MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

WINTER– 14 EXAMINATION

Subject Code: **17402 (MFP)** **Model Answer**

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q.1 a) Attempt any SIX of the following. **(12- Marks)**

i) Define extrusion. State its type.

Extrusion: **(01 Mark)**

Extrusion is a process in which a heated billet of metal is forced by high pressure through an orifice that is shaped to provide the desired form to the finished part.

Types of extrusion: **(01 Mark)**

1. Direct or forward extrusion
2. Indirect or backward extrusion
3. Tube extrusion
4. Impact extrusion

ii) Define forging, state its type

Forging: **(01 Mark)**

Forging is defined as the process of plastically deforming metals or alloys to a specific shape by a compressive force exerted by some external agency like hammer, press, rolls or by an upsetting machine of some kind. The portion of the work in which forging is done is termed the forge and the work is mainly performed by means of heavy hammers, forging machines, and presses.

Types of Forging: **(01 Mark)**

1. Smith die forging
   a) Hand forging
   b) Power forging
      i) Hammer forging
      ii) Press forging
2. Impression die forging
   a) Drop forging
   b) Press forging
   c) Machine forging

iii) Define casting and Pattern.

Casting: **(01 Mark)**

It is a process of manufacturing of parts by melting the required material and pouring it in mould cavity and allowed to solidify.

Pattern: **(01 Mark)**

Pattern is the principle tool during the casting process. It may be defined as a model of anything, so constructed that it may be used for forming an impression called mould in damp sand or other suitable material

iv) What is core print?

Core Prints: **(02 Marks)**

Castings are often required to have holes, recesses, etc. of various sizes and shapes. These impressions are obtained by using sand cores which are separately made in boxes known as core boxes. For supporting the cores in the mould cavity, an impression in the form of a recess is made in the mould with the help of a projection suitably placed on the pattern. This projection on the pattern is known as the core print. A core print is, therefore an added projection on a pattern, and it forms a seat which is used to support and locate the core in the mould.

v) State the different types of dies. **(02 Mark)**

1) According to the type of press operation

i) Cutting dies: - the common cutting dies are : blanking dies, piercing dies, perforating dies, notching, trimming, shaving and nibbling dies etc.
ii) Forming dies:- Bending dies, drawing dies, squeezing dies etc.

2) According to the method of operation

i) Simple die
ii) Compound die
iii) Combination die
iv) Progressive die
v) Transfer dies.
vi) Multiple dies

vi) What is notching operation in case of press operation?

Notching: **(01 Mark for description, 01 Mark for sketch)**

The notching is the operation of removal of the desired shape from the edge of a plate. The punch and the die set up is similar to the piercing or punching operation.

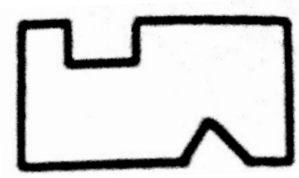


Figure: Notching operation

vii) Classify various types of pattern. (Any Four)

Types of pattern: **(02 Marks)**

1. Single piece pattern
2. Split pattern
3. Match plate pattern
4. Cope and drag pattern
5. Gated pattern
6. Loose piece pattern
7. Sweep pattern
8. Skeleton pattern
9. Segmental pattern
10. Shell pattern
11. Built up pattern
12. Boxed up pattern
13. Lagged up pattern
14. Left and right hand pattern

viii) State different types of moulding sand.

Types of Moulding Sand: **(02 Marks for eight points)**

1. Green sand
2. Dry sand
3. Loam sand
4. Facing sand
5. Backing sand
6. System sand
7. Parting sand
8. Core sand

Q.1 b) Attempt any TWO of the following. (8-Marks)

i) Explain the Shield metal are welding process.

Shield metal Arc Welding Process: (02 Mark for description, 02 Mark for figure)

Gas metal arc welding is a gas shielded metal arc welding process which uses the high heat of an electric arc between a continuously fed, consumable electrode wire and the material to be welded. Metal is transferred through protected arc column to the work.

In this process, the wire is fed continuously from a reel through a gun to constant surface which imparts a current up on the wire. A fixed relationship exists between the rate of wire burn off and the welding current so that the welding machine at a given wire feed rate will produce necessary current to maintain the arc. The current ranges from 100 to 400A depending up on the diameter of the wire, and the speed of melting of the wire may be up to 5m/min. The welding machine is dc constant voltage, with both straight and reverse polarities available.

The welding gun can be either air or water cooled depending up on the current being used. With the higher amperes, a water cooled gun is used. The welding wire is very often bare.

In gas metal arc welding, the welding area is flooded with a gas which will not combine with the metal. The rate of flow of this gas is sufficient to keep the oxygen of the air away from the hot metal surface while welding is being done. Carbon dioxide is used for working with steel, as GMA is a clean, faster method for welding steel. For welding aluminium or copper, argon or argon helium mixture are used. For stainless steel, MIG welding is done with either argon oxygen or helium argon gas mixture. Titanium requires pure argon gas shielding, and the copper –nickel and high –nickel alloys use argon helium mixture.

