JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 01/04/2024

EXPERIMENT Fitter Shop (01)

EXERCISE No. 01

NAME Tathagata Sur

CLASS B.I.S.E.-VG1 SEC A1 ROLL No. 002310501030

TITLE : Fitter Shop

OBJECT :

Procedure

1. Rust was removed from the cylindrical rod given, using a bench file and a flat file. The rod was fixed on the bench vice and the flat file was used to remove the rust till the 2 faces of the rod became rust free.
2. The cylindrical rod was dipped in wet chalk till a uniform layer was produced over it.
3. The square to be made was marked out on the layer of chalk by placing it on the V-block and doing the necessary outline using the surface gauge.
4. After creating an outline of the square, the diagonals were marked out using a scriber and a punch was made on the centre using a prick punch and a ball peen hammer.
5. A maximum radius circle was constructed having the centre found out earlier (using a divider) and arcs of equal length was scribed out on the circle and joined, giving us the necessary hexagon to work upon.
6. The extra material is then chipped out using a chisel (at an angle of 70°)

by placing the cylindrical rod on the vice.

#. The surfaces are then filed using a flat file till the surface became uniform, and level which is determined by a try-square.

Tools and Its Uses

1) **Flat File:** This file has parallel edges for about 2/3 of its length and then it tapers in width and thickness. The faces are double cut while edges are single cut. They are used for filing purposes, i.e. to remove the material by rubbing it on the metals.

2) **Marking Block:** This is also known as surface gauge. It is used to find the centre of a piece of round section material. It is normally used to scribe parallel lines. It consists of a scriber mounted on an adjustable stand and is used to test the accuracy of plane surfaces.

3) **V-Block:** In a V-block, grooves are provided to hold the round objects longitudinally.

4) Try Square: It is used for checking the squareness of two surfaces. It consists of a blade made of steel, which is attached to the base at 90°. The base is made of cast iron / steel. It is also used to measure the straightness of a surface.

5) Divider: Used to construct arcs of equal length on the circle.

6) Ball peen hammer: Used to strike punches and chisels (usually performed by the flat face of the hammer).

7) Prick punch: It is a hard metal rod with a sharp tip at one end and a blunt butt end at the other, which is hammered by a ball-peen hammer to strike a punch.

8) Scriber: It is made of a high carbon steel and is hardened from the front edge.

9) Chisel: It is used to cut a hard metal struck with a mechanical power such as a strike of a ball peen hammer.

QUESTIONS

⟨1⟩ Name several common forms of vice.

Some common forms are :—

(a) Hand vice
(b) Bench vice
(c) Machine vice
(d) Carpenter vice
(e) Shaper vice
(f) Leg vice
(g) Pipe vice
(h) Pin vice

⟨2⟩ Name several types of chisels and state where they are used.

(a) Flat chisel : used to cut bars and rod to reduce surfaces and to cut sheet metal that is too difficult.

(b) Cross-cist chisel : used for cutting grooves and slots (squarish)

(c) Round nose chisel : used for cutting semi-circular grooves for oil ways in bearings.

(d) Diamond point chisel : It is used for cleaning out corners or difficult places and pulling over centre punch marks wrongly placed for drilling.

(e) Side cut chisel : It is used at times when other types of chisels cannot be used.

(3) How would you specify a file? What is a safety edge file? Distinguish between cross filing and draw filing.

Files are multi-point cutting tools. It is used to remove the material by rubbing it on the metal.

Safety-edge files have no cutting surface on the thin edges of the file.

Cross-filing: Used for efficient removal of maximum removal of metal in the shortest possible time. The file must remain horizontal throughout the stroke (long, slow and steady) with pressure applied on the forward disk.

Draw-filing: This method is used to remove file marks and for finishing operations. Here, the file is gripped as close to the work as possible between the hands.

