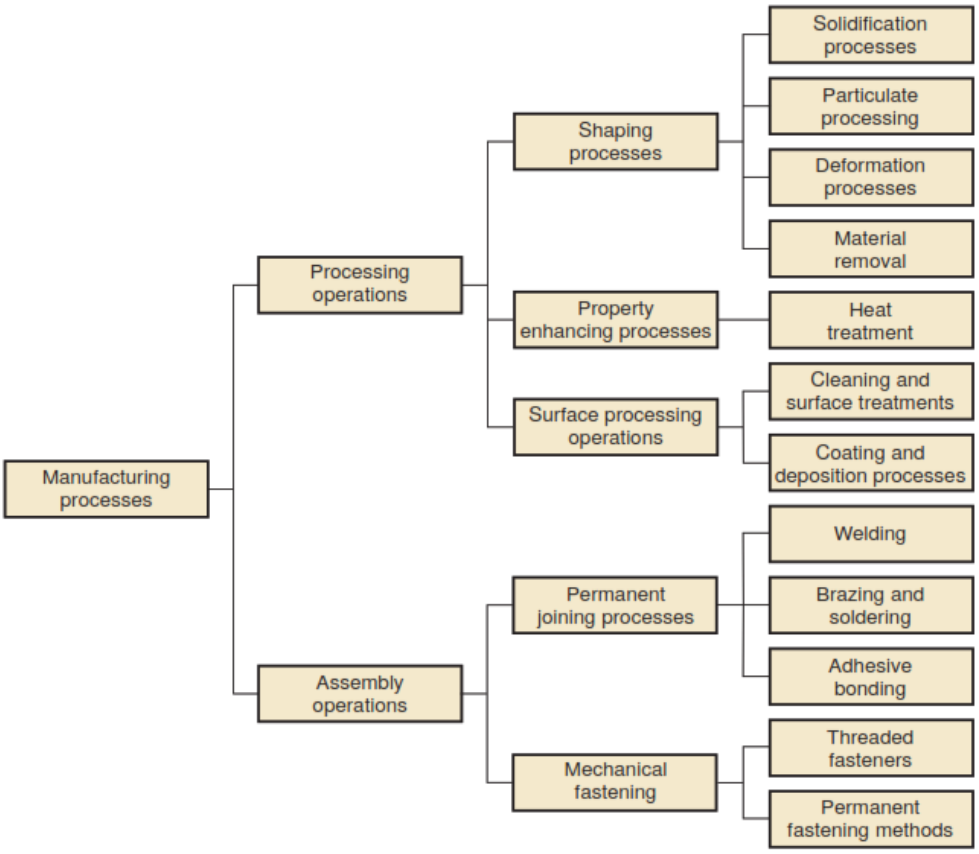
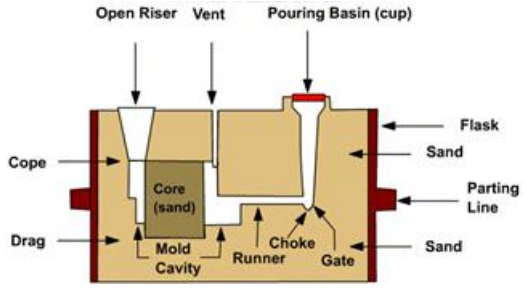
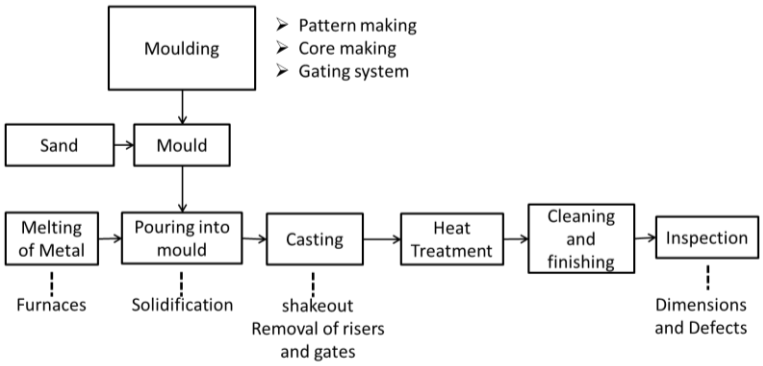
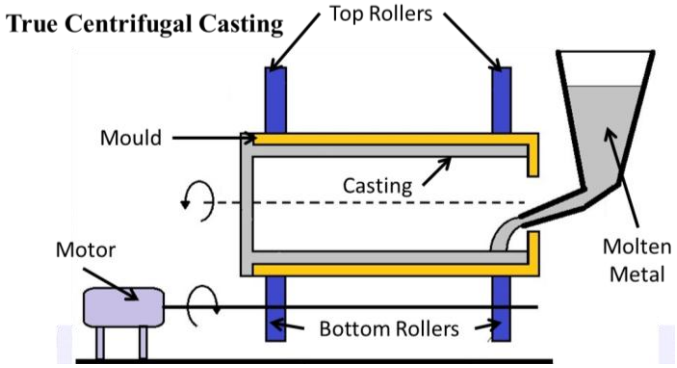
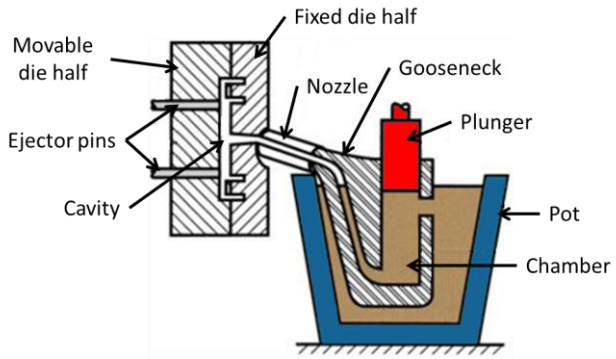
Unit 1