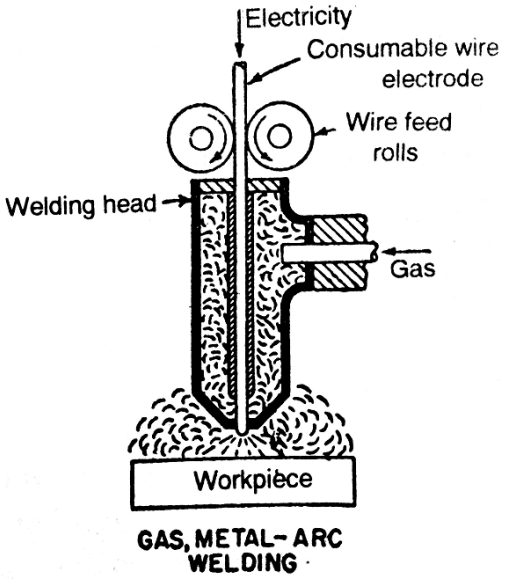


Figure: Shield metal-arc –gas welding process

ii) Describe counter boring and counter sinking operation with neat sketch.

Counter boring operation: (01 Mark for description, 01 Mark for figure)

Counter boring is the operation of enlarging the end of a hole cylindrically. The enlarged hole forms a square shoulder with the original hole. This is necessary in some cases to accommodate the heads of bolts, studs and pins. The tool used for counter boring is called a counter bore. The counter bores are made with straight or tapered shank to fit in the drill spindle. The cutting edges may have straight or spiral teeth. The tool is guided by a pilot which

extends beyond the edge of cutting edge. Counter boring can give an accuracy of about 0.050mm. The cutting speed for counter boring is 25% less than that of drilling operation.

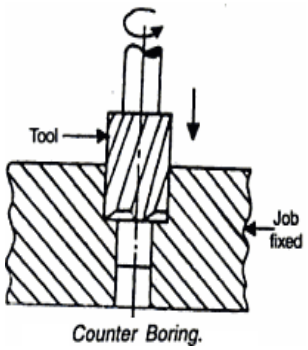


Figure: Counter boring operation

Countersinking: **(01 Mark for description, 01 Mark for figure)**

Countersinking is the operation of making a cone shaped enlargement of the end of a hole to provide a recess for a flat head or countersink rivet fitted into the hole. The tool used for countersinking is called a countersink. Standard countersinks have 60, 82 or 90 included angle and the cutting edges of the tool are formed at the conical surface.

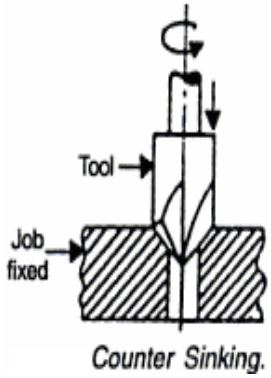


Figure: Countersinking operation

iii) What is thermosetting plastic? **(04 Marks for description)**

Thermosetting Plastic:

Those plastics which are hardened by heat, effecting a non-reversible chemical change are called thermosetting. In other words we can say that they acquire a permanent shape when heated and pressed and cannot be softened by reheating. They are also known as heat-setting or thermosets.

Thermosetting plastics are made from chains which have been linked together, referred to as cross-linked. These have a three dimensional network of molecules and will not soften when heated. They are particularly insoluble, fireproof and usually hard and brittle. These plastics cannot be reused. E.g. epoxy resins, amino resins, phenolics, silicon.

Q.2 Attempt any FOUR of the following. **(16- Marks)**

a) State the different types of press operation, explain blanking operation with neat sketch.

Press operations: **(02 Marks for any eight point)**

1. Piercing
2. Punching
3. Perforating
4. Blanking

5. Cutting off
6. Parting
7. Notching
8. Slitting
9. Lancing
10. Angle bending
11. Curling
12. Cupping
13. Coining
14. Embossing
15. Flatterning or planishing

Blanking: **(01 Mark for description, 01 Mark for figure)**

The blanking is the operation of cutting of flat sheet to the desired shape. The metal punched out is the required product and the plate with the whole left on the die goes as waste. While blanking the size of the blank is governed by the size of the die and the clearance is left on the punch.

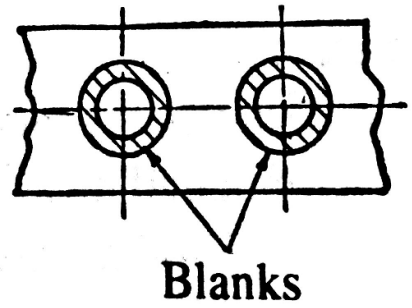


Figure: Blanking operation

b) Explain progressive die with neat sketch. **(02 Marks for description, 02 Marks for figure)**

Progressive die:

In progressive die , two or more operations are performed simultaneously at a single stroke of the press by mounting separate sets of dies and punches at two or more different stations. The metal is progressed from one station to the other till the complete part is obtained. The sheet metal is fed in to the first die where a hole is pierced by the piercing die set in the first cutting stroke of the ram. Plate is then advanced in the next station and the correct spacing is obtained by the stop. In the second cutting stroke of the ram, pilot enters in to the pierced hole and correctly locates it. While the blanking punch descends and shears the plate to form a washer. By the time the blanking operation is performed, the hole for the next washer is also pierced at the first station. Thus although two strokes are required to complete a washer, each piece of washer is discharged on every strokes of the ram due to the continuity on operation.