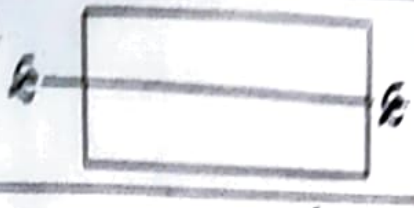
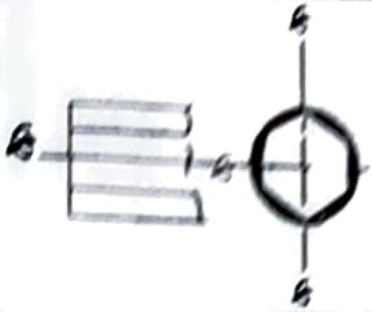
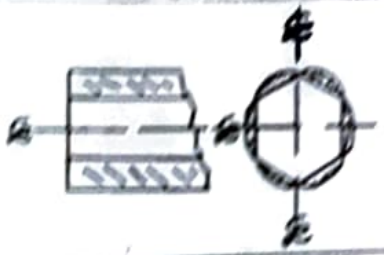
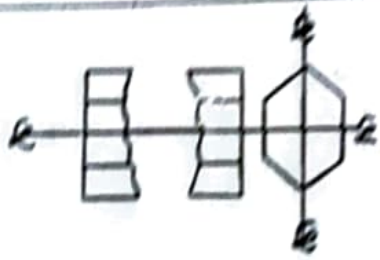
(4) How is a vice designated?

The size of the engineer's vice is stated by the width of the jaws. For e.g. - 150 mm parallel jaw bench vice is designated by lead or pitch and range and type of thread used.

Fitter Shop
Job No.-1

JADAVPUR UNIVERSITY
MECHANICAL ENGINEERING DEPARTMENT

MAKING A HEXAGONAL PRISM
MATERIAL : M.S. Rod ½" dia 1½" thick

OPERATION NO	SKETCH	OPERATION	TOOLS	GAUGES
1.		Filling burrs and squaring ends	VARIOUS, 10" flat file (medium)	Try square, rule and calipers
2.		Marking out Hexagon after brushing the surface with wet chalk	V—Block, Marking Gividers, Try Square, hammer, prick Punch.	
3.		Chipping	Vice, flat chisel (cold) hammer	
4.		Filling	Vice, soft metal clamp flat file	Combination set, rule and calipers

• Get detailed instructions from the Class Teacher.

Questions:

1. Name several common forms of vices. How a vice is designated ?
2. Name several types of chisels and state where they are used.
3. How would you specify a file ? What is a safety edge file ?
   Distinguish between Cross-filling and draw filling.

Name Tathagata Sur Class B.C.S.E-V.G.1 Roll 030

Class Teacher Prof. Dipanjan Saren Dated 01/04/2024

JUP - 213/2011-2012/1500

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 08/04/2024

EXPERIMENT

EXERCISE No. 02

NAME Tathagata Sur

CLASS B(SE-UG1) SEC A1 ROLL No. 002310501030

TITLE : Welding Shop

OBJECT :

(Q1) What is welding? Define fusion welding and plastic welding.

Ans Welding is a type of metal joining process by the application of heat where coalesence of material takes place with or without the application of pressure and with or without the addition of filler material.

Fusion Welding: In this case of welding, we have to apply heat upto metal's melting point at the joining point. The metals will join automatically and no pressure is required. For e.g.- Thermal Arc welding, Gas welding, Thermit welding.

Plastic welding: In this case of welding, we have to apply heat at the joining zone upto its plastic state and then apply Load or pressure. a metal reaches its plastic state when its red hot. the metals join on application of pressure. For e.g.- Friction welding

(Q2) Explain the different kinds of welding positions with neat sketch.

Lap Joint

Butt Joint

Single V Butt Joint

Double V Butt Joint

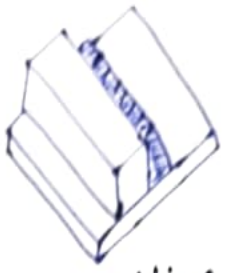
T-Joint

L-Joint

Edge-joint

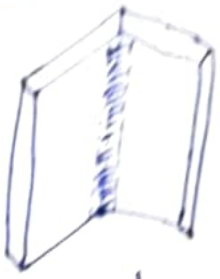
Single Strap Butt Joint

Double Strap Butt Joint



Flat position

Horizontal position



vertical position

overhead position

(Q3) Explain the principle of arc-welding.

Ans Arc-welding is the most versatile of all welding techniques and about 50% of industrial application. It uses a coated consumable electrode. This coating produces a gas shield and slag to protect the weld from the atmosphere. Thus, this welding process is called shielded MAW.

