

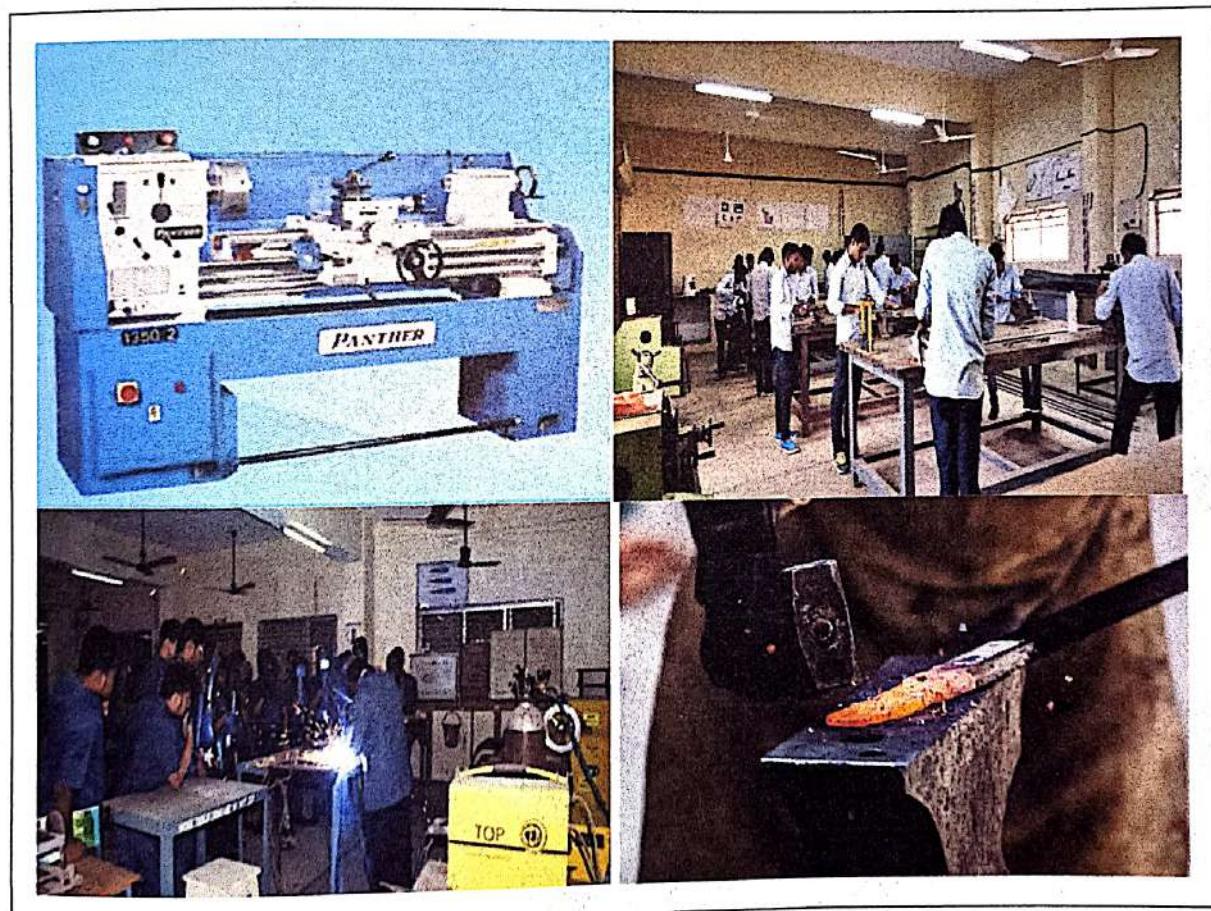


**ASANSOL ENGINEERING COLLEGE**  
**DEPARTMENT OF MECHANICAL ENGINEERING**

**LABORATORY EXPERIMENTS REPORT**

**PRACTICE OF MANUFACTURING PROCESSES LAB**

**PCME391**



Name of the Student:- AKASH BANERJEE

University Roll No: 10800722013

Year 2<sup>nd</sup> Semester:- 3<sup>rd</sup> Academic year 2022 - 2023

**ASANSOL ENGINEERING COLLEGE**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**PRACTICE OF MANUFACTURING PROCESS (PC ME 391)2022**  
**JOB-(04)**

NAME- AKASH BANERJEE UNIV. ROLL NO- L23

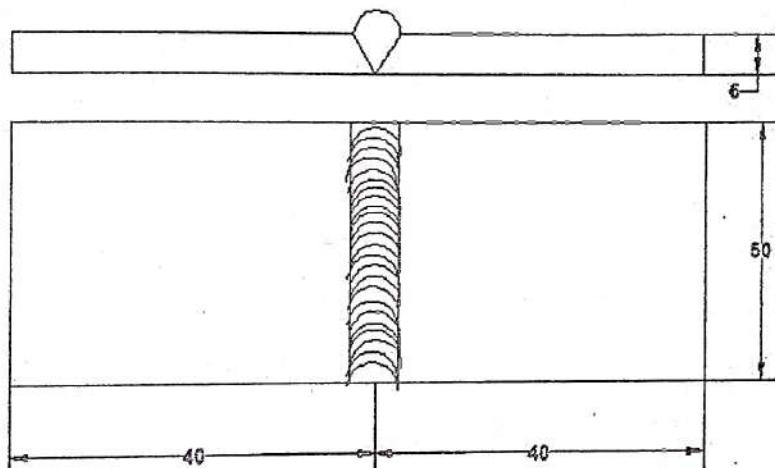
DEPARTMENT- Mechanical Engineering GROUP -

OBJECTIVE: To fabricate a welded butt joint by MMA Welding method using MS Plate.

MATERIAL REQUIRED:  $85 \times 50 \times 6 \text{ mm}^3$  MS flat Plate.

APPARATUS: Bench vice, Steel Ruler, Try-square, Hacksaw, Files, Scriber & Welding Setup.

FIGURE:



(All dimensions are in 'mm')

Report the following

1. State the various equipments/accessories required for MMA Welding and briefly describe their functional requirements with circuit diagram.
2. What is Edge Preparation and why it is necessary? Show various types of prepared edge with neat sketch.
3. Explain the different types of welding defects?

Date 29/08/22

Teacher's Signature ✓ Q. D.



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE	Univ.Roll No: L23	Section:	Date: 29/08/22
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Name of the Lab: Practice of Manufacturing Processes Lab.

Name of the Experiment: To fabricate a welded butt joint by MMA welding method using MS Plate.

Tools/Instrument list:

Bench Vice

Steel Ruler

Try-Square

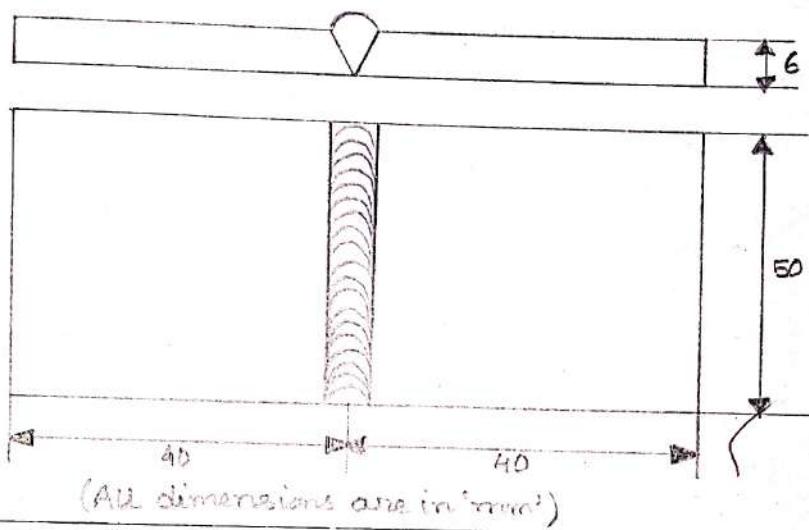
Hacksaw

Files

Scriber

Welding Setup.

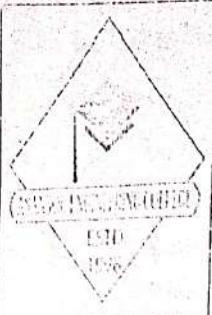
Sketch of the Job/Sample:



Operations Performed:

Sl. No	Descriptions	Remark if any
1.	Collecting tools.	
2.	Measuring & Marking of the metal.	
3.	Holding the metal in bench vice.	
4.	Cutting the metal to desired shape & length.	
5.	Filing the sides of the metal pieces to remove rust.	
6.	Welding the V-groove by manual metal arc welding setup and removed the slag by chipping hammer & finally the welding job is completed.	

Signature of Teacher/TA/Workshop instructor



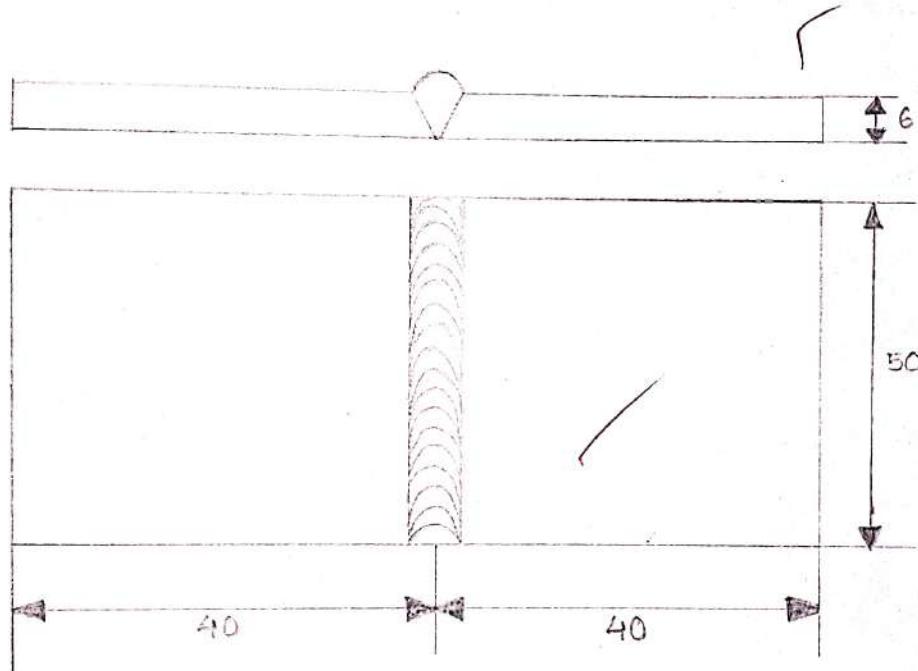
ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB  
PGME391

Name of the Student: AKASH BANERJEE Univ. Roll No L23

Year 2nd Semester 3rd Academic Year 2022-2023

TITLE:

OBJECTIVE: To fabricate a welded butt joint by MMA Welding method using MS Plate.



(All dimensions are in 'mm')

SIGNATURE OF LAB-IN-CHARGE:

PAGE NO- 01

Report the following:-

(1) State the various equipments /accessories required for MMA welding and briefly describe their functional requirements with circuit diagram.

→ (i) Power Source:- With MMA, the power source must provide current for melting the end of the electrode to produce weld metal and it must have a sufficiently high voltage to maintain the arc. The electrodes are operated with AC and DC.

(ii) Electrode:- In MMA welding process an arc is struck between the electrode and workpiece. It may be consumable or non-consumable.

(iii) Electrode holder:- It is a mechanical device on end of the welding cable which clamps the electrode in the desired position. It should be well insulated.

(iv) Cable:- The welding cables are flexible, rubber covered covered copper cable of a large enough size to carry to the required current to the work and the electrode holder without overheating.

(v) Chipping Hammer:- It is used to remove the slag. One of its edges is sharp and the other is like that of chisel.

(vi) Earthing clamp:- A ground clamp is attached to the end of one of the cables, so that it may be connected to the work. It is used to connect the return lead firmly to the joint.

(vii) Wire Brush:- It is used for removing loose slag, spatter and oxides. It is made of steel wires fitted on a wooden piece in 3-5 rows.

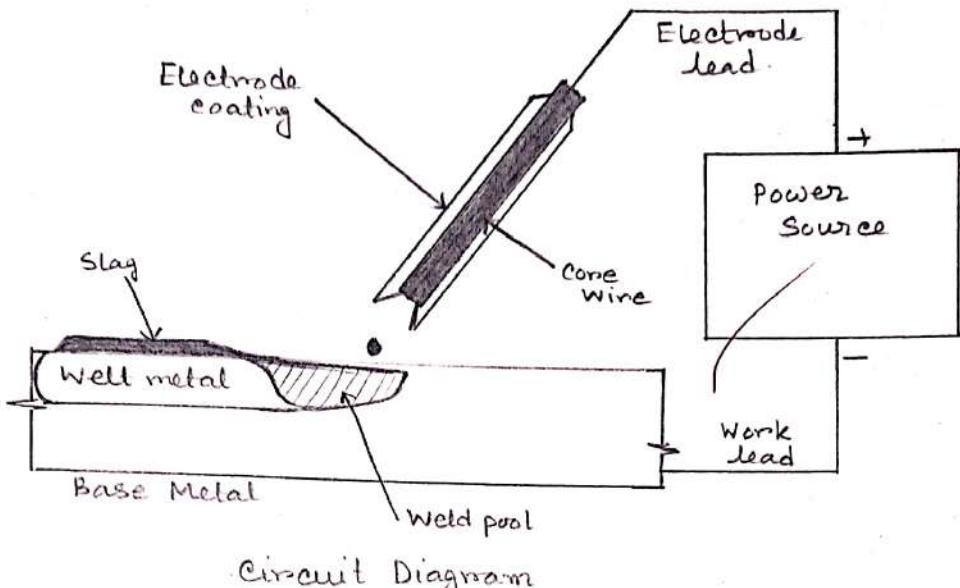
(viii) Hand Eye Shield:- It is a device designed to give protection from the arc radiation during arc welding.

(ix) Safety Goggles:- It is used for protection of eyes from flying slag during chipping and from the welding radiation.

(x) Hand Gloves:- Hand gloves are always used while working in welding shop to protect hands from flying spark, electrical shock, heat etc.

(xi) Apron:- It is made of leather, asbestos or other suitable materials for protection against radiated heat and spark.

(xii) Tong:- It is used for holding and moving hot material parts.  
It is also used to hold metal for hammering.



- (2) What is edge preparation and why it is necessary? Show various types of prepared edge with neat sketch.

→ The area of the metal's surface that is melted during the welding process is called the faying surface. The faying surface can be shaped before welding to increase the weld's strength, which is called edge preparation.

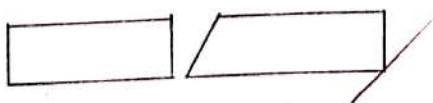
An edge that has been properly prepared has greater stability, which reduces the likelihood of it chipping, while also decreasing surface roughness which can cause increased friction between the tool and the workpiece. Decreased friction means less wear on tool, as well as cleaner finished product.