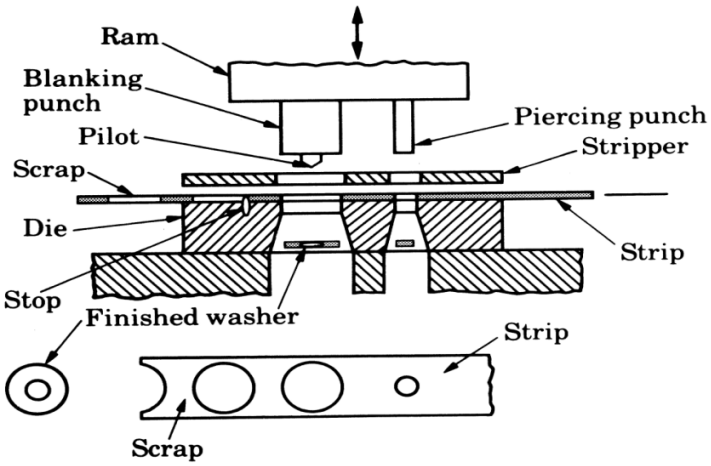


Figure: Progressive die

c) Explain any four properties of moulding sand. (Any 4 point, 01 Mark each)

1. **Porosity:** Molten metal always contain a certain amount of dissolved gases, which are evolved when the metal freezes , Also , the molten metal , coming in contact with the moist sand , generates steam or water vapour. If these gases and water vapour evolved by moulding sand do not find opportunity to escape completely through the mould they will form gas holes and pores in the casting.
   The sand must, therefore, be sufficiently porous to allow the gases or moisture present.
2. **Flowability:** Flowability of moulding sand refers to its ability to behave like a fluid so that, when rammed, it will flow to all portions of a mould and pack all around the pattern and take up the required shape. The sand should respond to different moulding process. High flowability is required of a moulding sand to get compacted to uniform density and to obtain good impression of the pattern in the mould.
3. **Collapsibility:** After the molten metal in the mould gets solidified, the sand mould must be collapsible so that free contraction of the metal occurs, and this would naturally avoid the tearing or cracking of the contracting metal.
4. **Adhesiveness:** The sand particles must be capable of adhering to another body, i.e. they should cling to the sides of the moulding boxes. It is due to this property that the sand mass can be successfully held in a moulding box and it does not fall out of the box when it is removed.
5. **Cohesiveness or strength:** This is the ability of sand particles to stick together. Insufficient strength may lead to a collapse in the mould or its partial destruction during conveying, turning over or closing. The mould may also be damaged during pouring by washing of the walls and core by the molten metal. The strength of moulding sand must, therefore, be sufficient to permit the mould to be formed to the desired shape and to retain this shape even after the hot metal is poured in the mould.
6. **Refractoriness:** The sand must be capable of withstanding the high temperature of the molten metal without fusing. Moulding sands with a poor refractoriness may burn on to the casting. Refractoriness is measured by the sinter point of the sand rather than its melting point.

d) What is core? State different types of core.

Core: - **(02 Marks for description, 02 marks for types)**

Cores are separate shapes of sand that are generally required to form the hollow interior of the casting or a hole through the casting. Sometimes cores are also used to shape those parts of the casting that are not otherwise practical or physically obtainable by the mould produced directly from the pattern. The core is left in the mould in casting and is removed after the casting.

Types of core:

1. Horizontal cores
2. Vertical cores
3. Balanced cores
4. Hanging and cover core
5. Wing core
6. Ram-up core
7. Kiss core

e) Explain piercing and lancing operation with sketch.

Piercing operation: **(01 Mark description, 01 Mark for figure)**

Piercing is the operation of production of hole in a sheet metal by the punch and the die. The material punched out to form the hole constitutes the waste. The punch point diameter in the case of piercing in less than or equal to the work material thickness. The punch governs the size of the hole and the clearance provided on the die. The spacing of hole on the plate is actuated by the stop. The stripper plate attached to the die body prevents the sheet metal from being lifted along with the punch after shearing operation.

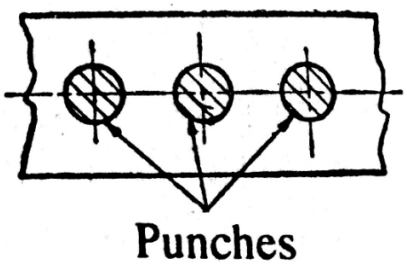


Figure: Piercing operation

Lancing operation: **(01 Mark for description, 01 Mark for figure)**

Lancing is the operation of cutting a sheet metal through part of its length and then bending the cut portion. The operation is illustrated in the figure.

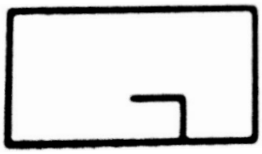


Figure: Lancing operation

f) Explain centrifugal casting with neat sketch.

Centrifugal casting: **(02 Marks description, 02 Marks for figure)**

In the centrifugal casting, molten metal is poured in to moulds while they are rotating. The metal falling in to the centre of the mould at the axis of rotation is thrown out by the centrifugal force under sufficient pressure towards the periphery, and the contaminants or impurities present being lighter in weight are also pushed towards in the centre. This is often machined out any way. Solidification progresses from the outer surface inwards, thus developing an area of weakness in the centre of the wall. This is caused by the meeting of the grain boundaries at final solidification and the entrapment of impurities in the central section. The grain is refined and casting are completely free from any porosity defect by the forced movement of the molten metal , thus making dense sound casting which are less subject to directional variations than static castings. The use of gates, feeders, and cores is eliminated, making the method less expensive and complicated.

Hollow cylindrical bodies such as cast iron water supply and sewerage pipes, steel gun barrels , and other symmetrical objects such as gears , disk wheels, pulleys , are conveniently cast without core by the centrifugal casting.