1	Classify the basic manufacturing Processes. Answer:  Very short description is required.
2	Explain basic terminology of sand casting with neat diagram Answer:  Pattern: a pattern is defined as a model or replica of the object to be cast. Except for the various allowance a pattern exactly resembles the casting to be made. Molding sand: Sand, which binds strongly without losing its permeability to air or gases. It is a mixture of silica sand, clay, and moisture in appropriate proportions. Core: A separate part of the mold, made of sand and generally baked, which is used to create openings and various shaped cavities in the castings. Pouring basin: A small funnel shaped cavity at the top of the mold into which the molten metal is poured. Sprue: The passage through which the molten metal, from the pouring basin, reaches the mold cavity. In many cases it controls the flow of metal into the mold. Runner: The channel through which the molten metal is carried from the sprue to the gate. Gate: A channel through which the molten metal enters the mold cavity. Riser: A column of molten metal placed in the mold to feed the castings as it shrinks and solidifies. Also known as “feed head”. Vent: Small opening in the mold to facilitate escape of air and gases.

3	Explain the casting process with flowchart Answer:  Very short description is required.
4	Select and explain the casting process most suitable for large oil pipes for caring oil. Answer: For large metal pipes most suitable process is True Centrifugal casting.  Short description [if for 5 marks] Advantages, disadvantages, application. [if for more than 5 marks]
5	Select and explain the casting process most suitable for jewelry and surgical implants. Answer: The most suitable for jewelry and surgical implants is investment casting [Diagram not compulsory for this only give step wise explanation] 1. Production of heat-disposable wax, plastic, or polystyrene patterns: The patterns are prepared by injecting wax or polystyrene in a metal dies. 2. Assembly of these patterns onto a gating system: then number of patterns are attached to a central wax sprue to form a assembly. 3. “Investing,” or covering the pattern assembly with refractory slurry: The mold is prepared by surrounding the pattern with refractory slurry that can set at room temperature. 4. Melting the pattern assembly to remove the pattern material: The mold is then heated so that pattern melts and flows out, leaving a clean cavity behind. 5. Pouring: The mould is further hardened by heating and the molten metal is poured while it is still hot. 6. Knockout, cutoff and finishing: When the casting is solidified, the mold is broken and the casting taken out. Then give Advantages, disadvantages, application.
6	Explain the casting process with highest production rate. Answer: It is Hot chamber Die Casting  Short description [if for 5 marks] Advantages, disadvantages, application. [if for more than 5 marks]

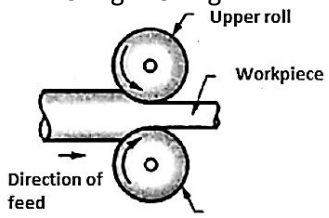
7 Differentiate between hot and cold working in deformation processes.