#### Various types of Edge Preparation:-

##### (1) Single square Groove:-



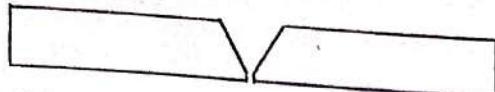
##### (2) Single Bevel Groove:-



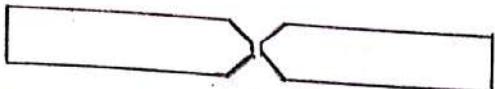
##### (3) Double Bevel Groove:-



(4) Single-V Groove:-



(5) Double-V Groove:-



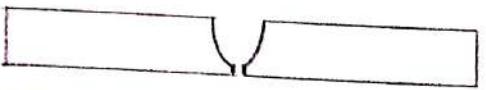
(6) Single-J Groove:-



(7) Double-J Groove:-



(8) Single-U Groove:-



(9) Double-U Groove:-



Explain the different types of Welding defects?

Welding defects are the irregularities formed in the given weld metal due to wrong welding process

- (1) Undercut :- When the base of metal melts away from the weld zone, then a groove is formed in the shape of a notch, then this type of defect is known as undercut. It reduces the fatigue strength of the joint.
- (2) Spatter :- When some metal drops are expelled from the weld and remain stuck to the surface, then this defect is known as spatter.
- (3) Porosity :- Porosity is the condition in which the gas or small bubbles gets trapped in the welded joint. It occurs when the electrode is ~~not~~ coated properly.
- (4) Slag inclusion :- If there is any slag in the weld, then it affects the toughness and metal weldability of the given material. This decreases the structural performance of the weld material. Slag is formed on the surface of the weld or between the welding turns.
- (5) Weld Crack :- Weld cracks can be present at the surface, inside the weld material or at the heat affected zones. The presence of residual stress can cause a crack on the weld metal.

- (6) Incomplete Fusion:- Incomplete fusion occurs when the welder does not accurately weld the material and the metal pre solidifies, which leads to a gap, which is not filled with the molten metal.
- (7) Blow holes:- This defect is produced when the gas that could not escape before the solidification of molten metal collects to form spherical cavities inside the bead.
- (8) Overlap:- This is the phenomenon of liquid metal spills on the surface of the welding bond. Incorrect angle of welding rod is a cause of overlap.

**ASANSOL ENGINEERING COLLEGE**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**PRACTICE OF MANUFACTURING PROCESS (PC ME 391)2022**  
**JOB-(05)**

NAME- AKASH BANERJEE UNIV. ROLL NO- L23

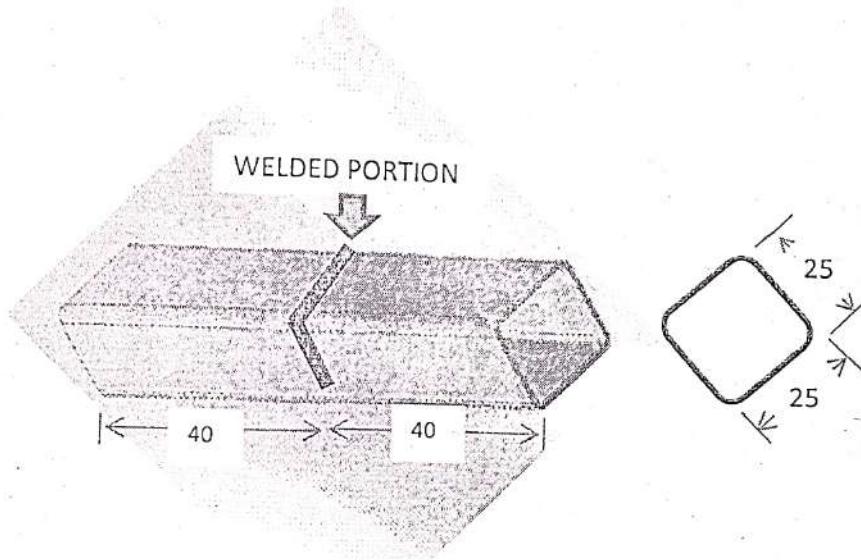
DEPARTMENT- Mechanical Engineering GROUP- \_\_\_\_\_

OBJECTIVE: To fabricate a welded joint by gas welding method using MS Square Pipe.

MATERIAL REQUIRED:  $85 \times 25 \times 25 \text{ mm}^2$  MS Square pipe

APPARATUS: Steel Ruler, Try-square, Hacksaw, File, scribe & Gas Welding Set up.

FIGURE:



(All dimensions are in 'mm')

Report the following

1. State the various equipment/accessories required for Gas Welding.
2. What is gas welding?
3. What are the different types of gas flames produced during gas welding explain with figure? What is the difference between Gas Welding & Arc Welding?
4. Explain the different types of welding defects?

Date 12/09/22

Teacher's Signature V.B.C.S



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB

Name of the Laboratory Practice of Manufacturing Processes Date 12/03/22

Name of the Experiment To fabricate a welded joint by gas welding method using MS square pipe.

Subject Code PC ME 391 No. of Experiment 02

Name of the Student AKASH BANERJEE

Semester 3rd Branch Mechanical

University Roll No L23 Batch

Group Members:-

Sl.No	Name of the Student	University Roll No
1.	Akash Banerjee	L23
2.	Gopinath Maji	L24
3.	Prem Pratap Nandan	L26

Signature of Teacher's/Tech. Assistant.

Date



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE

Univ.Roll No: L23

Section:

Date: 12/09/22

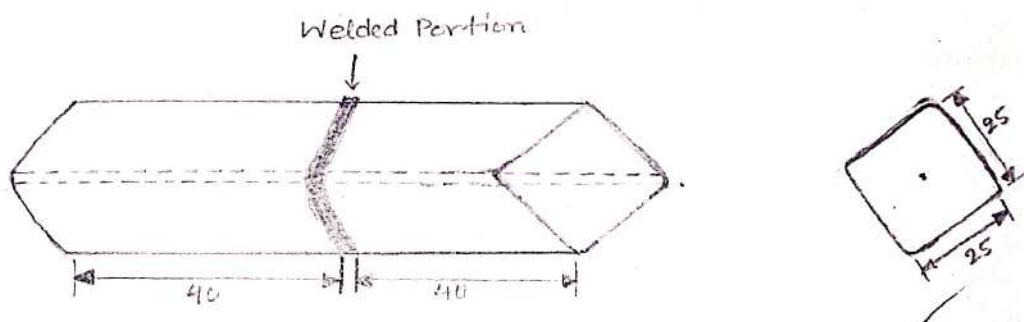
Name of the Lab: Welding Shop

Name of the Experiment: To fabricate a weld joint by gas welding method using MS square Pipe

Tools/Instrument list:

Steel Ruler	Try-Square	Hacksaw
File	Scriber	Bench vice
Gas welding Set-up		

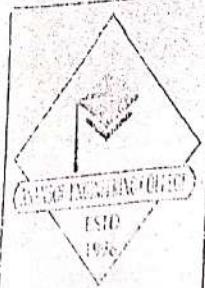
Sketch of the Job/Sample:



Operations Performed:

Sl. No	Descriptions	Remark if any
1.	Holding the job piece on bench vice.	
2.	Measuring the job-piece using steel ruler and then checking the corner angles to be $90^\circ$ using try-square.	
3.	Marking the job-piece using scriber.	
4.	Cutting the job-piece on marked line using hacksaw.	
5.	Welding the two job-piece by gas-welding.	

Signature of Teacher/TA/Workshop Instructor



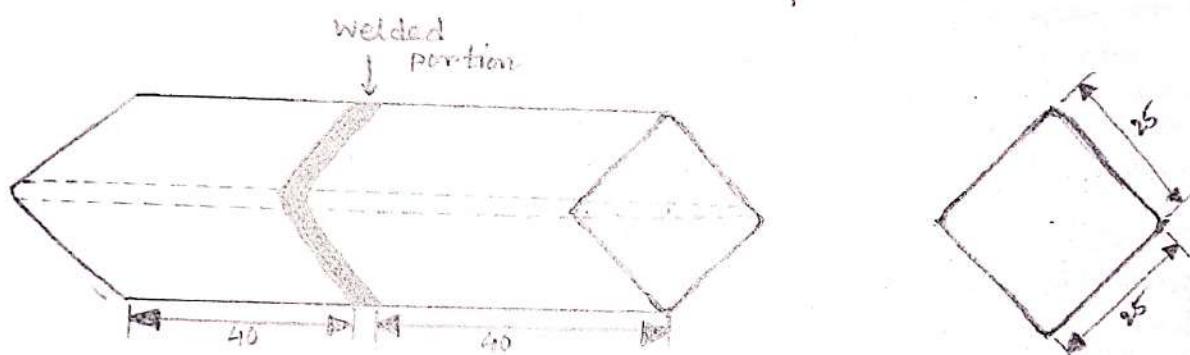
ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB  
PCME391

Name of the Student: AKASH BANERJEE      Univ.Roll No L23

Year 2nd      Semester 3rd      Academic Year 2022-2023

**TITLE:** Fabricate a welded joint by gas-welding process using MS square pipe.

**OBJECTIVE:** To fabricate a welded joint by gas-welding process using MS square pipe.



## General Safety in Gas Welding Process:-

- (1) Inspect equipments for leaks at all connections using approved leak-test solution.
- (2) Inspect hoses for leaks and worn places.
- (3) Use a flint lighter to ignite the flame.
- (4) Open cylinder valves very slowly to keep sudden pressure from exploding the regulators.
- (5) Open and light acetylene first, then open and adjust oxygen to a neutral flame.
- (6) Have a fire extinguisher easily accessible at the gas welding site.
- (7) When finished, close the cylinder valves.
- (8) Protect ~~glass~~ eyes with safety glasses from infrared radiation and wear apron and hand gloves.

Name of Operation	Instrument Used	Objective.
Measuring	Steel-Ruler	To measure distances and the dimensions in straight line.
Measuring	Ttry - square	To measure $90^\circ$ angles at the corners of the job piece.
Marking	Scriber	To mark lines on the metal workpiece. It is used as a pencil.
Cutting	Hack-Saw	To cut the metal job piece. It has V-cut tooth blade and can cut materials having less strength than its blade.
Filing	File.	To file the job piece at the edges, where welding is to be done.
Welding	Gas-Welding setup.	Gas welding setup is used to weld thinner metals. It consists of gas cylinders, welding torch, filler metal, welding table etc.

## Procedure for Gas-Welding Process :-

### (1) Holding & Cutting Process :-

- (i) A  $25 \times 25 \text{ mm}^2$  cross-section MS square pipe is taken.
- (ii) The jobpiece is measured along length using steel rubber and is marked at a distance of 85 mm from an edge using scriber.
- (iii) The job-piece is then held over bench vice.
- (iv) The square pipe is then cut using hack-saw at the marked distance.
- (v) The cut out portion of  $85 \times 25 \times 25 \text{ mm}^2$  square pipe is then measured and marked at the centre and is held over bench vice.
- (vi) It is then cut at the centre by ~~hack~~-saw.
- (vii) The cross-sectional edges of both cut-out job pieces are filed using file to get smoother edges and the surfaces are also filed, where the welding is to be done.

### (2) Welding Process :-

- (i) The two sections of job pieces are kept on welding table and their edges are attached together.
- (ii) The gas-welding set-up is prepared and the job-pieces are joined together using gas welding process.

## Report the Following :-

(1) State the various equipments /accessories required for gas welding.

→ The various equipments required for gas welding are —

(a) Compressed Gas Cylinders :- Compressed gas cylinders are used to store gases (i.e. acetylene and oxygen) required for gas welding. The standard size for this cylinders is  $6-7 \text{ m}^3$  and are painted black for oxygen and maroon for acetylene. They stored under high pressure.

(b) Cylinder Valves :- All cylinder valves are constructed and operate on the same principle. Their function is to lock the compressed or/liquified gas in the cylinder. Each valve consists of a stem which can be moved up or down by rotating a hand wheel which in turn can lift or lower the valve plate or plug, thereby opening or closing the cylinder.

(c) Pressure Regulators :- Gas pressure regulators are required to reduce the pressure of the gas in the cylinder or supply line to the pressure used

in the welding torch. The principle of construction of regulators for different gases is the same; however because the pressure they are required to control differ widely from gas to gas, therefore they are designed to maintain respectively different pressures.

(d) Gas Hoses:- Acetylene and oxygen are conveyed from the cylinders to the welding torch through hoses made of reinforced rubber of black, red and green colour, capable of withstanding high line pressure at moderate temperatures.

(e) Welding Torches:- A welding torch serves the purpose of bringing together correct volumes of the fuel gas and oxygen, and mix them thoroughly and pass them through a nozzle to form a flame of the required characteristics to weld a given metal.

(f) Torch Tip:- The tip of a welding torch is that portion of it from which the gas mixture issues out before it is ignited to give the desired flame.

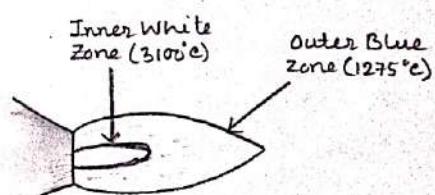
(2) What is Gas Welding?

→ Oxyacetylene welding, commonly referred to as welding is a welding process which relies on combustion of oxygen and acetylene. When mixed together in correct proportion within a hand-held torch or blowpipe, a relatively hot flame is produced with a temperature of about  $3,200^{\circ}\text{C}$ .

(3) What are the different types of gas flames produced during gas welding? Explain with figures. What is difference between Gas Welding and Arc Welding.

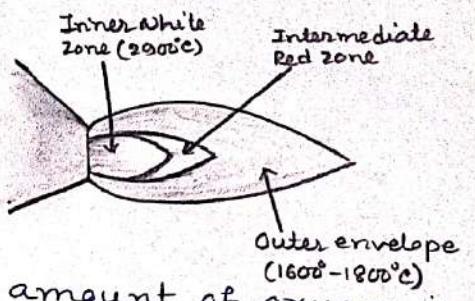
→ (a) Neutral Flame:- This flame has equal amount of oxygen and gases fuel by the volume.

This flame burns fuel completely and does not produce any chemical effect on metal to be welded. It is mostly used to weld mild steel, stainless steel, cast iron etc. It produces little smoke. This flame has two zones - the inner zone is white with a temperature of  $3100^{\circ}\text{C}$  and outer zone is blue with a temperature of  $1275^{\circ}\text{C}$ .



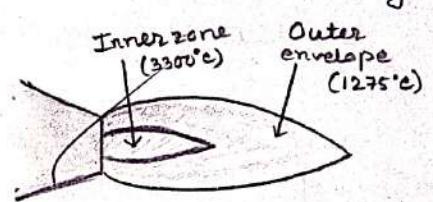
(b) Carburizing Flame:- The ratio of acetylene to oxygen present in this flame is 2:1. This flame chemically reacts with metal and form metal carbide. Due to this reason, this flame does not used

with metal which absorbs carbon. It is smoky and quiet flame. This flame has 3 regions - the inner zone has white colour of  $2900^{\circ}\text{C}$  temperature, the intermediate red zone and the outer envelope of blue colour with the temperature of  $1600^{\circ}\text{C}$  to  $1800^{\circ}\text{C}$ .



(c) Oxidizing Flame:- In this flame, the amount of oxygen is more than the amount of acetylene by defined two zones. The inner zone has very bright white colour and has temperature of about  $3300^{\circ}\text{C}$ . The outer flame is blue in colour. This flame is used to weld oxygen free copper alloy like brass, bronze etc.