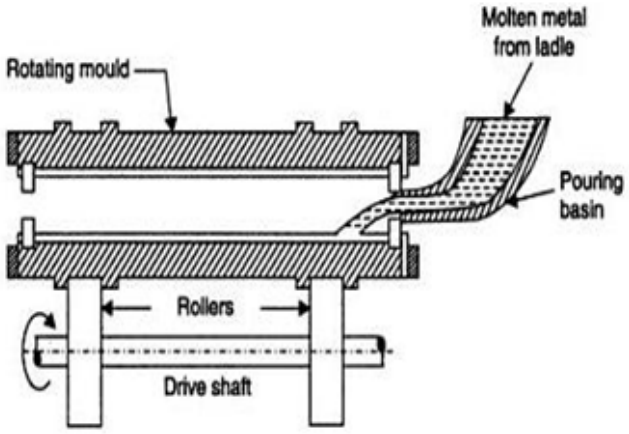


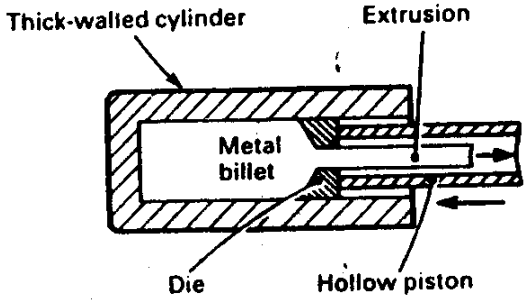
Figure: Centrifugal casting

Q.3 Attempt any FOUR of the following. **(16- Marks)**

a) Describe backward extrusion process with neat sketch.

(02 marks for sketch, 02 marks for explanation)

Backward Extrusion Process:- For this type of extrusion 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. As the billet does not move inside the chamber, there is no friction between them.



Indirect or backward extrusion

b) Explain shell moulding process. (02 marks for sketch, 02 marks for explanation)

SHELL MOULDING-

IT IS A RECENT INVENTION IN CASTING TECHNIQUES FOR MASS PRODUCTION AND SMOOTH FINISHING. It is also known as C- processes.

It consist of making a mould that has two or more thin shells or shell like parts which are moderately hard and smooth .The shells are0 .3mm to 0 .6 mm thick and can be easily handled and stored .

Shell moulds are made so that machined parts fit together easily held with clamps or adhesive and metal is poured in either in horizontal or vertical position. They are supported by bulky permeable materials such as sand, steel shot.

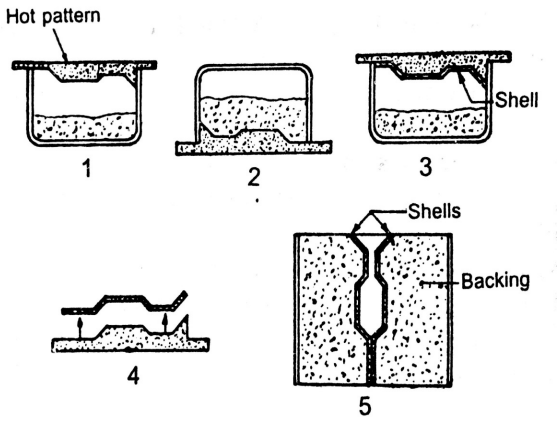
Processes-thermosetting plastic, dry powder and sand is mixed in a mauler.

Metal pattern is sprayed with separating silicon grease heated to a 205 to 230 degree centigrade and covered quickly with resin bonded sand. After some time hard layer of sand is formed over the pattern.

Pattern and shell are then heat treated in an oven at 315 degree centigrade for one minute the shell is ready for stripping from the pattern.

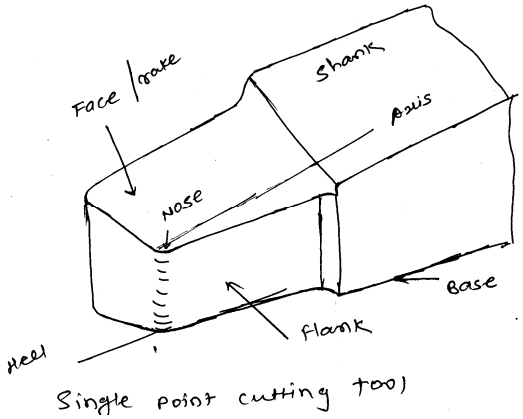
Steps in shell moulding –

(A) Hot pattern and the box containing a mixer of sand and thermo setting resin.
(B) Pattern and box inverted and kept in this position for some time.
(C) Box and pattern again inverted and brought to original position .a shell of resin bonded sand sticks to pattern and the rest falls.
(D) Shell separated from the pattern with the help of ejector pins.



c) Draw the nomenclature of single point cutting tool showing various elements on it.

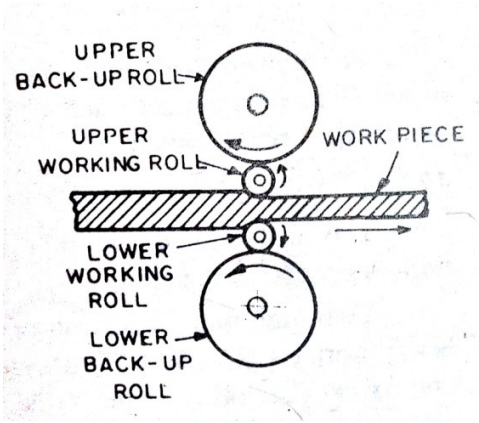
(02 marks for sketch, 02 marks for naming)



d) Explain four high rolling mill with neat sketch.