Answer:

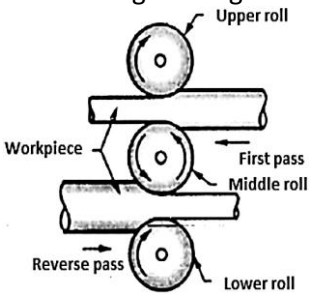
Hot Working	Cold Working
No strain (work) hardening and residual stresses.	Residual stress may be induced during the work.
Lesser force is required for deformation.	More force is required for deformation.
Ductility of metal is high above recrystallization temperature, so large deformation is possible.	Ductility of metal is low below recrystallization temperature, so small deformation is possible.
Less powerful equipment are needed	More powerful equipment are needed
More heat energy is required	Less heat energy is required
Poor surface finish due to scaling and oxidation	Good surface finish due to absence of scaling and oxidation
Less accuracy and dimensional control, so further machining is required	Better accuracy and dimensional control, so further machining is not required
Handling of hot object is difficult	Handling is easy
Lower life of equipment	Longer life of equipment

8 Classify the types of rolling mills with neat diagram

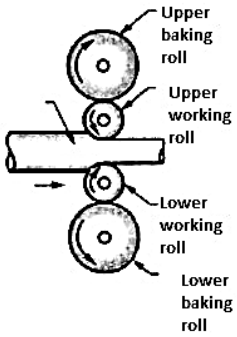
1. Two-high rolling mill:



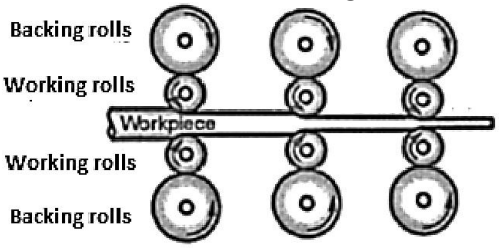
2. Three-high rolling mill:



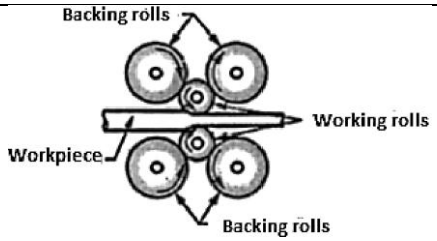
3. Four-high rolling mill:

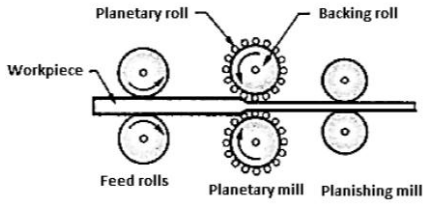


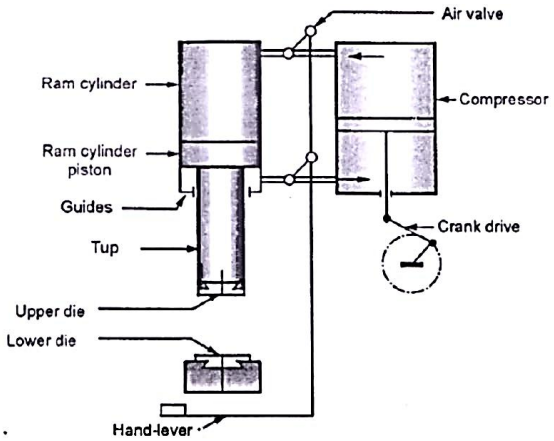
4. Tandem/Continuous rolling mill:



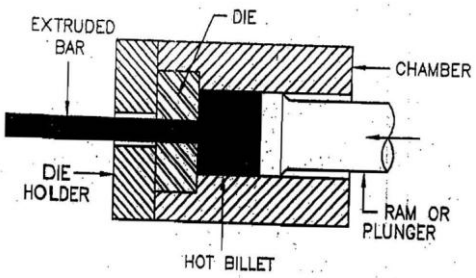
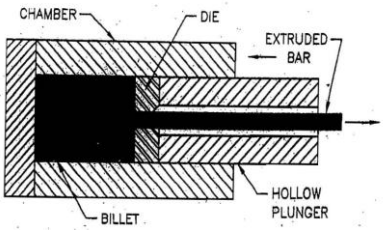
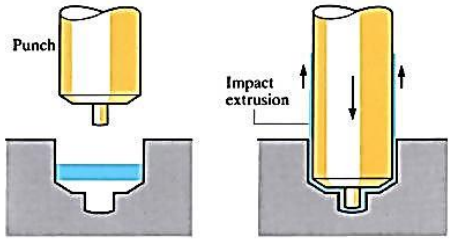
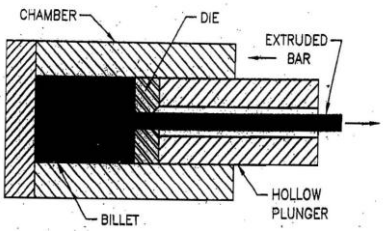
5. Cluster rolling mill:

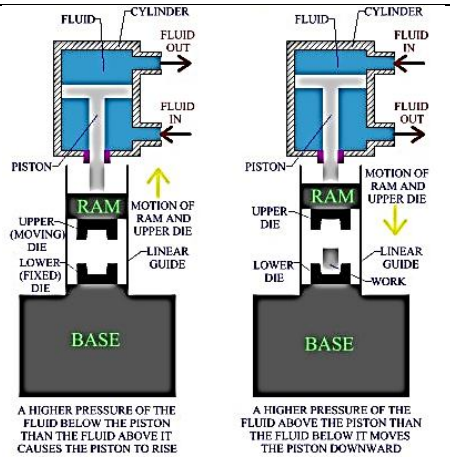
<table>
<tr><td></td><td>


6. Planetary rolling mill


</td></tr>
<tr><td>9</td><td>Classify the forging methods
Answer:
Forging process is classified as follows :
1. According to the working temperature
a. Hot forging: Most of the forging operations are performed above the recrystallization temperature but below the melting point of the metals.
b. Cold forging: For certain products like bolts, rivets, screws, pins, nails, etc. cold forging is also very common. It increases the strength which results from the strain hardening of the component.
2. According to the method of applying the blows
a. Impact forging: In this method of forging, a machine that applies impact load on the workpiece is called as forging hammer.
b. Gradual pressure forging: In this method of forging, a machine that applies gradual pressure on the workpiece called as forging press.
3. According to the degree to which the flow of workpiece is constrained by the dies
a. Open-die forging: In this method of forging, the workpiece is compressed between two flat dies which allows the metal to flow without constraint in a lateral direction relative to the die surfaces.
b. Closed-die or impression-die forging: In this method, the die surfaces contain an impression or shape which is applied to the workpiece during the compression. During the operation, some portion of the workpiece flows beyond the die impression to form a flash. (Flash is excess metal which is trimmed off at the end).
c. Flash less forging: In this method, the workpiece is completely constrained within the die and no flash is produced. The volume of the initial workpiece must be controlled closely so that it matches with the volume of the die cavity.</td></tr>
<tr><td>10</td><td>Explain pneumatic hammer with neat sketch
Answer:


➢ In these hammers, the compressor cylinder compresses the air and delivers it to the ram cylinder. By using this compressed air pressure, the ram cylinder piston is actuated.
➢ A lever operates an air valve provided on the air passage from compressor cylinder to ram cylinder.</td></tr>
</table>

	➢ Piston of ram cylinder carries tup at its bottom which can slide inside the fixed guides. ➢ The compression of the reciprocating cylinder is obtained with the help of crank drive which is operated by a reduction gear drive. ➢ Pneumatic hammer can produce 70 to 200 blows/minute.
11	Classify extrusion on the basis of working mechanism Answer: Classification According to working mechanism a. Direct (Forward) extrusion  When the material is extruded in the same direction of applied pressure b. Indirect (Backward) extrusion  In this type, the ram or plunger used is hollow and as it presses the billet against the back wall of the closed chamber, the metal is extruded back into the plunger. c. Impact extrusion 
12	Explain indirect extrusion Answer:  A billet is fed into the machine chamber. In this type, the ram or plunger used is hollow and as it presses the billet against the back wall of the closed chamber, the metal is extruded back into the plunger. It involves no friction between the metal billet and the chamber because the billet does not move inside the chamber, so as compared to direct extrusion, less total force is required in this method. But the equipment used is mechanically complicated. Indirect extrusion is also used to solid as well as hollow components. For producing solid parts ram is hollow whereas for producing hollow parts ram is solid.
13	Explain working of hydraulic press with neat sketch. Answer:



The basic working principles of the hydraulic press are simple, and rely on differences in fluid pressure.

Fluid is pumped into the cylinder below the piston, this causes the fluid pressure under the piston to increase. Simultaneously, fluid is pumped out of the top channel, causing the fluid pressure above the piston to decrease.