2<sup>nd</sup> Part:-



### Gas Welding

- (1) Heat is supplied using a flame produced by the chemical combustion of a gaseous fuel with oxygen.
- (2) Electrical conductivity has no role in gas welding process.
- (3) No prerequisite power supply is desired in gas welding.
- (4) Usually shielding is not provided in gas welding process.
- (5) The flame temperature is about  $3200^{\circ}\text{C}$
- (6) Separate filler rod is introduced in gas welding process.
- (7) Gas Welding is suggested for thin materials.
- (8) Gas welded parts do not have much strength.

### Arc Welding.

- (1) An electric arc is established to supply necessary heat for fusing the base metals.
- (2) Arc welding processes are applicable to electrically conductive metals only.
- (3) An electrical power supply is prerequisite for every arc welding.
- (4) Shielding of the high temperature arc and hot weld bead is necessary.
- (5) The temperature of arc is about  $4000^{\circ}\text{C}$
- (6) Arc producing as well as filler rod material is the electrode.
- (7) Arc welding is suggested for medium and thick materials.
- (8) Arc Welded parts have very high strength.

(4) Explain the different types of Welding Defects.

→ The different types of welding defects are—

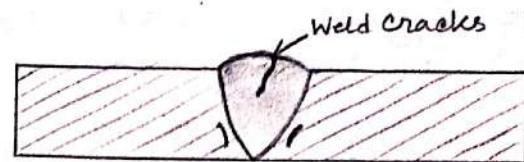
(a) Weld crack:- This is the most unwanted welding defect. Welding cracks can be present at the surface, inside the weld material, or at the heat affected zone.

• causes :-

(i) Poor ductility of the given base metal.

(ii) The presence of residual stress.

(iii) The rigidity of the joint which makes it difficult to expand or contract the metal.



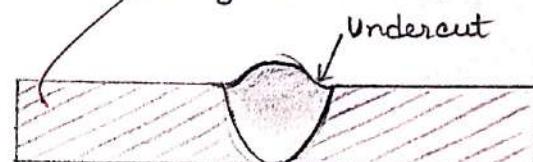
(b) Undercut :- When the base of the metal melts away from the weld zone, then a groove is formed in the shape of a notch, then this type of defect is known as undercut.

• causes :-

(i) If the arc voltage is very high, then this defect may occur.

(ii) Using a large electrode is a reason for undercut.

(iii) High electrode speed.



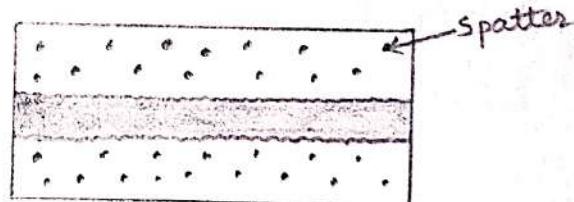
(c) Spatter :- When some metal drops are expelled from the weld remain stuck to the surface, then this defect is known as spatter.

• causes :-

(i) High welding current.

(ii) Incorrect polarity.

(iii) Improper gas shielding.



(d) Porosity :- Porosity is the condition in which the gas or small bubbles gets trapped in the welded zone.

• causes :-

(i) It occurs when the electrode is not coated properly.

(ii) Increased welding currents.

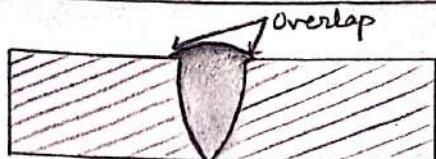
(iii) Rust or oil on the welding surface.



(e) Overlap :- When the weld face extends beyond the weld toe, then this defect occurs. In this condition, the weld metal rolls and forms an angle less than 90°.

• causes :-

- (i) Improper welding technique.
- (ii) High welding current.
- (iii) Use of large electrodes.



(f) Slag Inclusion :- If there is any slag in the weld, then it affects the toughness and metal weldability of the given material. This decreases the structural performance of the weld material. Slag is formed on the surface of the weld or between the welding turns.



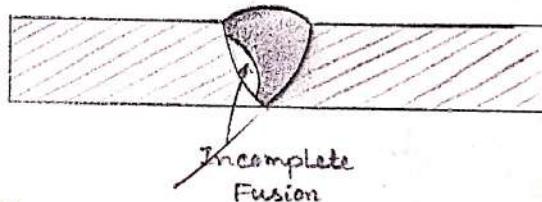
• causes :-

- (i) Slag is formed if the welding current density is very small.
- (ii) Welding speed is too fast.
- (iii) Improper welding angle and travel rate of welding rod.

(g) Incomplete Fusion :- Incomplete fusion occurs when the welder does not accurately weld the material and the metal pre-solidifies which leads to a gap which is not filled with molten metal.

• causes :-

- (i) It occurs due to the low heat input.
- (ii) When the weld pool is very large and runs ahead of the arc.
- (iii) When the angle of the joint is too low.



**ASANSOL ENGINEERING COLLEGE**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**PRACTICE OF MANUFACTURING PROCESS-II (PC ME 391)2022**

**JOB-(07)**

NAME- AKASH BANERJEE UNIV. ROLL NO- L23

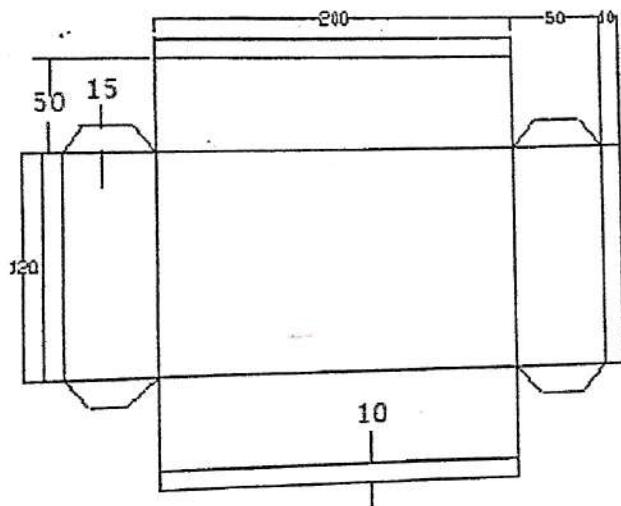
DEPARTMENT- Mechanical Engineering GROUP- \_\_\_\_\_

OBJECTIVE: To prepare a sheet metal product (rectangular tray).

MATERIAL REQUIRED: G.I. sheet.

APPARATUS: Snip, steel ruler, mallet, scribe, stake and straight, soldering pest edge soldering iron.

**FIGURE:**



(All dimensions are in 'mm')

**Report the following**

1. Describe the method of preparation of tray with neat sketch.
2. What are the commonly used materials in sheet metal? How is sheet metal specified?
3. What are the different types of soldering? State its composition and application.
4. Name and explain various hand tools used in sheet metal work.

Teacher's Signature

*S. Ansar  
19/09/22*

Date 30/11/22



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING

PRACTICE OF MANUFACTURING PROCESSES LAB

Name of the Laboratory Practice of manufacturing process Date \_\_\_\_\_

Name of the Experiment To prepare a sheet metal product (rectangular tray)

Subject Code PCME 391 No. of Experiment \_\_\_\_\_

Name of the Student AKASH BANERJEE

Semester 3<sup>rd</sup> Branch Mechanical

University Roll No 123 Batch \_\_\_\_\_

Group Members:-

Sl.No	Name of the Student	University Roll No
1.	AKASH BANERJEE	123
2.	GOPINATH MAJI	124
3.	PREM PRATAP NANDAN	126

10.01.23

Signature of Teacher's/Tech. Assistant.

Date



## ASANSOL ENGINEERING COLLEGE

## DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE

Univ.Roll No: L23

Section:

Date:

Name of the Lab: Practice of Manufacturing Process Lab.

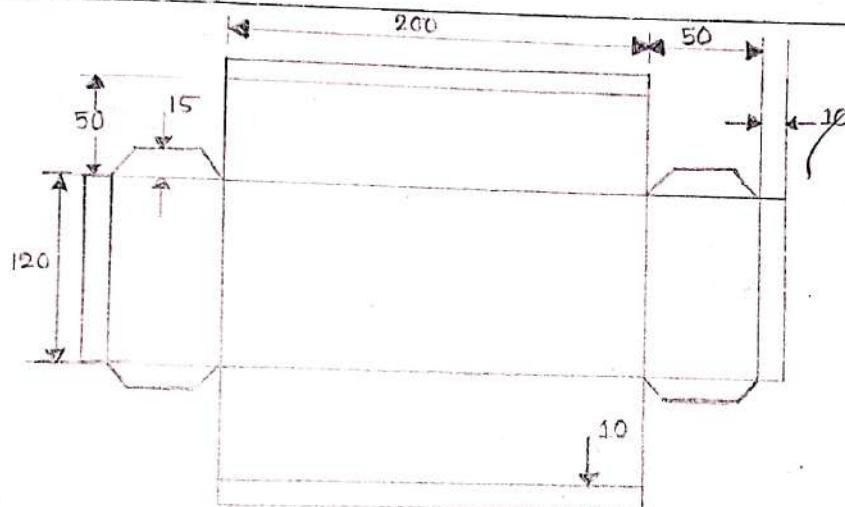
Name of the Experiment: To prepare a sheet metal product (rectangular tray)

Tools/Instrument list:

Snip  
ScriberSteel Ruler  
Stake & Straight

Mallet

Sketch of the Job/Sample:

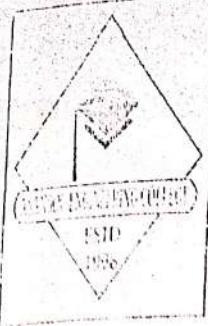


(All dimensions are in mm)

Operations Performed:

Sl. No	Descriptions	Remark if any
1.	First with steel ruler, the required length is measured and with the help of scribe that length is marked.	
2.	Then the marked length is cut with the help of snip.	
3.	Then the sheet is folded with desired shape with the help of stake and straight.	
4.	At last, the parts are joined with help of rivets, and the tray is formed.	

Nature of Teacher/TA/Workshop instructor

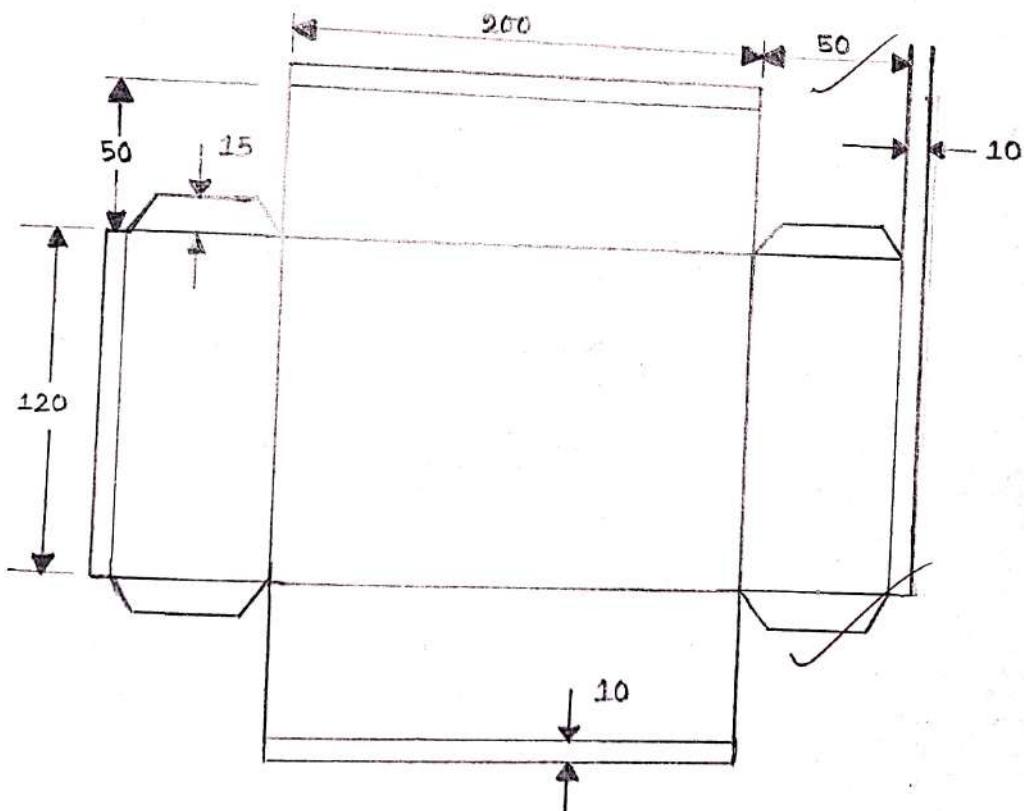


ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB  
PCME391

Name of the Student: AKASH BANERJEE Univ.Roll No L23  
Year 2<sup>nd</sup> Semester 3<sup>rd</sup> Academic Year \_\_\_\_\_

**TITLE:** Prepare a sheet metal product (rectangular tray).

**OBJECTIVE:** To prepare a sheet metal product (rectangular tray).



(All dimensions are in 'mm')

## General Safety in Handling Sheet Metal :-

- (1) Handling of Tools should be proper.
  - (2) The sheet should be handled properly to avoid accidental cuts.
  - (3) Hands should be well clear while using the tools.
  - (4) keep the area around the device clear and free from dust before, during and after installation.
  - (5) keep the tools away from areas where people could trip over them while walking.
  - (6) Do not wear loose clothing.
- }

Report the following:-

(1) Describe the method of preparation of tray with neat sketch.

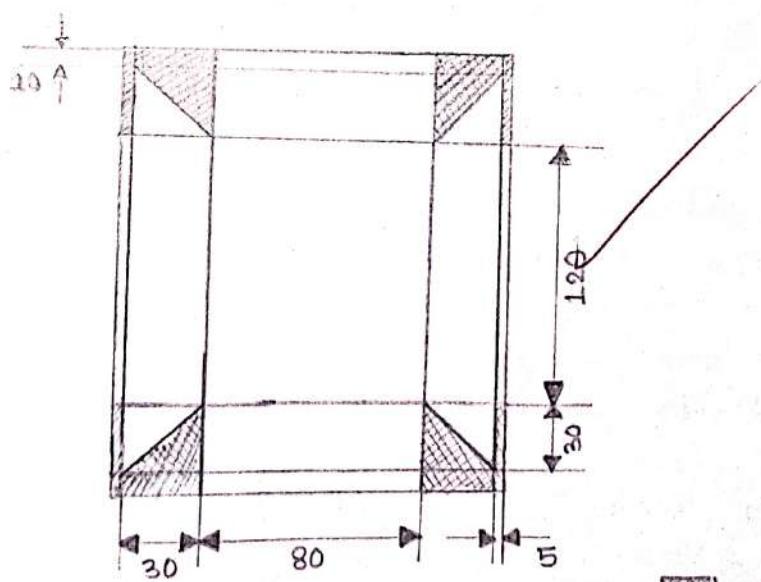
→ (a) Layout Marking:- First using steel ruler and scribe we have to start marking of our desired shape. From the 200 mm we have to make 120 mm space and from the 150 mm we have to make 80 mm, which consists provide the base of the job.