To start the arc, initially the welder has to briefly touch the tip of the electrode to the workpiece to complete the circuit. Then the electrode is removed to slight distance from the workpiece which initiates an arc. The arc so produced generates intense heat which melts the tip of the electrode, the coating and a portion of the adjacent base metal. This molten metal is allowed to solidify together to form a solid inseperable joint. The slag formed is then easily chipped off.

(Q4) Give a list of equipment required in general for electric arc-welding.

Ans (i) welding machine: It supplies the required

voltage & current for welding. AC and DC inputs results in different output.

AC welding: voltage: 50-80 V, current = 100 A

DC welding: voltage = 17-35 V, current = 100-120 A

(ii) Poles: If DC, one +ve and one -ve and if AC, one-phase and one neutral

(iii) Cable: Connection between welding table & machine.

(iv) welding Table: Generally at +ve terminal

(v) C-shaped clamps

(vi) Electrodes/Electrode Holder: 2-3 mm in size

(vii) Precautionary measures: Apron, Guard, fareshield

(Q5) What safety precautions are to be taken?

Ans: (i) welding must be operated and visualised through a glass. As large quantities of visible light, UV-rays & IR rays are emitted, a handguard & helmet must be used.

(ii) Poisonous fumes are emitted, one should always maintain distance.

(iii) Burns can occur from coming in contact with hot parts. One should be covered from head to toe wearing apron, handgloves, full sleeves etc.

(iv) One should operate carefully and avoid the prevalent mechanical hazards.

(Q6) What are the different types of welding?

Welding process

- Gas welding
  1. Oxy-acetylene
  2. Air-acetylene
  3. Oxy-hydrogen
- Resistance welding
  1. Butt
  2. Spot
  3. Seam
  4. Projection
- Arc welding
  1. Carbon arc
  2. Metal arc
  3. Plasma arc
  4. Gas metal arc (MIG)
  5. Gas tungsten arc (TIG)
- Newer welding
  1. Electron beam
  2. Laser
- Solid-State welding
  1. Friction
  2. Ultrasonic
  3. Diffusion
  4. Explosive

(Q7) What are the welding defects?

(1) Poor fusion: Due to faulty welding conditions, there is lack of thorough and complete union between the deposited & parent metal.

(2) Under-cut: Due to improper posⁿ of electrode or torch-tip, a groove is melted into the base metal adjacent to the toe of weld.

(3) Porosity: Formation of blow holes, gas pockets or roughness on weld surface.

(4) Cracking and Slag inclusions

Procedure

(1) The given mild steel pieces are thoroughly cleaned of rust.

(2) The two pieces are positioned on the welding table such that they are seperated slightly.

(3) The electrode is fitted into the electrode holder, the current is meanwhile set to proper value.

(4) Wearing the face shield, the arc is struck and holding the 2 pieces together first run of the weld is done.

(5) The second run of the weld is done with proper wearing and with uniform movement. The electrode is kept at about 15° from the vertical and in the direction of welding.

(6) Any scale formed is removed with the help of a chipping hammer.

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 22/04/2024

EXPERIMENT 03

EXERCISE No.

NAME Tathagata Sur

CLASS BISE - UG1 SEC A1 ROLL No. 002310501030

TITLE : Machine Shop

OBJECT :

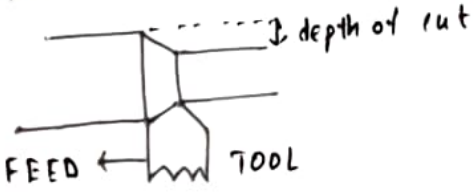
(2) Write short notes on:-

(a) Step turning / Straight turning and Taper turning

Turning is the most commonly used operation in lathe. By turning operation, excess material from the work piece is removed to produce a cylindrical or cone-shaped surface. Two of the common types of turning are:-

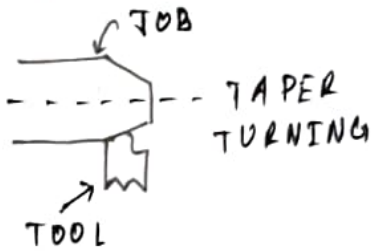
(i) Straight turning

In this operation, the work is held in the spindle and is rotated whole, the tool is fed past the the work piece in a direction parallel to the axis of rotation.