Four High Rolling Mill:- **(02 marks for sketch, 02 marks for explanation)**

it consists of four horizontal rolls, two of similar diameters and two of larger diameter, arranged directly one over the other as shown in fig. the larger diameter rolls are called back up rolls and their main function is to prevent the deflection of the smaller rolls, which otherwise would result in thickening of rolled plates or sheets at the centre. The smaller rolls are known as working rolls and they are the rolls which concentrate the total rolling pressure over the metal. These mills are generally used for subsequent rolling of slabs.



e) Explain TIG welding with neat sketch. (02 marks for sketch, 02 marks for explanation)

TIG –IT STANDS FOR TUNGSTEN INERT GAS WELDING.

It is basically an arc welding processes in which the arc is struck between non consumable tungsten electrode and metal base.

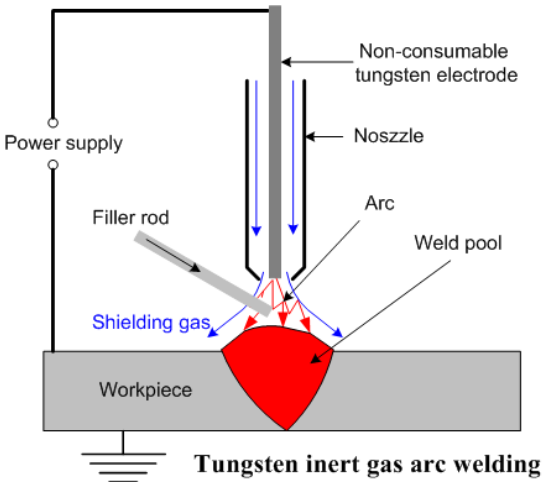
.the electrode is held in a special type electrode holder which is so designed that apart from holding it also carries a passage around the electrode for flow of inert gas to provide a protective shield around the arc.

It prevents contamination of heated areas and base metal from atm.

.the processes is capable of producing continuous, intermittent or spot welds.

If filler metal is needed, additional filler metal can be provided from outside by filler rod under arc in the same way as that of gas welding.

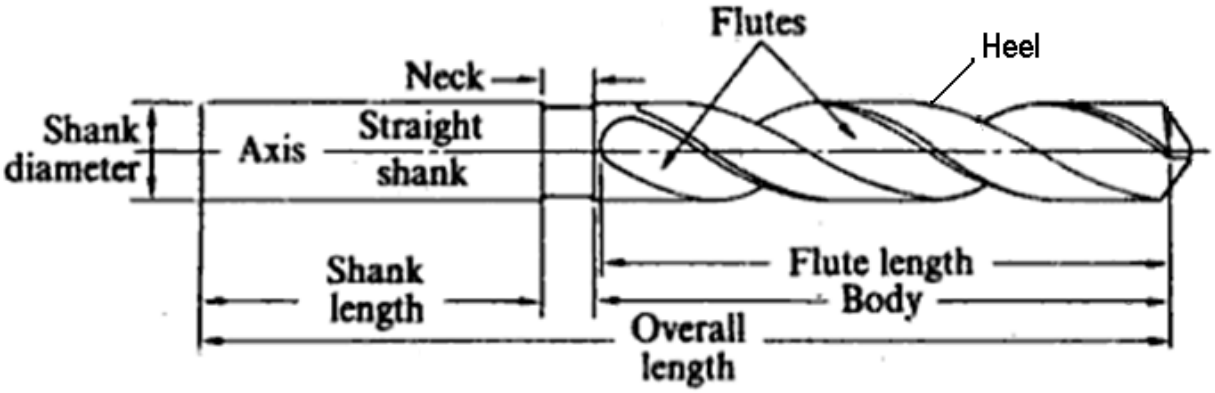
It is suitable for welding of most metal and alloys.



Tungsten inert gas arc welding

f) Draw a neat sketch of twist drill showing its nomenclature on it.

(02 marks for sketch, 02 marks for naming)



Q 4. Attempt any FOUR of the following **(16 Marks)**

a) Explain close die forging with neat sketch. **(02 marks for sketch, 02 marks for explanation)**

Impression die forging is also called as close die forging. Impression die s generally contains preliminary shaping steps to permit the change from the original forging stock to the finished forging without mechanical defects.

Simple symmetrical parts may be forged directly in the finished impression (finishing die cavity) without preliminary shaping. The more difficult or complex shapes may require several difficult steps to produce finished forging.

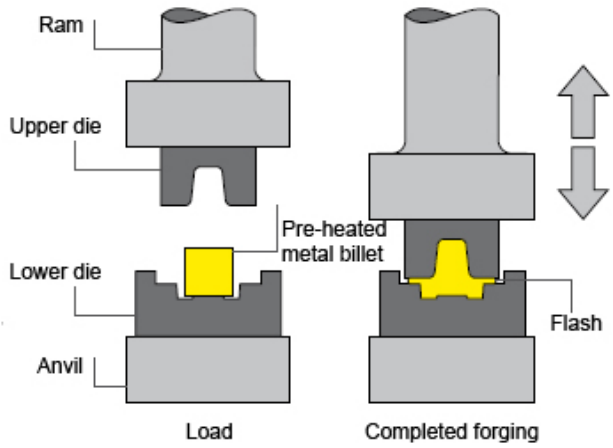
The most used preliminary forging step is the edger, which serves to proportion the cross sectional area along the length of the flowing metal from a section being reduced to a section being enlarged.

The fullering step or fuller reduces the cross sectional area between the ends of the forging stock without appreciable change to the end section.