After completing both side marking, in each corner one square in  $30\text{ mm} \times 30\text{ mm}$  is made from which two triangles are made of the square.

(b) Shearing:- After marking, remove the unwanted portion by cutting it with the help of snip. While cutting, cut along the proper line.

(c) Folding:- First fold 200 mm side, of 5 mm portion by keeping the pattern over the anvil edge for  $180^\circ$  towards the marking, repeat this step for opposite edge. Use rectangular stake, fold along baseline  $80\text{ mm} \times 120\text{ mm}$  for  $90^\circ$  opposite of the marking. Using the mallet, fold the triangular shape projection  $90^\circ$  towards the tray.

(d) Finishing:- Fold the remaining portion 10 mm  $180^\circ$  outwards using stake and mallet to lock the triangular folds by riveting. Use mallet to make the perfect shape.



Layout of Rectangular Tray  
(All dimensions are in mm)

■ Unwanted portion

2. What are the commonly used materials in sheet metal? How is sheet metal specified?

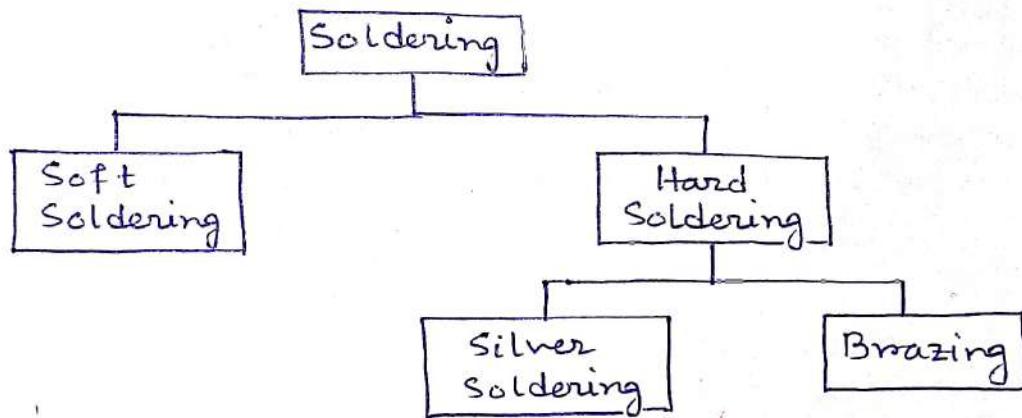
→ There are many different metals that can be made into sheet metal, such as aluminium, brass, copper, steel, tin, nickel, but the most commonly used material in sheet metal is galvanized steel or Iron (G.I. Sheet). It is made by coating steel with zinc, to make it more corrosion resistant.

#### Specification of Sheet Metal :-

Sheet metal is specified by the followings -

- (a) The overall thickness of stock forms, tube walls or other fabricated components.
- (b) The numerical gauge thickness of the sheet, foil or wire product.
- (c) The overall width or outer diameter of stock forms such as bars, plates and tubes.
- (d) The overall length i.e. length of stock materials such as bars, rods, plates and tubes.
- (e) Ultimate tensile strength (UTS) at break.
- (f) Yield strength (YS).
- (g) Young's modulus or the modulus of elasticity (E).

3. What are the different types of soldering? State its composition and application.



(a) Soft Soldering:- In soft soldering, the solder is mostly composed of lead and tin, has a melting range of  $150^{\circ}\text{C}$  -  $350^{\circ}\text{C}$ . It is used in sheet-metal work for joining parts that are not exposed to high temperatures and are not subjected to extreme loads and forces.

(b) Silver Soldering:- In silver soldering, silver mixed with tin is utilised as a solder.

The different compositions of solder for different purposes are as follows—

- (i) Soft solder - lead 37%, tin 63%.
- (ii) Medium solder - lead 50%, tin 50%.
- (iii) Plumber's solder - lead 70%, tin 30%.
- (iv) Electrician's solder - lead 58%, tin 42%.

It employs solder which melt at higher temperatures and are stronger than those used in soft soldering.

(c) Brazing:- These types of soldering, metal use a very higher melting point than the metals used in hard and soft soldering. However it is similar to hard soldering, the metal being bonded is heated as opposed to melting. The alloy components are usually silver, copper, manganese, nickel and/or chromium.

4. Name and explain various hand tools used in sheet metal work.

→ (1) Cutting Tools:-

(a) Chisels:- This is used to cut the sheets. It is also used to remove the unwanted metal from the surface of a job by chipping. Mostly flat type and round nose type chisels are used.

(b) Snips:- This is similar to scissors, used for cutting or shearing thin metal sheets. Its length varies from 200 mm to 600 mm. Mainly straight snip and curved snip is used. Bench shear is used to cut the sheet metal of 3 mm thickness.

(2) Striking Tools:-

(a) Hammers:- These are used on the sheet metal for straightening, bending, leveling, riveting removing nails, forging, chipping etc., with the application of impact load exerted manually. When the hammer head made of wood, rubber or non-iron material, then it is called Mallet.

(b) Punch:- Punch is used for marking out work, locating centres etc. There are four types - dot punch, centre punch, letter punch, and number punch.

### (3) Supporting Tools:-

(a) Stakes :- The stakes are used for doing various operations like forming, bending, hammering etc. Based upon the purpose, required shape of stake is selected. They are horn stake, funnel stake, half moon stake etc.

(b) Anvil :- The anvil acts as a base for smithy work, while hammering. The body of the anvil is made of mild steel (MS), wrought iron or cast iron (CI).

### (4) Marking and Measuring Tools:-

(a) Steel Rule :- It is used for linear measurements up to the accuracy of 0.5 mm.

(b) Scribers :- It is made up of hardened steel with pointed end used for marking lines on the sheet.

(c) Wire Gauge :- It is used for measuring the thickness of sheet metal.

### (5) Bending and Folding Tools:-

(a) Pliers :- The pliers are mainly used for bending the sheet metal to the required shape.

(b) Folding Bars :- The folding bars are used for bending and folding operation of the sheet metal.

**ASANSOL ENGINEERING COLLEGE**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**PRACTICE OF MANUFACTURING PROCESS (PC ME 391)2022**  
**JOB-(03)**

NAME- AKASH BANERJEE UNIV. ROLL NO- L23

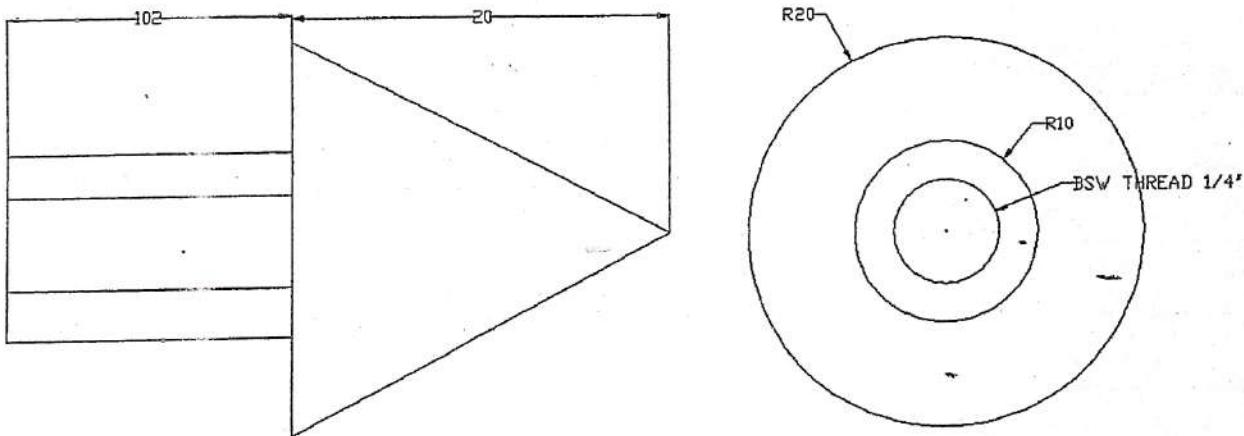
DEPARTMENT- Mechanical Engineering GROUP -

OBJECTIVE: To prepare a Plumb Bob.

MATERIAL REQUIRED:  $45 \times 40 \text{ mm}^2$  dia of M.S. round bar.

APPARATUS: Lathe, single point HSS tool, steel ruler, outside caliper ,jenny caliper , surface gauge, chuck key, tool post wrench.

FIGURE:



(All dimensions are in 'mm')

Report the following

1. What are the basic parts of an engine lathe? Discuss the function of head stock.
2. Why chucks are used? List various types of chucks used in lathe. Describe any one in brief.
3. Define taper turning and taper. Name the different methods of taper turning done on a center lathe.
4. Define feed and depth of cut. Describe tumbler gear mechanism.

Date \_\_\_\_\_

Teacher's Signature \_\_\_\_\_



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB

Name of the Laboratory Practice of Manufacturing Processes Date \_\_\_\_\_

Name of the Experiment To Prepare a Plumb Bob.

Subject Code PCME391 No. of Experiment \_\_\_\_\_

Name of the Student Akash Banerjee

Semester 3<sup>rd</sup> Branch Mechanical

University Roll No 123 Batch \_\_\_\_\_

Group Members:-

Sl.No	Name of the Student	University Roll No
1.	AKASH BANERJEE	123
2.	GOPINATH MAJI	124
3.	PREM PRATAP NANDAN	126

Signature of Teacher's/Tech Assistant.

Date



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING

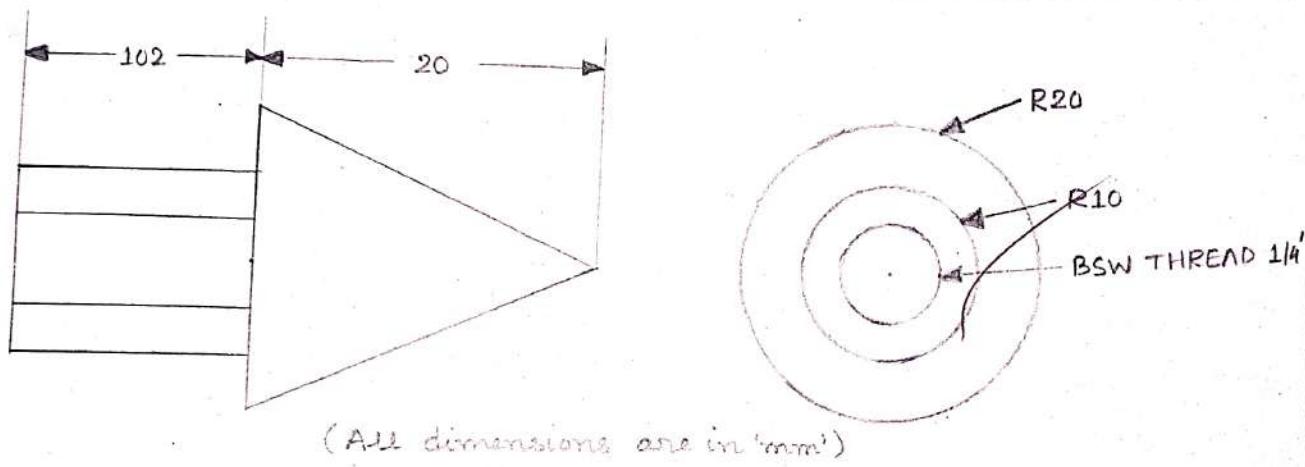
Name of the Student: AKASH BANERJEE	Univ.Roll No: L23	Section:	Date:
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Name of the Lab: Practice of Manufacturing Processes.  
Name of the Experiment:- To prepare a plumb Bob.

Tools/Instrument list:

Steel Ruler	Outside Caliper	Jenny caliper
Surface gauge	Chuck key	Tool post wrench.

Sketch of the Job/Sample:



Operations Performed:

Sl. No	Descriptions	Remark if any
1.	First with the steel ruler required shape is measured and cut by power-shaw.	
2.	Facing the jobpiece in lathe, after setting it in the chuck.	
3.	With the help of outside caliper and jenny caliper the required dia is measured and excess material is removed.	
4.	At last, half the portion of 20 mm is taper turning done and desired plumb bob is obtained.	

Signature of Teacher/TA/Workshop instructor



# ASANSOL ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

PRACTICE OF MANUFACTURING PROCESSES LAB

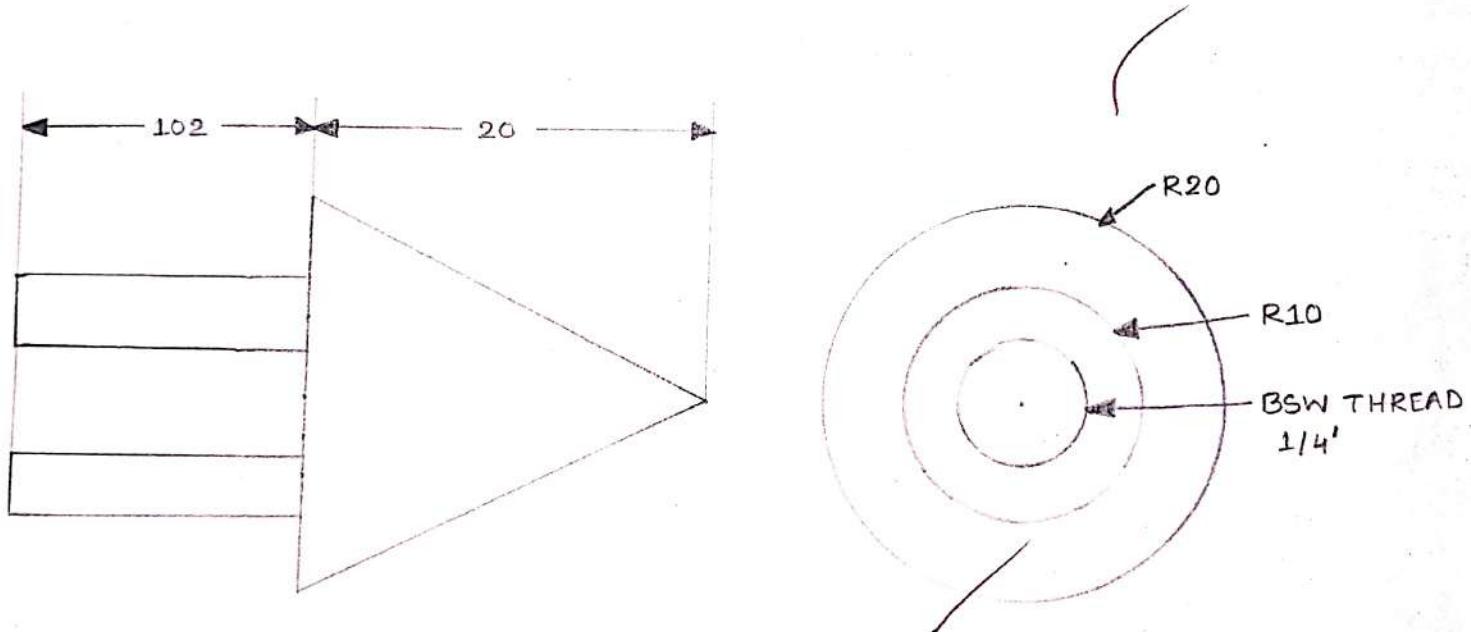
PGME391

Name of the Student: AKASHI BANERJEE Univ.Roll No L23

Year 2<sup>nd</sup> Semester 3<sup>rd</sup> Academic Year 2022-23

TITLE: Preparing a plumb bob in lathe.