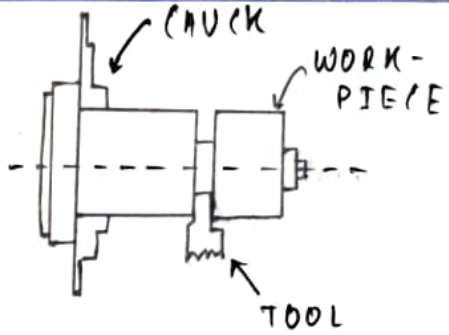
(ii) Taper turning

A taper may be defined as a uniform increase/decrease in diameter measured along its length.



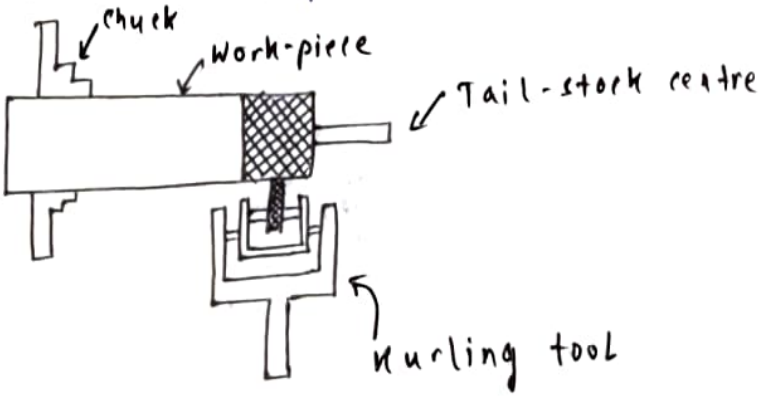
(b) Grooving

It is the art of making grooves of reduced diameter in the work-piece.



(c) Knurling

It is the process of embossing a diamond shaped/straight line pattern into the surface of workpiece. It is eventually, roughening of the surface and is done to provide a better gripping surface.



(d) Facing

It is marching the ends of a piece of stock smooth, flat and perpendicular to the lathe axis. Facing is used to cut work to the desired length and to produce a surface from which measurements can be taken.

(e) Thread cutting

The rotation of the lead screw is used to transverse the tool along the work to produce screw thread. The lead screw is a long threaded shaft used as a master screw, and is brought into operation when threads have to be cut.

Tool List

(1) **Tool holder**:- Used to secure the lathe tool in place during a range of processes including facing, threading and boring.

(2) **Box spanner**:- It is a tube with six-sided sockets on both ends and turned with a short length of rod called tommy bar.

(3) **1/2" spanner**:- This is a tool which is used to provide grip & mechanical advantage in applying torque to turn objects.

(4) **Screw driver**:- This is used for inserting (screwing) and removing (unscrewing) screws.

(5) **Job cather**:- It is a device which clamps around the work-piece and allows the rotatory motion to be transmitted to the job piece.

(6) **6" steel Rule**:- Used for measuring purposes.

(7) **Metal strip**:- Measuring purpose

Outside Caliper:- Measuring the outside diameter of the job-piece.

(8) **Turning tool**:- Used to remove unwanted material from the job-piece.

(9) **Right hand cutting tool**:- used to remove material while moving Leftward. The name is derived from its analogy with human right hand.

(10) **Round nose tool**:- Used to provide a fine finish to the job-piece.

(11) **Thread cutting tool**:- Used to create threads on the job-piece. When used, it produces a helical ridge of uniform section on the work-piece.

Procedure

(1) **Marking**:- A mild steel bar is taken and its dimensions are measured.

(2) **Holding and centering**:- The job is held and centering is done with the help of surface gauge and chuck key. It is confirmed that the job axis coincides with the lathe machine.

(3) **Straight turning**:- Performed to obtain the job's required diameter.

(4) **Taper turning**:- After completion of straight turning, taper turning is done to the required length of the job as per the required dimension.

(5) **Grooving**:- Grooves are made into the job as per requirement using the groove operation.

(6) **Knurling**:- One side of the job piece is subjected to knurling operation so as to provide a better grip.

(7) **Thread cutting**:- Using the lead screw of the lathe machine, and the V-edge tool, threads are made into the job piece.

(8) **Facing**:- Finally facing is done to make the face straight and then checked whether the requirements are made.