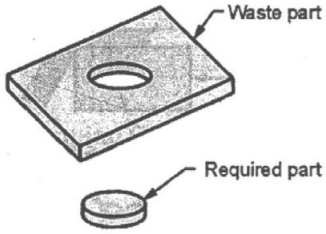
A higher pressure of the fluid below the piston than the fluid above it causes the piston to rise.

In the next step, fluid is pumped out from below the piston, causing the pressure under the piston to decrease. Simultaneously, fluid is pumped into the cylinder from the top, this increases the fluid pressure above the piston. A higher pressure of the fluid above the piston, than the fluid below it, moves the piston downward.

14 Explain the different press working cutting operations in short

Answer:

1. blanking



It is the cutting operation of a flat metal sheet and the article punched out is known as blank.

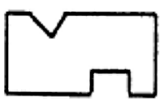
Blank is the required product of the operation and the metal left behind is considered as a waste.

2. Punching

It is the cutting operation with the help of which holes of various shapes are produced in the sheet metal.

It is similar to blanking; only the main difference is that, the hole is the required product and the material punched out to form a hole is considered as a waste.

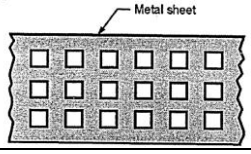
3. Notching

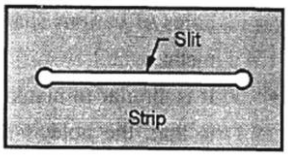
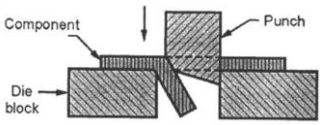
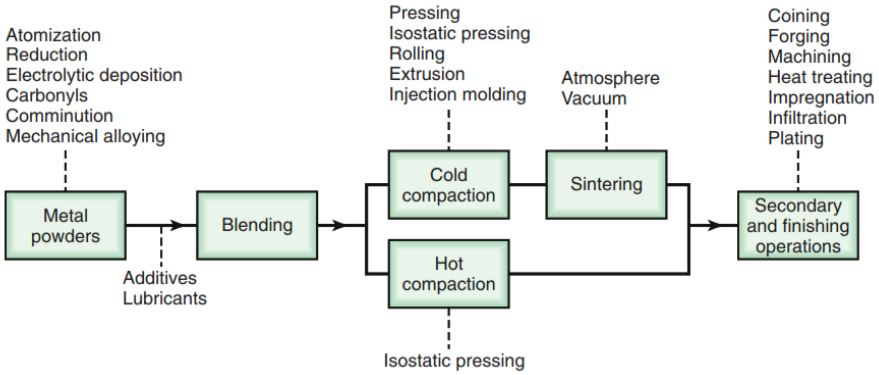
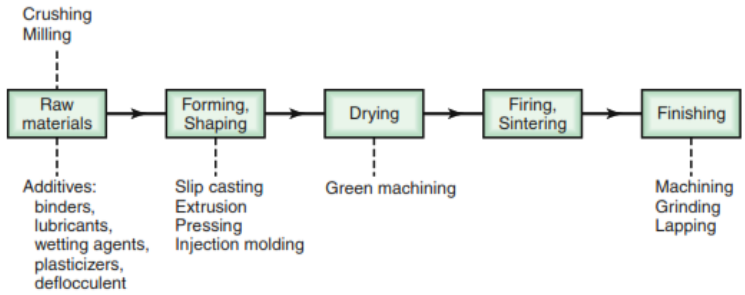


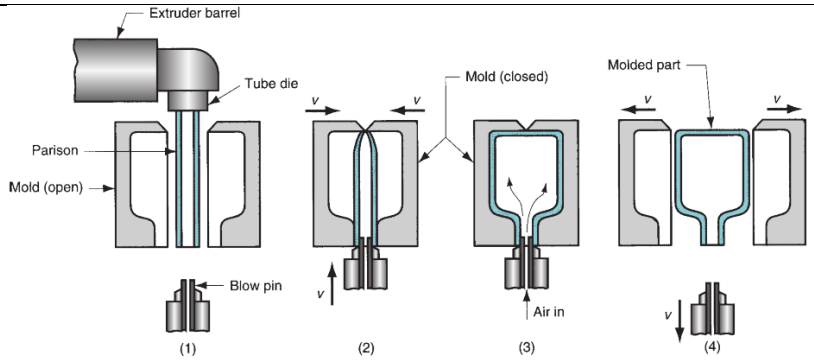
It is similar to blanking operation, but in this full surface of punch does not cut the metal.