OBJECTIVE: To prepare a plumb Bob.



(All dimensions are in mm)

### General Safety :-

- (1) While operating the lathe, avoid wearing gloves, loose clothing, jewellery.
- (2) Pull longer hair back or use the appropriate hair covering.
- (3) Always wear the proper eye protection.
- (4) Remove chuck keys and wrenches before operating.
- (5) Keep the workplace clean of metal shavings, use a broom, never use your hands.
- (6) Always stop the lathe before adjusting.
- (7) Do not change spindle speeds until the lathe comes to complete stop.
- (8) Handle sharp cutters, centres and drills with care.
- (9) Never lean on the lathe.
- (10) Never lay tools directly on the lathe ways.

Report the following:-

(1) What are the basic parts of an engine lathe? Discuss the function of headstock.

→ The basic parts of an engine lathe are -

- |                |                 |
|----------------|-----------------|
| (a) Headstock, | (e) Lead Screw  |
| (b) Tailstock, | (f) Feed rod,   |
| (c) Lathe bed, | (g) Chip pan.   |
| (d) Carriage   | (h) Hand wheel. |

Function of Headstock:- The main function of headstock is to transmit power to the different parts of a lathe. It comprises off the headstock casting to accommodate all the parts within it. It provides mechanical means of rotating the work at multiple speeds.

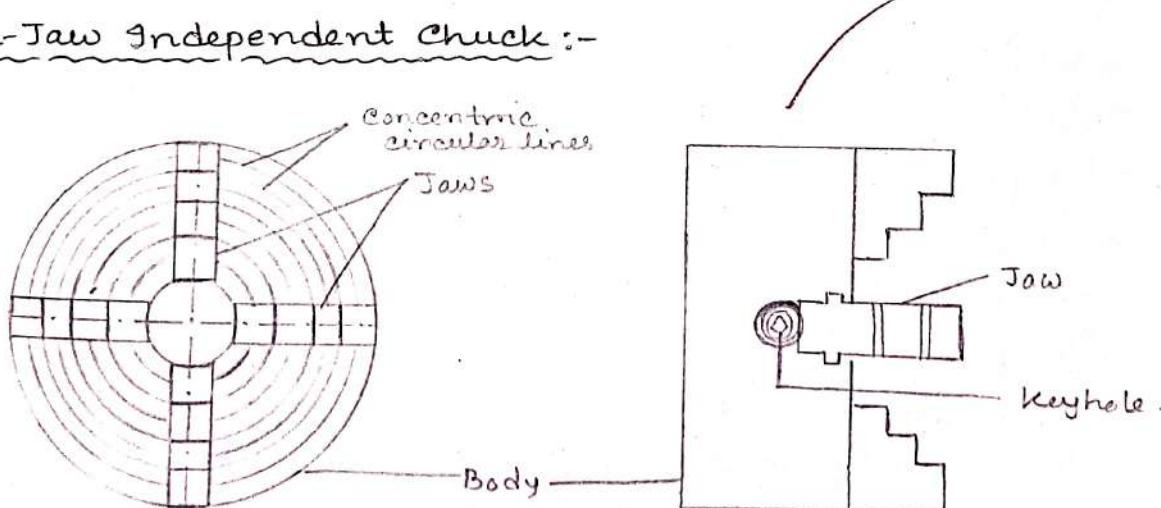
(2) Why chucks are used? List various types of chucks used in lathe. Describe any one in brief.

→ A chuck is a specialized type of clamp used to hold an object with radial symmetry, especially a cylinder. In a lathe, it holds the rotating workpiece.

Types of chuck in lathe:- The different types of chucks used in lathe machine are -

- (a) Four jaws independent chuck,
- (b) Three jaws universal chuck,
- (c) Combination type chuck,
- (d) Magnetic type of chuck,
- (e) Collet chuck,
- (f) Air or hydraulic operated chuck,
- (g) Drill chuck.

Four-Jaw Independent Chuck:-



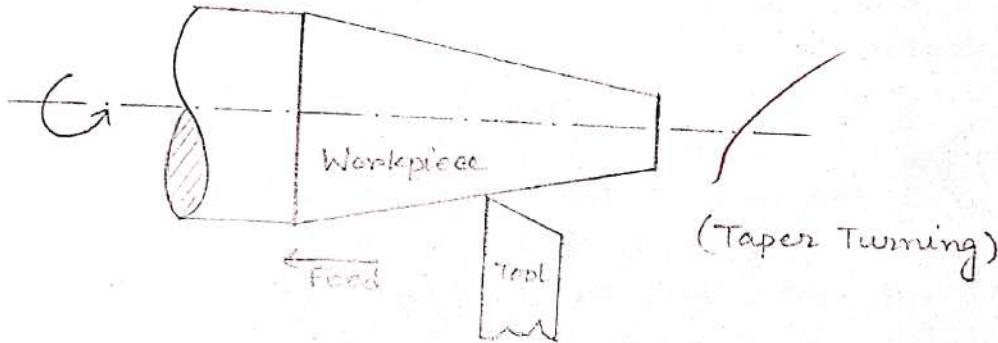
The arrangement of four jaws independent chuck, which has four jaws, that are located at an angle of  $90^\circ$  to each other. All the four jaws are operated independently. Each jaw

made of tough steel has three inner and one outer gripping surface. The outer gripping surface is used for holding larger sizes of the workpiece by reversing the jaw.

Concentric circles inscribed on the face of the chuck facilitate quick centering of the workpiece. This type of chuck is particularly used in the setting up of heavy and irregular shaped particles.

(3) Define taper turning and taper? Name the different methods of taper turning done on a centre lathe.

→ Taper Turning:- Taper turning is a machining process in which the gradual reduction in diameter from one part of a cylindrical workpiece to another part occurs.



Taper :- A machine taper is a system for securing cutting tools or toolholders in the spindle of a machine tool or power tool.

Taper Turning Methods on a Centre Lathe:-

The followings are the different types of taper turning methods on lathe machine—

- (a) Tailstock set over method,
- (b) Compound rest method,
- (c) Taper turning attachment method,
- (d) Form Tool method,
- (e) combining feeds method.

(4) Define feed and depth of cut. Describe tumbler gear mechanism.

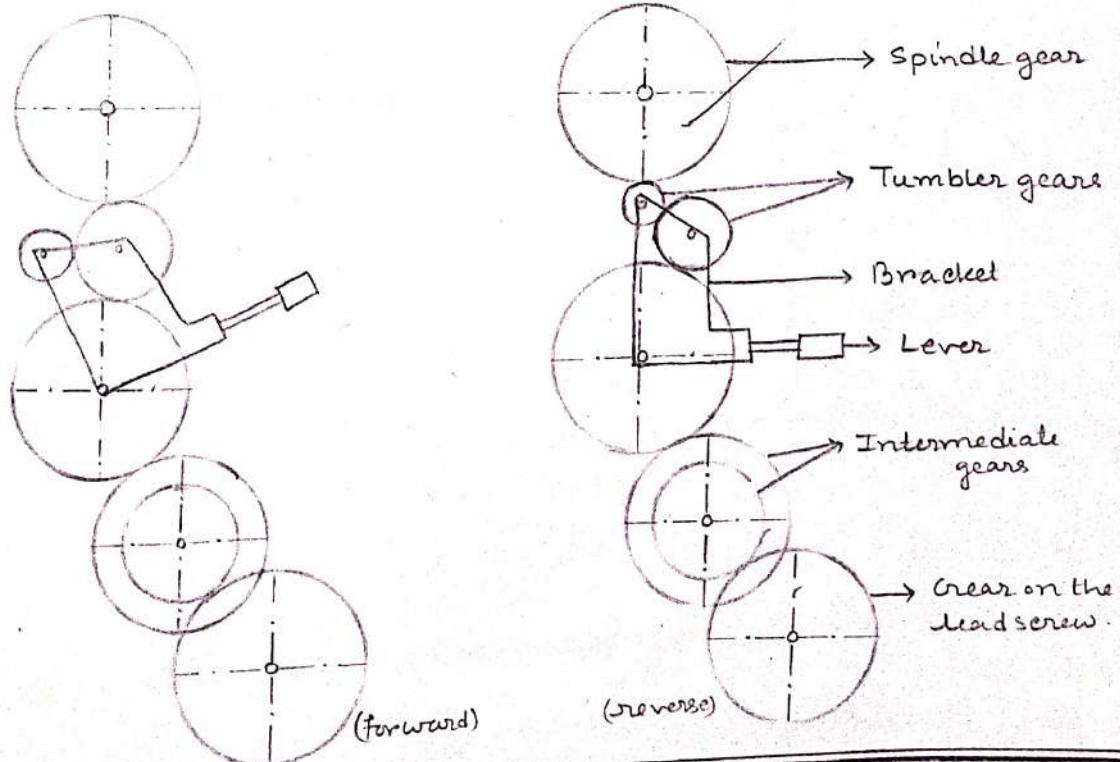
→ Feed:- Feed or feed rate is the relative velocity at which the cutter is advanced along the workpiece in a machining process.

Depth of Cut:- Depth of cut is the tertiary cutting motion that provides necessary depth of material that is required to remove by machining.

Tumbler Gear Mechanism:-

Tumbler gears are used to give the desired direction of movement to the lathe carriage, via lead screw or the feed shaft. Usually to change the direction of feed rod and lead screw, tumbler gear mechanism is used. The carriage can be moved from headstock end to tailstock from tailstock end to headstock end automatically by engaging the tumbler gear.

With the forward position, only one gear is in contact between the lathe spindle and the main gear train, and the lathe carriage is moved towards the headstock. With the reverse, the drive is through the two gears, the second gear being introduced only to reverse the direction of rotation, and the carriage is moved away from the headstock. With neutral position, the spindle is disengaged from the lead screw or feed shaft gear box.



**ASANSOL ENGINEERING COLLEGE**  
**MECHANICAL ENGINEERING DEPARTMENT**  
**PRACTICE OF MANUFACTURING PROCESS (PC ME 391) 2022**  
**JOB-(01)**

NAME- AKASH BANERJEE UNIV. ROLL NO- L23

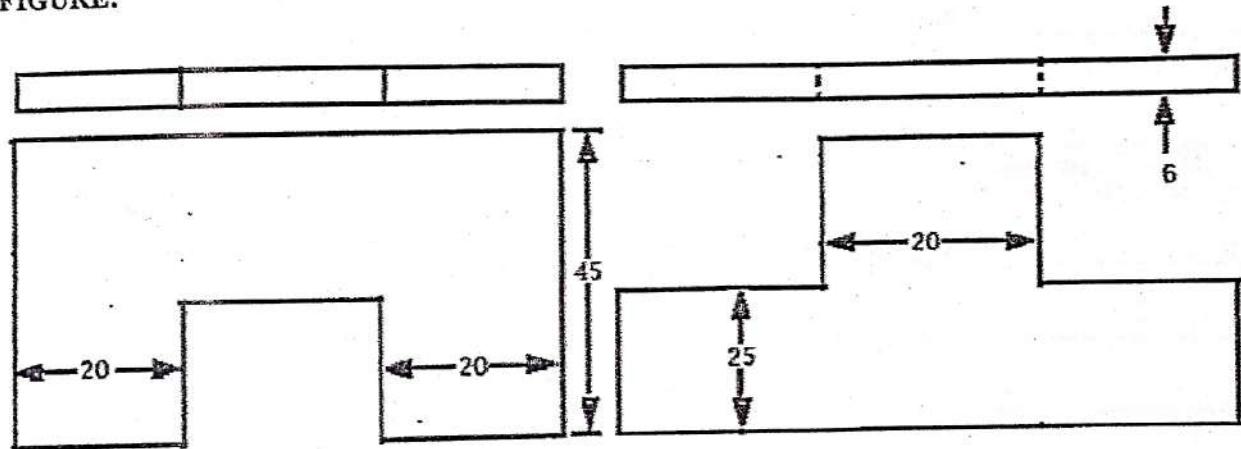
DEPARTMENT- Mechanical Engineering GROUP- \_\_\_\_\_

OBJECTIVE: To prepare male and female section on MS plate.

MATERIAL REQUIRED:  $65 \times 50 \times 6 \text{ mm}^3$  MS flat metal.

APPARATUS: Steel ruler, try square, hammer, jenny caliper, scribe, file, prick punch or centre punch, hacksaw & bench vice.

FIGURE:



(All dimensions are in 'mm')

Report the following

1. How vice are specified? Name the different types of vices.
2. Name the different marking and measuring tools used in the fitting shop?
3. How files are classified? Describe with neat sketches.

*[Handwritten signature]*

Teacher's Signature \_\_\_\_\_

Date \_\_\_\_\_



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB

Name of the Laboratory Practice of Manufacturing Processes Date \_\_\_\_\_

Name of the Experiment To prepare male and female section on MS plate

Subject Code PCME 391 No. of Experiment \_\_\_\_\_

Name of the Student AKASH BANERJEE

Semester 3<sup>rd</sup> Branch Mechanical

University Roll No 123 Batch \_\_\_\_\_

Group Members:-

Sl.No	Name of the Student	University Roll No
1.	AKASH BANERJEE	123
2.	GOPINATH MAJI	124

Signature of Teacher's/Tech. Assistant.

Date



## ASANSOL ENGINEERING COLLEGE

## DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE

Univ.Roll No: L23

Section:

Date:

Name of the Lab: Practice of Manufacturing Process Lab.

Name of the Experiment:- To prepare Male and Female section on MS plate.

Tools/Instrument list:

Steel Ruler

Try-Square

Hammer

Terry caliper

Scriber

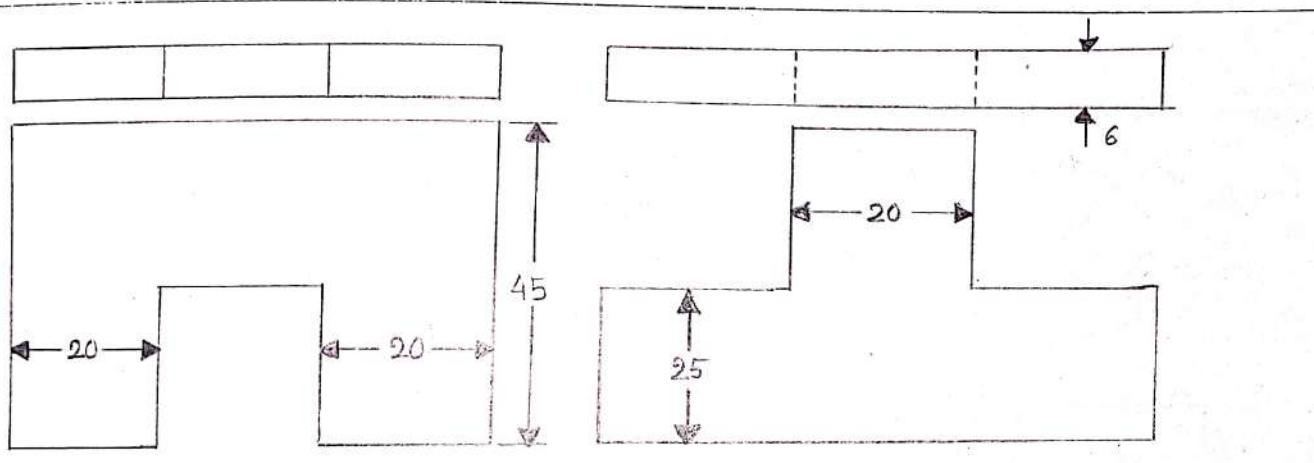
Hacksaw

File

Centre punch

Drill bits.