Questions

(Q1) How is a lathe specified? How many spindle speeds are there in your lathe? Why are different spindle speeds necessary?

Ans: A lathe is specified by:-

(i) Swing - The largest diameter that can be swung for the lathe bed.
(ii) The distance between headstock and tailstock centre.
(iii) Length of a bed in meter.
(iv) Pitch of the lead screw.
(v) Horsepower of the machine.
(vi) Speed range and the no. of speeds of HS spindle.
(vii) The weight of the machine.

According to the provided info, there were six spindle speeds in the lathe as follows: 80, 110, 190, 250, 400 and 600.

Different spindle speeds are required because of:-

(i) Properties of material of workpiece/job.
(ii) Machining operation to be performed on the workpiece.

(Q2) Define cutting speed, feed and depth of cut.

Ans

Cutting speed:- Speed at which the work moves concerning the tool. The proper cutting speed for a given job depends upon the hardness of the material of the tool bit and how feed and depth of cut is required.

Feed Rate:- It is defined as the distance the tool travels during one revolution of the part. Cutting speed and feed determines the surface finish, power requirements and material removal rate. The primary factor in choosing feed and speed is the material to be cut. However; the tool material, rigidity of the workpiece, size and condition of the lathe, and depth of cut is also to be considered.

Depth of cut:- It is the distance that the tool bit moves into the work, usually measured in thousandths of millimeter. General machine practise is to use a depth of cut upto five times the rate of feed, such as rough cutting stainless steel using a feed of 0.020 inches per revolution and a depth of cut of 0.1 inches which would reduce the diameter by 0.200 inch.

(Q3) Select the correct rpm for turning a M.S. bar 30 mm in dia. and 160 mm long with an HSS turning tool in a lathe. The lathe has got the following rpm: 48, 76, 116, 182, 270, 421, 646, 1000. Assume proper cutting speed.

Ans = Let the cutting speed for the M.S. bar be 425 mm/min.

We know,

$$\text{cutting speed} = \frac{\pi \times \text{Diameter} \times \text{RPM}}{60}$$

$$\Rightarrow \text{RPM} = \frac{\text{cutting speed} \times 60}{\pi \times \text{Diameter}}$$

$$= \frac{425 \times 60}{3.14 \times 30} = 270.70 \text{ rpm}$$

Thus, the 270 rpm speed is appropiate.

(Q4) A job held in between centres of a lathe, is found to turn taper when feed is given by - (a) operation of the compound slide and (b) operating the Longitudinal feed mechanism. State possible cause and remedies.

Ans = The job is found to turn taper because -

(1) Swelling of the compound by mistake. The compound rest has by mistake rotated from the centre Line of the lathe

by an angle. Hence the feed is given in an inclined manner which is not parallel, resulting in tapering of the job. Remedies include checking whether the compound rest is ll to the centre Line of Lathe and make changes otherwise.

(ii) Axis of the job is not collinear (Tail stock set over method of tapering). By mistake, due to being a long job and wrong adjustment of the tail-stock, the axis is not ll to the motion of carriage hence resulting in tapering. Remedies include adjusting the tail-stock in such a way that the axis of job is parallel to motion of carriage.

(Q5) what method is adapted for locating the centres of your job? what is a centre drill?

Ans Centre of job is located using a V-block and scribber. We placed the job on the V-block and drew a Line with the scribber, then we rotated the job on the V-block to draw another edge with scribber. This was repeated to form a square, whose diagonals intersected at the centre of the job.

centre drill is a tool for producing a conical hole in the face of the job at the centre, to make the bearing support of the lathe centre when the job is to be held between the Headstock and Tailstock.

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 20/04/2024

EXPERIMENT 04

EXERCISE No.