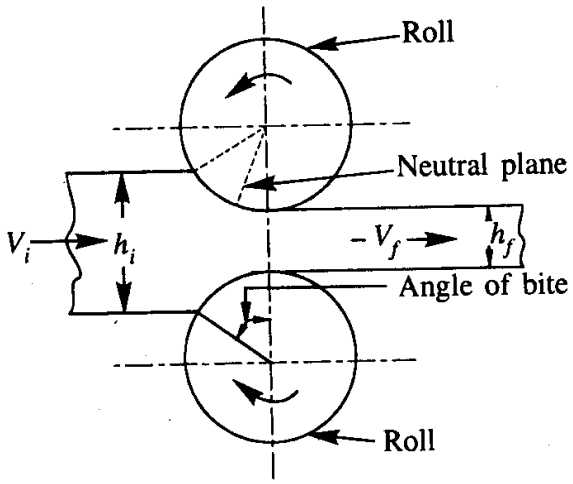
The bending step or bender forms the length of the forging stock to a shape for finishing impression.

Excess material is allowed to run out between the flat die surfaces and this flash is sometimes removed or trimmed prior to forging in the finishing die.

Die must however be heated before the first forging is made. after forging operation the part must be trimmed to remove the flash.



b) Explain principle of rolling with neat sketch. **(02 marks for sketch, 02 marks for explanation)**



Rolling is a process where metal is compressed between two rotating rolls for reducing its cross section area. The metal is taken into rolls by a friction and subsequently compressed to obtain the final shape .The thickness of the metal that can be drawn depends on the roughness of the roll surface. The reduction that could achieve with the set of rolls is designated as the angle of bite is shown in figure. This depends on the type of rolling and the condition of the roll. The volume of the metal that enters the rolling stand should be same as that leaving it except in initial passes when there might be some loss due to filling of voids and cavities in the ingots. Since the area of the cross section gets decreased the metal leaving the rolls would be at the higher velocity than when it entered. The pressure on the rolls gradually builds up from entry to the neutral point where it is the highest and then decreases till it reaches the exit.

c) Explain soldering process and state its two applications.

(03 marks for explanation, 01 mark application)

Soldering is a method of joining similar or dissimilar metals by means of a filler metal whose liquidus temperature is below 450 ^{o}c. The metal or alloy used for this purpose is known as solder. A solder is an alloy of lead and tin to which some other metals are sometimes added to lower its melting point. Before starting the operation the metal pieces should be properly cleaned. Solvent cleaning, acid pickling and even mechanical cleaning are applied before soldering. To remove the oxides from the joint surface and to prevent the filler metal from oxidizing, fluxes are generally used in soldering. The most commonly used soldering method is with soldering iron, the soldering iron is a copper rod with thin tip which can be used for flattering the soldering material. The soldering iron can be heated by keeping in a furnace or by means of an internal electrical resistance.

Applications: joining of thin sheets, tanks, in electronic appliances

d) How lathe machines are classified? **(Any four 01 mark for each point)**

1) The height of the centers measured from the lathe bed.
2) The swing diameter over the bed:- this is the largest diameter of work that will revolve without touching the bed and is twice of the centre measured from the bed of the lathe.
3) The length between centers:- This is the maximum length of work than can be mounted between the lathe centers.
4) The swing diameter over carriage:- this is the largest diameter of work that will revolve over the lathe saddle.
5) The maximum bar diameter:- This is the maximum diameter of bar stock that will pass through headstock spindle.
6) The length of bed:- This indicate the approximate floor space occupied by the lathe.

In addition to above parameters, the number and range of spindle speeds, number of feeds, floor space required are, maximum size of tool holders, lead screw diameter, motor size etc are some of the parameters.

e) Define cutting parameters in lathe machine and state its significance.

(02 marks to define, 02 marks for significance)

Cutting Speed: - It is the speed at which the metal is removed by the tool from the work piece. In lathe it is the peripheral speed of the work past the cutting tool expressed in meter per minute.
Cutting speed is directly proportional to the surface or peripheral speed of the work. It considerably effects on the tool life and efficiency of machining. It affects on machining time there by productivity and the production cost
Feed: - It is the distance the tool advances for each revolution of the work. Feed is expressed in mm/ rev.
It is influenced by the material being machined, geometry of the cutting tool, required degree of surface finish, rigidity of the machine tool being used, and type of coolant being used.
Depth of cut: - It is the perpendicular distance measured from the machined surface to the uncut surface of the work piece.
It determines the thickness of metal layer removed by the cutting tool in one pass.

f) State the manufacturing methods for (01 mark each)

i) Plastic Jug:- Injection moulding
ii) PVC sheets:- Extrusion moulding, calendaring
iii) Plastic Bottle:- Blow moulding
iV) Refrigerator Door liners:- Reaction injection moulding