Sketch of the Job/Sample:



(All dimensions are in 'mm')

Operations Performed:

Sl. No	Descriptions	Remark if any
1.	Holding the job in the bench-vice.	
2.	Measuring with the help of Steel Ruler & Try-square.	
3.	Then marking the desired lengths by scribe and centre punch.	
4.	After marking, then drilling with the help of drill bits.	
5.	Cutting with the use of Hacksaw, the measured lengths.	
6.	Filing the job to smooth surface finish.	

Nature of Teacher/Tutor/Workshop instructor



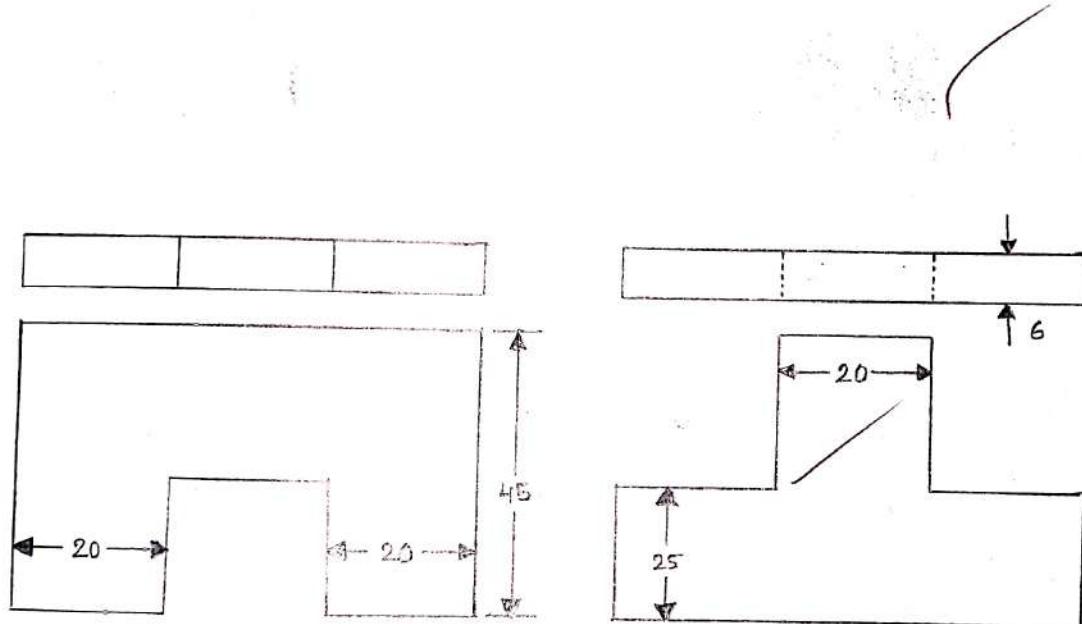
ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB  
PCME391

Name of the Student: AKASH BANERJEE Univ. Roll No \_\_\_\_\_

Year 2nd Semester 3rd Academic Year 2022-23

TITLE: Preparation of male and female section on MS Plate.

OBJECTIVE: To prepare male and female section on MS plate.



(All dimensions are in mm)

## General Safety in Fitting Shop:-

- (1) Do not use a file without a handle.
- (2) Do not use hammer with a loose head.
- (3) Keep your hands away from moving parts.
- (4) Ensure that the workpiece is clamped in the vice firmly and securely.
- (5) Keep the hand tools and vice clean.
- (6) Always use brush to remove any chip.
- (7) Always roll up your sleeves or wear short sleeves.
- (8) Remove wristwatches, rings, bracelets since they can lead to injuries.
- (9) Always wear safety shoes.



Name of Operation	Instrument used.	Objective.
Measuring	Steel Ruler	It is used to measure distances and dimensions in straight line.
Measuring	Try - square	It is used to measure $90^\circ$ angles at the corners of the job piece.
Hitting	Hammer	It is used for hitting purpose in different types of operations.
Marking	Jenny - Caliper	It is used to mark a straight line at a particular distance from an edge of the job piece.
Marking	Scriber	It is used as a pencil to mark lines on the work piece.
Marking	Centre Punch	It is used for permanent marking on the job piece.
Drilling	Drill bits	It is used to drill or make hole inside the job piece.
Cutting	Hacksaw	It is used to cut the metals having less strength than its blade material.
Holding	Bench vice	It is used to hold the job piece.

### Working Principle :-

First of all we have to hold the MS plate in the bench vice. Then we have to measure the distances of straight lines using steel ruler and  $90^\circ$  corner angles using try-square. Then we have to mark the specified lengths using jenny caliper, scriber and centre punch. After that we have to go through the drilling process. After drilling, we have to cut the required metal using hacksaw. And at last we have to file the metal plate.

Report the Following :-

1. How vice are specified? Name the different types of vices.

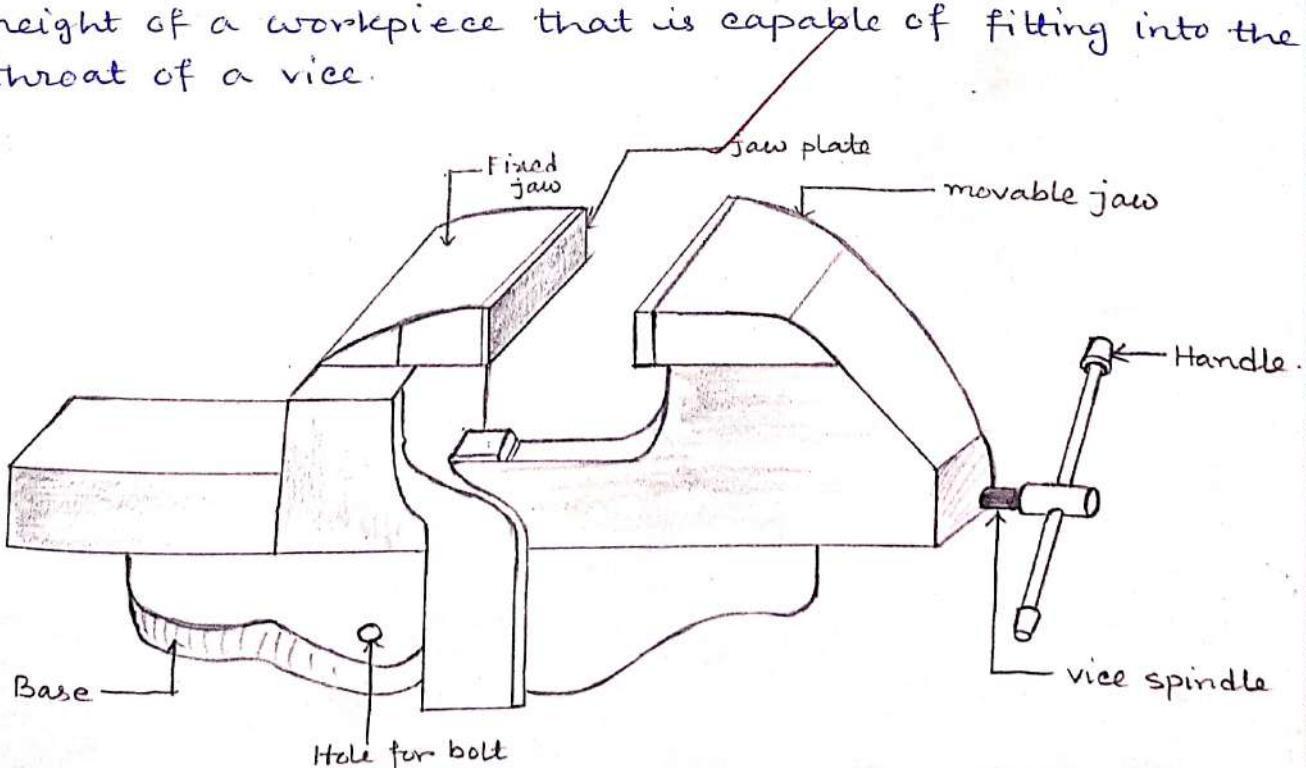
→ Vices are specified on the basis of -

(i) Weight :- A vice's specification is depended on its weight. It is useful to know when making a purchase, in order to determine whether the work surface, we want to mount our vice on, is strong enough to hold the tool.

(ii) Jaw width :- The jaw width is how wide the jaws are from one side to another and is measured by the horizontal distance along the top of the jaw edge. The jaw width indicates how much of a workpiece will be covered.

(iii) Jaw opening :- The jaw opening of a vice is how far the mouth of the jaws can open. This is determined by the length of the screw (which holds the jaws together), and longer the screw, the further the sliding jaw can open from stationary jaw. The opening indicates the maximum capacity of the jaws, means that the vice will not be able to clamp an object wider than this.

(iv) Throat depth :- The throat depth is how deep the jaws of a vice are and is measured by the vertical distance from the top edge of the jaws down to the top of the screw/slide. This indicates the maximum height of a workpiece that is capable of fitting into the throat of a vice.



## Different types of vices:-

The name of the different type of vices are -

- (a) Bench vice, (b) Pipe vice, (c) hand vice, (d) Leg vice,
- (e) pin vice, (f) Drill vice, (g) Tool maker's vice,
- (h) carpenter vice.

(2) Name the different marking and measuring tools used in fitting shop.

### → Marking Devices :-

- (i) Jenny Caliper :- It is used to make a straight line on the job piece at a fixed distance from a particular edge of the workpiece.
- (ii) Scriber :- It is used as a pencil in the fitting shop to make straight line on the job-piece.
- (iii) Centre Punch :- It is used for permanent marking on a job piece. It is hitting by a hammer on the job piece to make permanent marks.

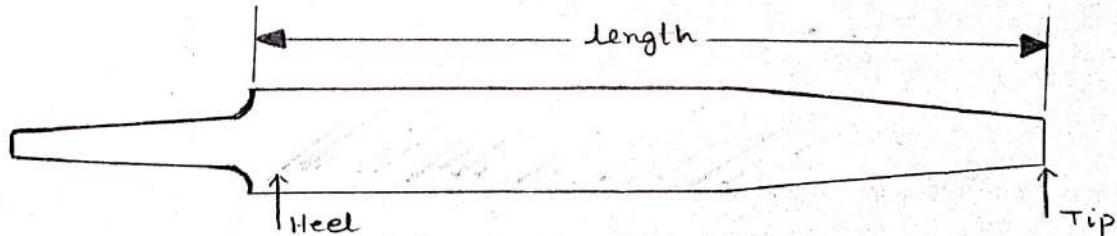
### • Measuring Devices :-

- (i) Steel Ruler :- It is used to measure distances and also to measure the dimensions of a straight job-piece.
- (ii) Try-square :- It is an angle measuring device. It is used to check whether the corners of a job piece are at right angle ( $90^\circ$ ) or not.

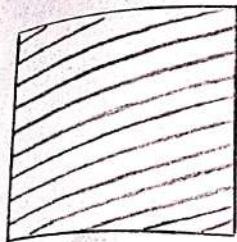
(3) How files are classified? Describe with neat sketches.

→ Files are classified according to length, grades, cut of file, shape of file.

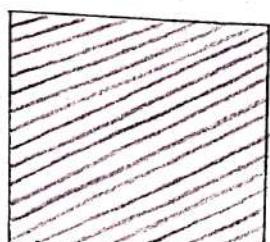
- (i) According to length :- Length is the distance measured from the tip to the heel. It may be 300 mm, 250 mm, 200 mm, 150 mm or 100 mm as per specification.



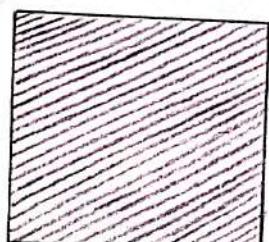
- (ii) According to Grades :- The different grades of files commonly available as rough, bastard, second cut, smooth and dead smooth.



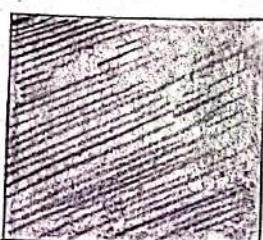
(Bastard)



(Second  
cut)



(Smooth)



(Dead  
Smooth)

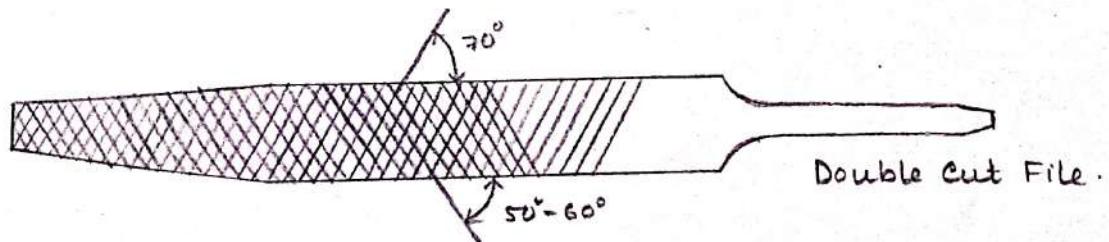
- (i) Bastard file → used for general/ordinary filling.
- (ii) Second cut → used for good/fine finishing purpose.
- (iii) Smooth file → used for removing less metal and for giving good surface finishing.
- (iv) Dead smooth → used for high quality finishing.

(iii) According to cut of file :- The rows of teeth determine the cut of a file. Single cut, double cut, rasp cut and curved cut are the different types of cuts available in file.

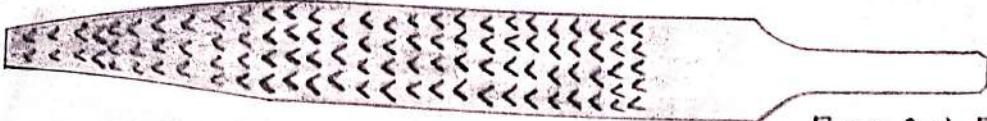
(a) Single Cut :- It has a single row of teeth in one direction on the face of the file at an angle of  $60^\circ$ . This type of file is used for filling soft materials such as lead, Aluminium, tin etc.



(b) Double Cut :- It has rows of teeth in two directions across each other, one at an angle of  $50^\circ$ - $60^\circ$  and another at  $70^\circ$ . It is used to file hard materials such as bronze, steel, brass etc.

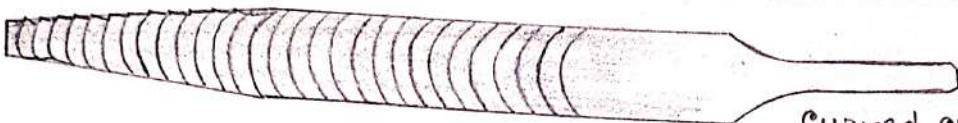


(c) Rasp Cut :- This has individual, sharp, pointed teeth in a line and is useful for filling on ~~softer~~ soft materials like wood, leather and others.