In this operation, metal pieces are cut from the edges of a sheet.

4. Perforating



	It is similar to piercing but the difference is that, to produce holes the punch is may or may not be of round shape and also multiple holes are produce in single stroke. 5. Slitting  It is the operation of making an unfinished cut through a limited length only. 6. Lancing:  In this operation, there is a cutting of sheet metal through a small length and bending this small cut portion downwards. [There are total 9 operations you can explain any operation as per marks, i.e. 5 operations for 5 marks]
15	Explain the different press working forming operations in short Answer [Similar to question 14 only take forming operations like Bending, Drawing, Embossing, Forming, Coining]
16	Explain powder metal processing steps in short with neat sketches whenever possible. Answer  [Write very short description]
17	Explain steps in shaping of ceramics Answer  [Write very short description]
18	Explain the process of manufacturing plastic bottles for cold drink Answer: Blow moulding is used for manufacturing plastic bottles for cold drink



(1) extrusion of parison(bar or pipe);

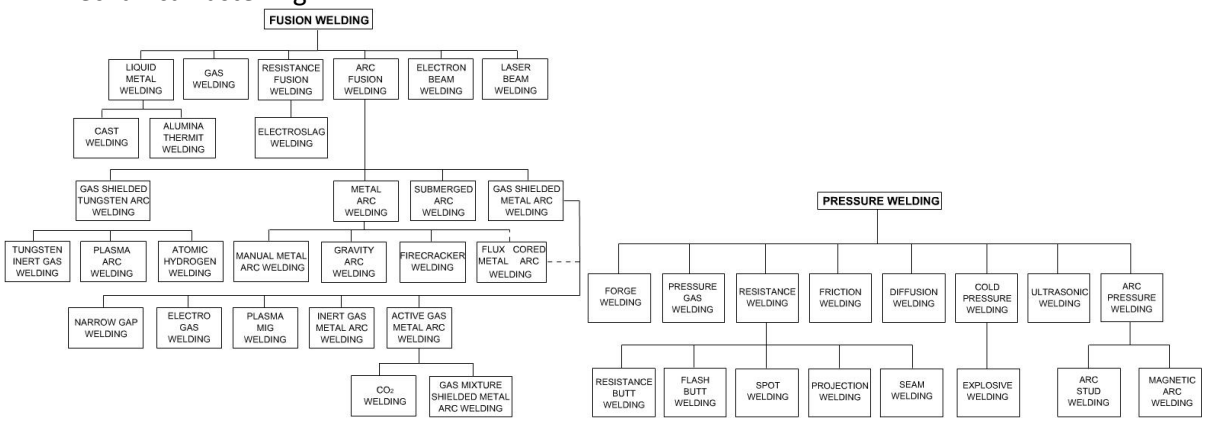
$$\dot{H} = I^2RT$$

(2) parison is pinched at the top and sealed at the bottom around a metal blow pin as the two halves of the mold come together;
(3) the tube is inflated so that it takes the shape of the mold cavity; and
(4) mold is opened to remove the solidified part

19 Categories different joining methods in detail with suitable tree diagram.

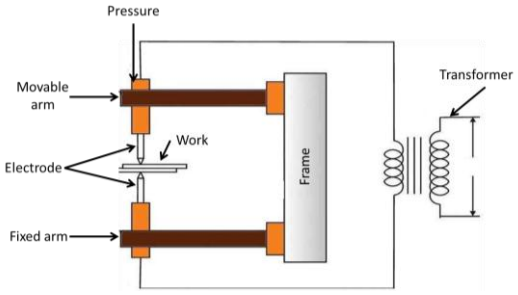
Answer:

- Welding
- Brazing
- Soldering
- Adhesive bonding
- Mechanical fastening



20 Explain Resistance welding method of joining metal sheet.

Answer:



The metal parts to be joined are heated to a plastic state over a limited area by their resistance to the flow of electric current and mechanical pressure is applied to complete the weld

Two copper electrodes are connected in low resistance circuit presses the metals to be weld, the circuit is completed.

The electric resistance at the joint of metal to be welded is very high compared to the remaining circuit, so highest temperature is produced at the joint

$$\dot{H} = I^2RT \qquad \therefore H \propto R$$

Where T – Time for current flow

Mostly AC is used, as any desired combination of voltage and current can be produced by using a transformer.

Metal with medium and high resistance (steel, stainless steel, monel metal, silicon bronze) are easy to weld.