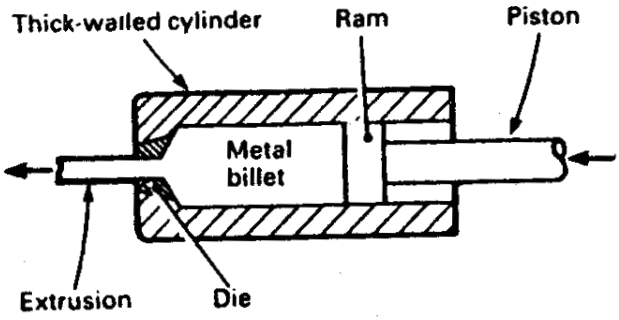
Q 5. Attempt any FOUR of the following **(16 Marks)**

a) Compare Hot rolling and Cold rolling process: **(01 mark for each point)**

Hot Rolling	**Cold Rolling**
It is carried out above the recrystallisation temperature but below the melting or burning point.	It is carried out below the recrystallisation temperature.
The purpose of hot rolling is to convert larger sections such as ingots into smaller sections which can be used either directly in as rolled state or as stock for working through other processes.	Cold working generally employed for providing a smooth and bright surface finish to the previously hot rolled steel. it is also used to finish the hot rolled components to close tolerances
Surface finish of hot rolled parts is relatively poorer due to oxidation and scaling.	Cold rolled parts have better surface finish.
Hot rolling refines metal grains, resulting in improved mechanical properties	Cold rolling processes lead to distortion of grains

b) What is Direct Extrusion process? Describe with neat sketch:-

(02 marks for sketch, 02 marks for explanation)



Direct extrusion

Direct extrusion process is shown in fig. The raw material used is a billet. It consists of a press operated ram and a cylinder or container into which the heated billet is placed. A dummy block is used between the ram and the hot metal. With application of ram pressure, the metal first plastically fills the cylindrical shape. And it is then forced out through the die opening until a small amount remains in the container.

c) Explain bending operation in case of press operation with neat sketch.

(02 marks for sketch, 02 marks for explanation)

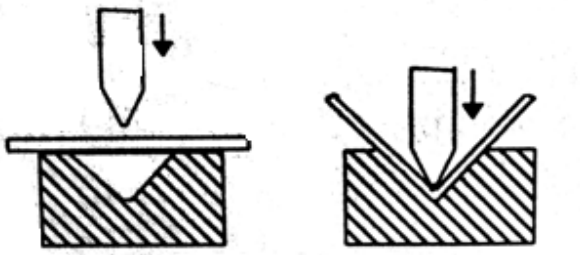


Figure Bending operation

In bending the metal is stressed in both tension and compression at the two sides of the neutral axis beyond the elastic limit but below the ultimate strength of the material. As the metal is loaded beyond the elastic limit, some amount of plastic deformation takes place and when load is removed the metal retains the bent shape given by the die. Some amount of elastic recovery of the metal when the load is removed, resulting in a slight decrease in the bent angle. The effect is known as spring back. To correct the effect of spring back, the metal is bent through a greater angle so that when the load is removed the component will spring back to the desired angle.

d) State the types of dies. Explain compound die with neat sketch.

(01 mark classification, 02 marks for sketch, 01 marks for explanation)

Types of dies:

i) According to the type of press operation

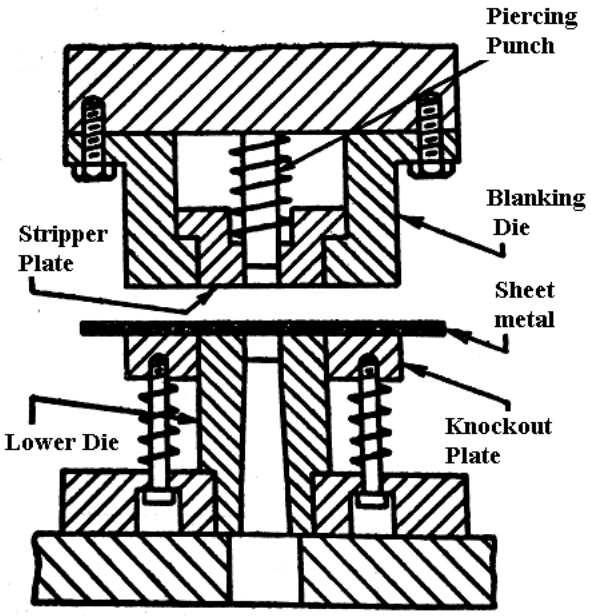
iii) Cutting dies: - the common cutting dies are : blanking dies, piercing dies, perforating dies, notching, trimming, shaving and nibbling dies etc.

iv) Forming dies:- Bending dies, drawing dies, squeezing dies etc.

ii) According to the method of operation

vii) Simple die
viii) Compound die
ix) Combination die
x) Progressive die
xi) Transfer dies.
xii) Multiple dies

Compound Die: - In these dies, two or more operations may be performed at one station. Such cutting dies are considered as cutting tools since, only cutting operations are carried out. Fig. shows a simple compound die .the blanking die and piercing punch are bolted to the ram. The spring loaded stripper plate is housed within the blanking die. The lower die body has cutting edge both on its outward and inward surfaces. The outside cutting edge serves as a punch for the blanking operation, and the inside cutting edge operates as a die for the piercing punch.



e) Classify the moulding methods. Explain pit moulding process in brief.

(01 mark classification, 03 marks for explanation)

Classification of moulding processes:

1) **According to different forms**
   i) Hand moulding ii) Machine moulding
2) **According to the material of which the mould is made.**
   i) Green sand mould ii) Dry sand mould iii) Skin dried mould iv) loam mould
3) **According to the methods used in making the mould**
   i) Bench moulding
   ii) Floor moulding
   iii) Pit moulding
   iv) Sweep moulding
   v) Plate moulding

Pit moulding: - moulds of large jobs are generally prepared in a pit dug in the foundry floor which facilitates in lifting the pattern and casting the mould easily. Since a pit which functions as a drag cannot rolled over, the sand under the pattern may be rammed by bedded-in. the pattern may be suspended in correct location as the sand is rammed under it.