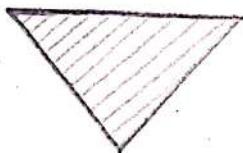
Rasp Cut File.

(d) Curved Cut :- These files have deeper cutting action, and are useful for filing soft materials like plastic, aluminium, tin, copper etc. It is available only in flat shape.



Curved cut file.

(iv) According to Shape :- The various shapes of files with their application are available as triangular file, round file, half round file, flat file, square file etc.



Triangular File



Round File.



Half Round File.



Flat File



Square File

ASANSOL ENGINEERING COLLEGE  
MECHANICAL ENGINEERING DEPARTMENT  
PRACTICE OF MANUFACTURING PROCESS (PC ME 391)2022  
JOB-(10)

NAME - AKASH BANERJEE UNIV. ROLL NO- 10800722013 (L23)

DEPARTMENT- Mechanical Engineering GROUP \_\_\_\_\_

OBJECTIVE:- To prepare a Scriber from M.S. round bar as per dimension.

MATERIAL REQUIRED:- Ø6 x 200mm M.S. round bar.

APPARATUS:- Steel ruler, flat & ring tong, sledge hammer, hacksaw, hot chisel and anvil.

OPERATIONS:- Measuring, marking, cutting, chiseling, upsetting and finishing



- i. Describe the method of preparation of punch with neat sketch.
- ii. Describe with neat sketch of (a) Anvil (b) Swage block.
- iii. What do you understand by "open fire" and "stock fire"? Which of the two is more advantageous and why?
- iv. Explain with sketches the following operation.

- (a) Up setting      (b) Drawing down      (c) Bending.

DATE: 22/11/22

  
Teacher's Signature

ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB

Name of the Laboratory Practice of Manufacturing Processes. Date \_\_\_\_\_

Name of the Experiment To prepare a scriber from MS round bar as per dimension.

Subject Code PC ME 391 No. of Experiment \_\_\_\_\_

Name of the Student AKASH BANERJEE

Semester 3<sup>rd</sup> Branch MECHANICAL

University Roll No 10800722013 Batch \_\_\_\_\_

Group Members:

	Name of the Student	University Roll No
1.	Akash Banerjee	10800722013
2.	Gopinath Maji	10800722014
3.	Prem Pratap Nandan	10800722017

Signature of Teacher's/Tech. Assistant:

Date



ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE

Univ.Roll No: (L23)  
10800722013

Section:

Date:

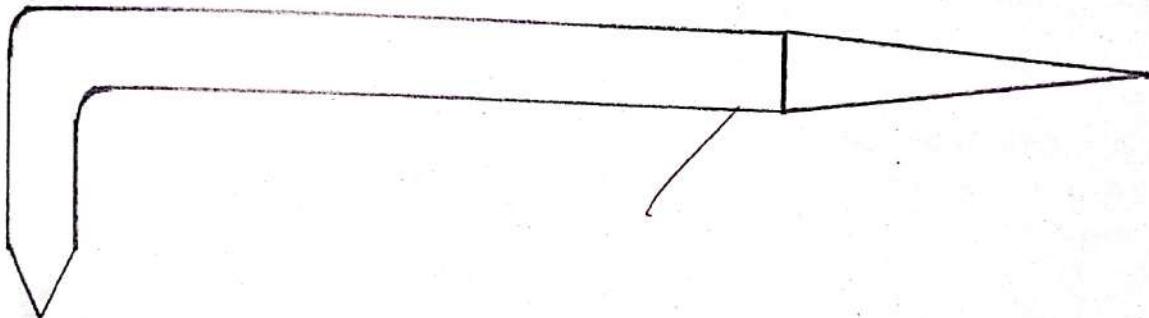
Name of the Lab: Practice of Manufacturing Processes.

Name of the Experiment: To prepare a scribe from MS round bar as per dimension.

Tools/Instrument list:

Steel Ruler	Flat & ring tong	Sledge hammer
Hacksaw	Hot Chisel	Anvil.

Sketch of the Job/Sample:



Operations Performed:

Sl. No	Descriptions	Remark if any
1.	First the required dimensions are measured by steel ruler.	
2.	Then the dimensions are marked.	
3.	Then the marked dimensions are cut by hacksaw.	
4.	Heating it to the forging temperature and hot chisel is used to cut extra part and flat & ring tong is used to grab the product and sledge hammer is used to give the shape to the product.	
5.	At last the finishing has been done and the scribe is prepared.	

Signature of Teacher/Tutor/Workshop instructor



## ASANSOL ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

PRACTICE OF MANUFACTURING PROCESSES LAB

PCME391

Name of the Student: AKASH BANERJEE Univ.Roll No 10800722013

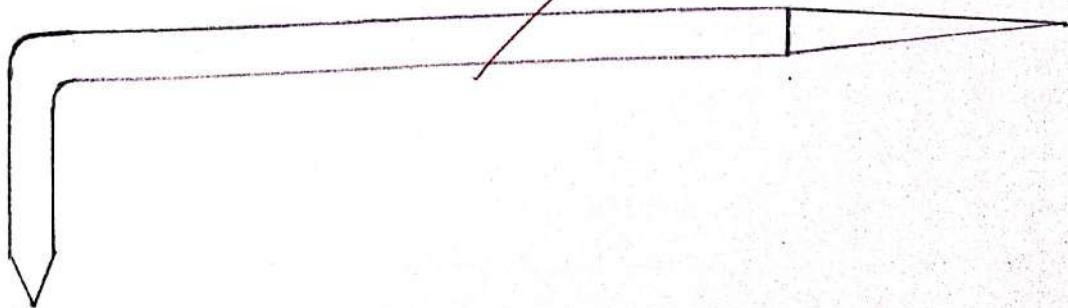
Year 2<sup>nd</sup> Semester 3<sup>rd</sup> Academic Year 2022 - 2023

TITLE:- Preparation of a Scribe from MS round bar.

OBJECTIVE:- To prepare a scribe from MS round bar as per dimension.

Working Procedure :- A scribe is a thin steel rod with a pointed end or ends, one of the ends may be bent at right angles. to allow access to holes. It is used to marked lines on the metal work pieces.

First we have to take a MS round bar and measure the required dimension with the help of steel ruler. Then the measured dimensions are marked with the help of marking tools. Then the marked dimensions are cut with the help of a hackshaw. Then the only portion to be upset is heated to forging temperature and hot chisel is used to cut again the required dimension and the sledge hammer is also used for the heavy blow purpose. And at last the product is done for finishing purpose and scribe is ready.



SIGNATURE OF LAB-IN-CHARGE:

PAGE NO- 50

### Safety Precautions:-

- (1) Always avoid the use of damaged hammers.
- (2) Never strike a hardened surface with a hardened tool.
- (3) Always use the proper tongs according to the type of work.
- (4) The anvil should always be free from moisture and grease while in use.
- (5) Always wear proper clothes, foot-wears and goggles.
- (6) Always put out the fire in the forge before leaving the forge shop.
- (7) Proper safety guards should be provided on all revolving parts.
- (8) Always keep the working space clean.

Q1. Describe the method of preparation of punch with neat sketch.

→ A punch is a tool used to indent or create a hole through a hard surface. They usually consists of a hard metal rod with a narrow tip at one end and a broad flat butt at the other. When used , the narrower end is pointed against a target surface and the broad end is then struck with a hammer or mallet , causing the blunt force of the blow to be transmitted down the rod body and focused more sharply onto a small area.

Punch press mainly converts the rotary motion into linear motion. The main motor provides the power to drive the flywheel through the clutch and connecting rod, the flywheel drives the crankshaft or eccentric gear, and converts the surrounding motion into straight line use. During operation , the drive structure provides power for the up and down movement of the gate , opening and closing the upper and lower die shoes.

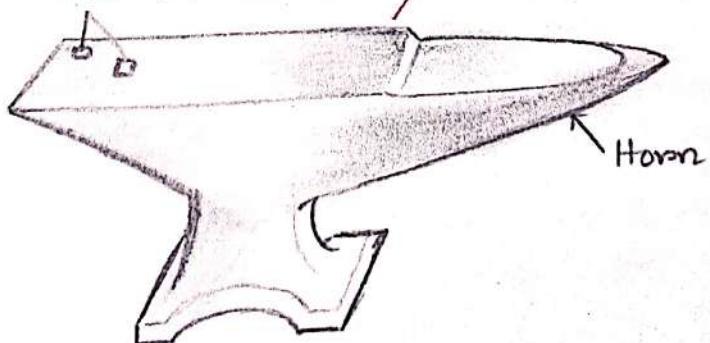


Punch.

Q2. Describe with neat sketch of (a) Anvil , (b) Swage block .

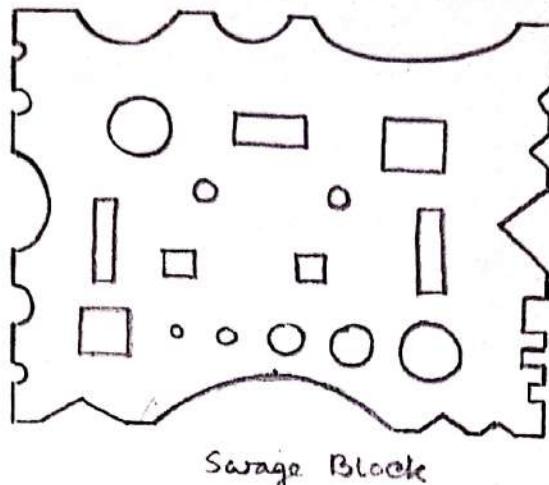
→ (a) Anvil:- An anvil is a metalworking tool consisting of a large block of metal , with a flattened top surface, upon which another object is struck. Anvils are as massive as practical , because the higher their inertia , the more efficiently they cause the energy of striking tools to be transferred to the workpiece.

Holes for chisels and swage blocks.



(b) Swage Block:- A swage block is a large , heavy block of cast iron or steel used in smithing , with variously-sized holes, in its face and usually with forms on the sides. The through holes are of various shapes

and sizes and are used to hold, support or back up a hot bar of metal for further shaping. Operations performed on a swage block include bending, cutting, punching and forming.



Swage Block

Q3: What do you understand by 'open fire' and 'stock fire'? Which one is more advantageous and why?

→ Open Fire :- In making open fire fresh coal is placed on the previously burnt coal. As the fire burns, the coal from sides, coal from top is drawn to the centre of the hearth and its place is occupied by more fresh coal. Open fire is used for general work purpose.

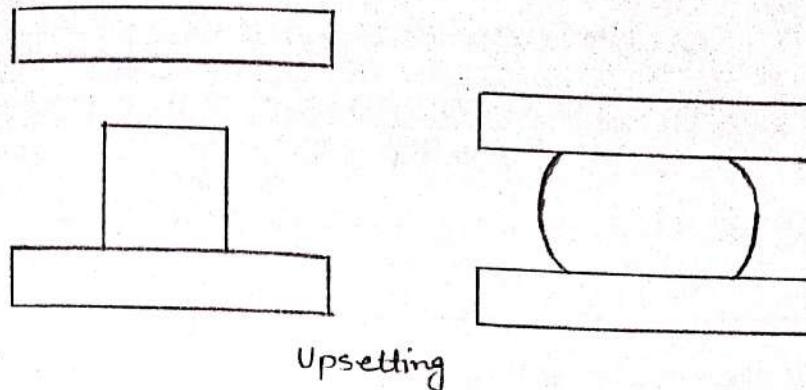
Stock Fire :- In stock fire, the coal is stocked around a wooden block. After packing the coal, the wooden block is withdrawn by turning it. Thus a tunnel is formed with an opening at the top. It is used for heating for a long period of several hours to heat relatively big jobs.

Stock fire is more advantageous because open fires are appalling inefficient, whether coal, gas or wood is being burnt, very little calorific value obtained. So stock fire is more advantageous.

Q4: Explain with sketches the following operation -

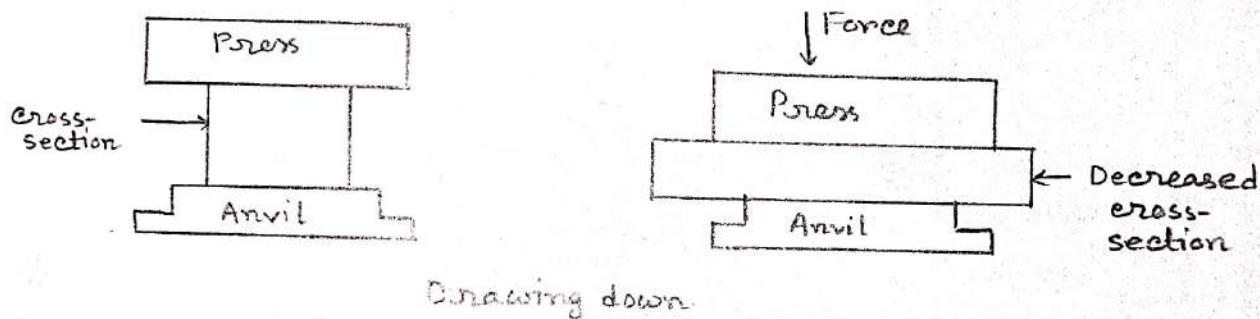
(a) Upsetting, (b) Drawing down, (c) Bending.

→ (a) Upsetting :- Upsetting of metals is a deformation process in which a billet is compressed between two dies in a press or a hammer. This operation reduces the height of a part while increasing its diameter. This forging process is ideal for longer shapes where only one end of parts need to be forged. It plastically deforms metal under great pressure into high strength components of varying sizes.



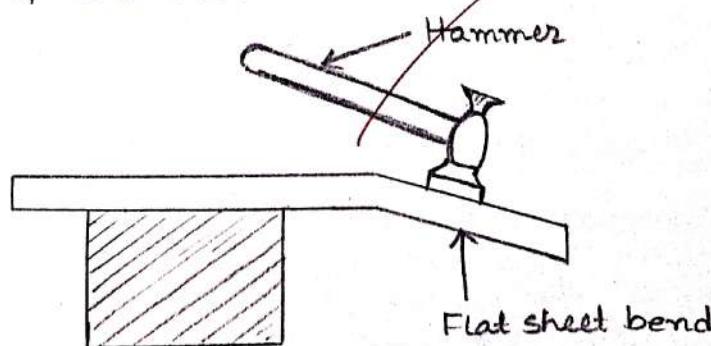
Upsetting

- (b) Drawing down:- The term drawing down is used by a blacksmith to mean thinning a piece of metal by hammering it. This technique often used to forge a taper. It is exactly a reverse process to that of upsetting. In the sense, it is employed when a reduction in thickness, width or both of a bar is desired with a corresponding increase in its length.



Drawing down

- (c) Bending:- Bending begins with heating the metal to cherry red. The metal is placed on the anvil and it is hammered to shape, as seen. A chalk line should be done on the metal, before heating, which marks the point of the bend.