A bed of coke is laid on the bottom of the pit, covered with straw and then a layer of sand, which is rammed and leveled. The coke bed is connected with atmosphere by vertical vent pipes in the corner of the pit to provide an outlet for the gases generated. If the floor is lightly damp, the inside surface of the pit are lined with tar-paper, bricks, or wooden planks.

f) State the causes and remedies of following casting defects

(02 mark causes, 02 marks for remedies)

i**) Blow holes:**

Causes:-

i) Excessive moisture in the sand.
ii) low permeability of sand
iii) Sand grains are too fine
iv) Sand is rammed too hard
v) Venting is insufficient

Remedies:-

i) Moisture content of the sand must be well.
ii) Sand of proper grain size should be used.
iii) Ramming should not be too hard.
iv) Vent holes should be provided.

ii) Misrun:-

Causes:-

i) Too thin sections and wall thickness.
ii) Improper gating systems.
iii) Damaged pattern.
iv) Slow and intermediate pouring.
v) Pour fluidity of metal.
vi) Improper ally composition.

Remedies:

i) Use hotter metals
ii) Frequent inspection and replacement of pattern.
iii) Proper design of gating and risering
iv) Use of chills and padding.

Q. 6 Attempt any TWO of the following (16 Marks)

(a) principle of resistance welding- (02 marks)

when strong electric current (A.C) of high amperage and low voltage passed through pieces to be joined are held together offers resistance, resulting in raising the temperature Of the junction to fusion and apply mechanical pressure.

Types of resistance welding are (02 marks)

i)Spot welding
ii) Butt welding
iii) Flash welding
iv) Seam welding
v)Projection welding
vi)percussion welding

Seam welding- **(02 marks for sketch, 02 marks for explanation)**

in Principle it is very similar to spot welding except that in this processes spot welding tips are replaced continuously rotating wheel type electrodes with the result ,the weld produced is continuous instead of being intermittent
The metal between the electrodes gets heated to welding heat and welded continuously under constant pressure of rotating electrodes as it passes.

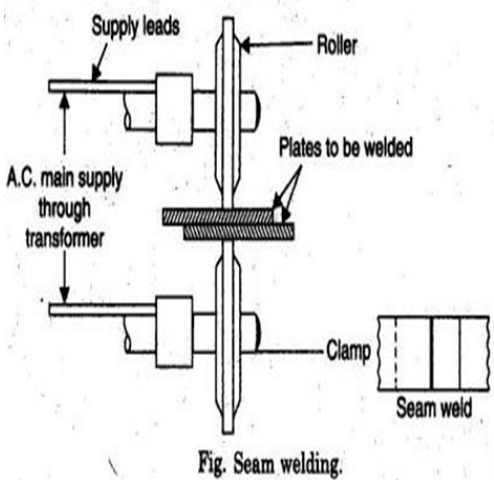
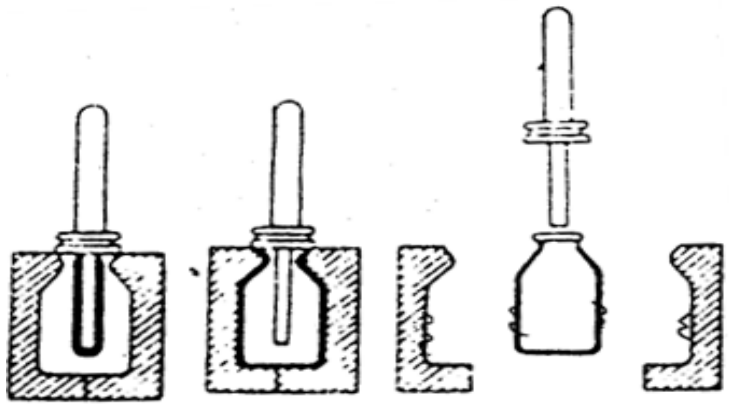


Fig. Seam welding.

b) Blow Moulding: - (03 marks for sketch, 03 marks for description, 02 marks for applications)

The blow moulding is used to make hollow article like bottles, drums, barrels and other liquid container. In this process, heated plastic tube (Parison) sticks to mould around the tube. The shape of parison stick is hollow. Air under pressure is blown through parison stick to expand the parison to required shape of the mould. After cooling, the mould is opened and the part is ejected.

Applications: - Hollow object like bottles, drums, vessels.



Blow Mould

Blow moulding

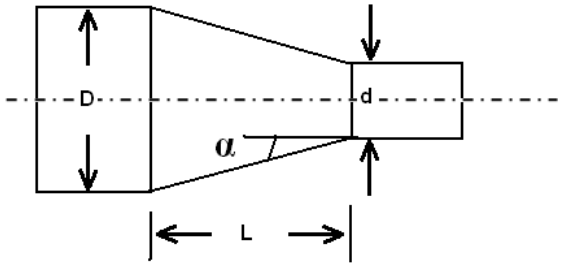
(c)

A taper may defined as a uniform increase or decrease in diameter of piece of work measured along its length. **(02 marks)**

Methods of taper turning **(04 marks)**

- By a broad nose form tool
- By setting over the tailstock centre
- By swiveling the compound rest
- By taper turning attachment
- By combining longitudinal and cross feed in lathe.

Taper angle can be calculated as **(02marks)**



From figure shown above taper angle is given by

$$\alpha = tan^{-1}\left(\frac{D-d}{2L}\right)$$

where,

D = Bigger diameter of tapered work piece in mm.

d = Smaller diameter

L = Length of the tapered portion in mm,

α = angle of taper = half taper angle