Bending Operation

ASANSOL ENGINEERING COLLEGE  
MECHANICAL ENGINEERING DEPARTMENT  
PRACTICE OF MANUFACTURING PROCESS (PC ME 391)2022

JOB-(09)

NAME- AKASH BANERJEE UNIV. ROLL NO- 10800722013

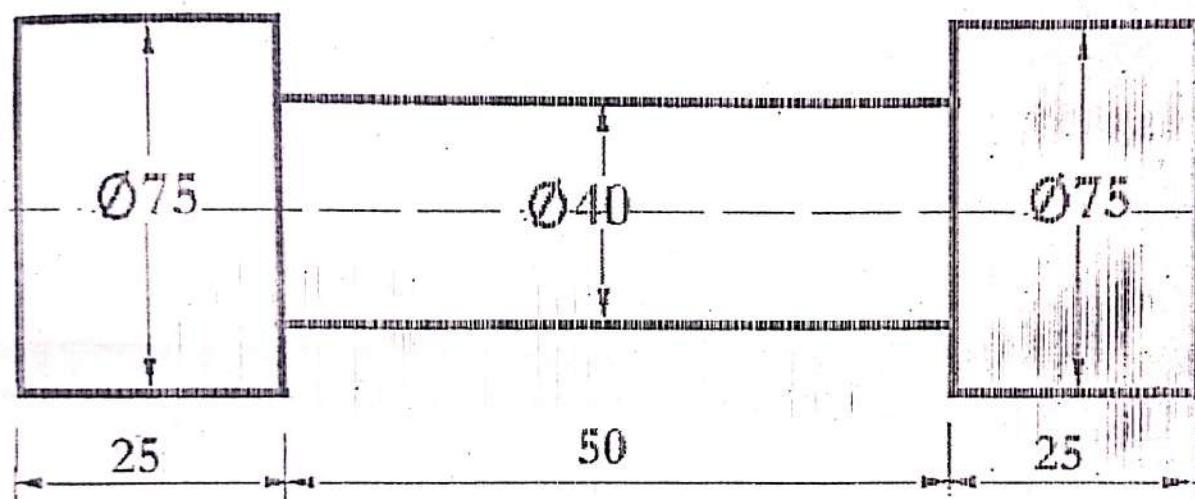
DEPARTMENT- Mechanical Engineering, GROUP -

OBJECTIVE: To Prepare a two piece split pattern from a light wood by wood turning lathe.

MATERIAL REQUIRED: 250mm Length, Diameter 50mm Gamhar/Sal wood.

APPARATUS: Steel ruler, try square, saw, rasp cut file, claw hammer, outside caliper, jenny caliper, tool set wrench, chuck key.

FIGURE:



(All dimensions are in 'mm')

Report the following

1. Describe the method of preparation of two piece split pattern with neat sketch?
2. Write the name of the tools required for making the pattern.
3. What are the common materials used for making pattern? Write their relative merits & demerits.
4. How the layout of a pattern made? Explain (a) follow board (b) core prints.
5. What do you understand by the term gating system? Name the types of gates used in molding?

Date 16/01/23

Teacher's Signature

**ASANSOL ENGINEERING COLLEGE**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**PRACTICE OF MANUFACTURING PROCESSES LAB**

Name of the Laboratory Practice of Manufacturing Processes Date \_\_\_\_\_

Name of the Experiment To prepare a two piece split pattern from a light wood by wood turning lathe.

Subject Code PCME391 No. of Experiment \_\_\_\_\_

Name of the Student AKASH BANERJEE

Semester 3<sup>rd</sup> Branch MECHANICAL

University Roll No 10800722013 Batch \_\_\_\_\_

Group Members:

Sl.No	Name of the Student	University Roll No
1.	Akash Banerjee	10800722013
2.	Gopinath Maji	10800722014
3.	Prem Pratap Nandan	10800722017.

Signature of Teacher's/Tech. Assistant.

Date



## ASANSOL ENGINEERING COLLEGE

## DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Student: AKASH BANERJEE

Univ.Roll No:  
10800722013

Section:

Date:

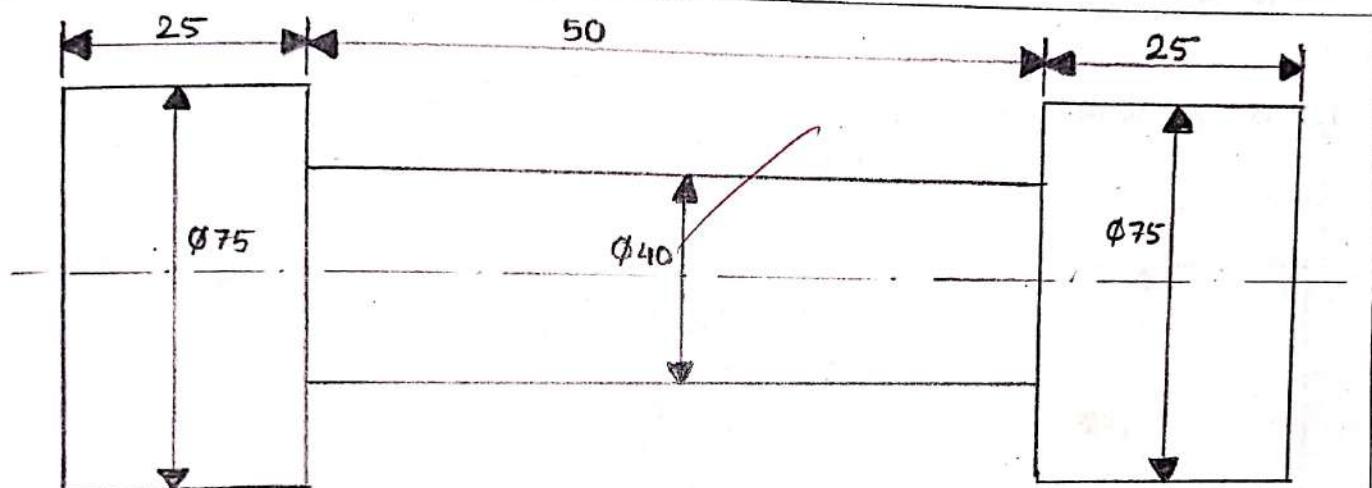
Name of the Lab: Practice of Manufacturing Processes.

Name of the Experiment:- To prepare a two piece split pattern from a light wood by wood turning lathe.

Tools/Instrument list:

Steel Ruler  
Rasp cut file  
Jenny caliperTry Square  
Claw hammer  
Tool post wrenchSaw  
Outside caliper  
Chuck key.

Sketch of the Job/Sample:



Operations Performed:

Sl. No	Descriptions	Remark if any
1.	First we cut the raw piece into desired shape with the help of saw.	
2.	After that we hold the job in lathe machine.	
3.	After that facing and turning done to make desired shape.	
4.	Then polishing done with help of emary paper.	
5.	After polishing two holes made by drills for pins.	
6.	Now the pattern is ready and the molten metal poured into the mould cavity.	
7.	After solidifying we take out the product and filling it for accurate shape.	

Signature of Teacher/TA/Workshop Instructor



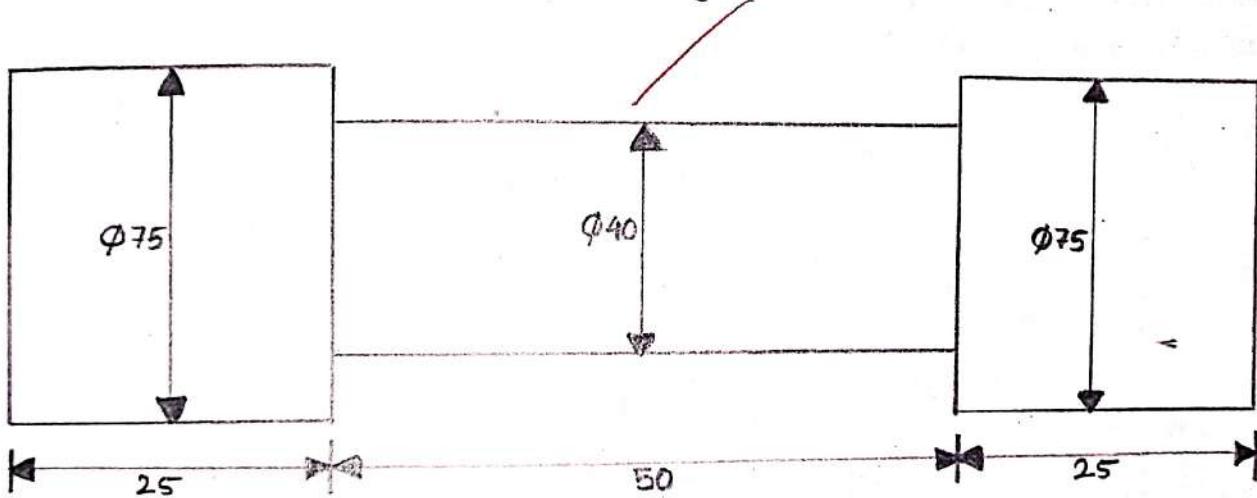
ASANSOL ENGINEERING COLLEGE  
DEPARTMENT OF MECHANICAL ENGINEERING  
PRACTICE OF MANUFACTURING PROCESSES LAB  
PGME391

Name of the Student: AKASH BANERJEE      Univ. Roll No 10800722013

Year 2<sup>nd</sup>      Semester 3<sup>rd</sup>      Academic Year 2022-'23

TITLE:- Preparation of a two piece split pattern from a light wood by wood turning lathe.

OBJECTIVE:- To prepare a two piece split pattern from a light wood by wood turning lathe.



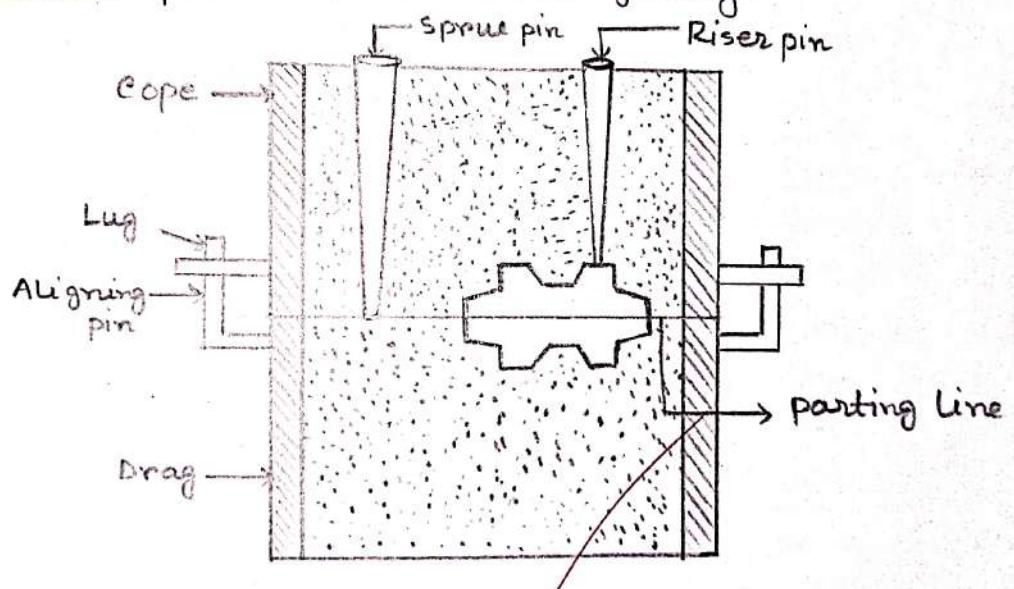
(All dimensions are in "mm")

Safety Precautions :-

- (1) We should aware of flying sand particles while cleaning mould pattern etc.
- (2) Take eye protection.
- (3) Aware of fingers getting pressed in between mould and squeeze plate.
- (4) Aware of falling of castings on feet while transferring from shake out machine to bins.
- (5) Area should be well-ventilated.

(1) Describe the method of preparation of two piece split pattern with neat sketch.

→ At first place the moulding board on a horizontal surface. The drag box is placed above the moulding board. Now one piece of pattern is kept at centre of the drag. The parting sand is spread before we keep the pattern. Facing sand is sprinkled over the pattern to a depth of 2 mm and greensand is filled over it. Then proper ramming is done on the greensand to get a air-free packing. Excess sand is removed with strike off bar. The drag is inverted upside down. Then the cope box is placed over the drag box. Now the parting sand is sprinkled over the parting surface. The other piece of pattern is placed over the drag pattern. Then facing sand is riddled over the pattern to a depth of 5 mm and riser is placed over the pattern & another sprue pin above parting surface. Now green sand is filled over it. Then the riser pin and sprue pin gets removed from the green sand. And atlast pattern is removed gently.



(2) Write the name of the tools required for making the pattern.

→ (a) Cutting Tools:- Cutting tools like saws, chisels, drillers hammers are used in pattern making.

(b) Measuring Tools:- Measuring tools like steel ruler, jenny calipers, outside calipers are used for measuring purpose in pattern making.

(c) Holding Tools:- Holding Tools like bench vice, Cr-cramp are used.

(d) Other Tools:- Files, scrapers are used for finishing purpose.

(3) What are the common materials used for making pattern? Write their relative merits and demerits.

→ (a) Wood :-

- Merits :- (i) It is cheap and available in abundance.  
(ii) Can be easily shaped into various designs.  
(iii) Light weight

- Demerits :- (i) It is susceptible to moisture, due to which it may crack or split.  
(ii) Due to low resistance, it wears out quickly.  
(iii) Its life is shorter.

(b) Metal :-

- Merits :- (i) The pattern life is much longer.  
(ii) Do not absorb moisture.  
(iii) More stronger.

- Demerits :- (i) Metal patterns are expensive.  
(ii) It has a tendency to rust.  
(iii) Patterns are heavier in weight.

(c) Plastic :-

- Merits :- (i) Light in weight.  
(ii) High strength.  
(iii) High resistance to wear.

- Demerits :- (i) These are fragile.  
(ii) These may not work in machine molding where chances of shock conditions.

(d) Wax :-

- Merits :- (i) Provide a very good surface finish.  
(ii) There's no chance of the mold cavity being damaged.  
(iii) Provide high accuracy for costs.

- Demerits :- (i) Equipment and process costs are high.  
(ii) The process requires high level of skill.

(4) How the layout of pattern made? Explain - (a) follow board,  
(b) core prints.

→ A pattern layout is simply the way in which your motifs are arranged within the pattern. Not all layout styles work for all motifs. There are few ways of pattern layout. They are - open layout, lengthwise centrefold, off centre lengthwise fold, crosswise centrefold etc.

(a) Follow Board :- This pattern is adopted for those castings where there are a few portions which are structurally weak and if not supported correctly are possible to break under force of ramming. Therefore bottom board is adapted as a follow board to intimately fit contour of weak pattern and thus support it during the ramming of drag.

(b) Core Prints :- Core print is an open space provided in the mould for locating, positioning and supporting the core. The density of core is less than the density of metal being poured in the cavity. So there will be an upward buoyancy force on the core. To overcome this defect the coreprints are used.

(5) What do you understand by the term gating system? Name the types of gates used in moulding.

→ Gating systems are channels through which molten metal flows into the die cavity. The primary purpose is to ensure a smooth and complete flow between the ladle and the cavity of the mould. To achieve perfect casting it is important to have a well-designed gating system.

According to their position in the mould cavity gates are classified as -

- (a) Top gating,
- (b) Parting-line gating,
- (c) Bottom gating.