NAME Tathagata Sur

CLASS B.C.S.E- UG1 SEC A1 ROLL No. 002310501030

TITLE : Forging Shop

OBJECT :

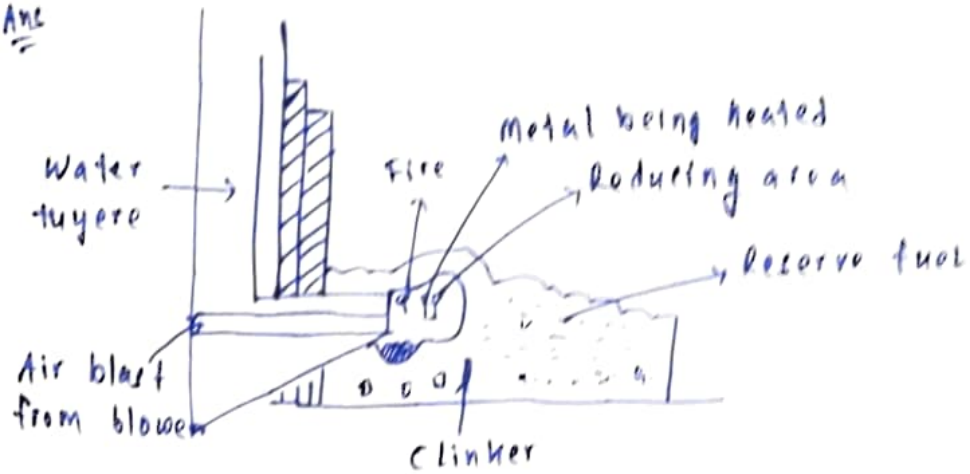
Tools

1. **Ball-peen hammer**: In the forging process, the blacksmiths use it to deliver blows.
2. **Round hollow bit tong**: They are mostly handy for holding round iron or octagonal steel. In our case, we use it for holding square material (the job).
3. **Measurement gauge**: Used to determine whether the drawn out job piece is of the required size or not.
4. **Job piece**: Bar made of mild steel used for drawing out.
5. **Poker**: It is a bent rod used to strike the fire. Poker is made of mild steel.
6. **Shovel**: Used to place coal into the furnace hearth.
7. **Blower**: Used to supply air at high pressure to the hearth.

Questions

(Q1) Prepare a sketch of the open-hearth used. How much is the blast pressure?

Ans



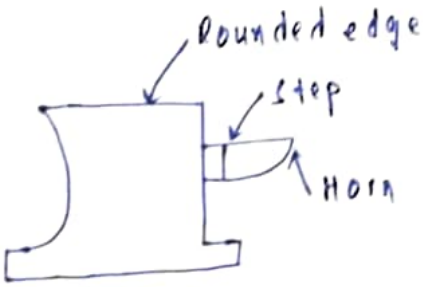
Open-hearth furnace

The blast pressure is 1-7 ounce/sq. inch

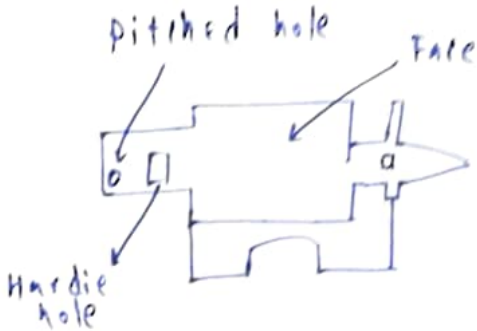
(Q2) which fuel is used for the open-hearth?

Ans A high carbon content with few impurities fuel is used, also known as hard coke.

(Q3) Sketch an anvil and state the functions of each part.



Side-view



Top-view

① Face:- Generally made of hardened steel and tempered to resist the blows of the smith's hammer so that the anvil face doesn't deform under repeated use.

(2) Horn:- Mostly made up of unrecidual steel or iron and used in bending operations. Sometimes it is also used by some smiths as an aid in "drawing down" stock.

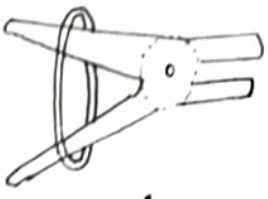
(3) Step:- It is the soft area of the anvil and mostly used for cutting, whose purpose is to prevent damaging the steel face of the anvil by conducting such operations there.

(4) Hardie hole:- It is a square hole in which specialized cutting tools are placed. Also used in punching and bending operations.

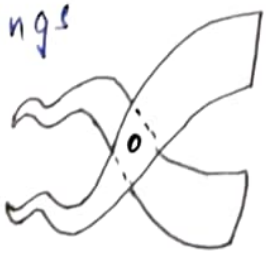
(5) Pritchel hole:- Small round hole used mostly for punching operations.

(Q4) Name the different types of tongs.

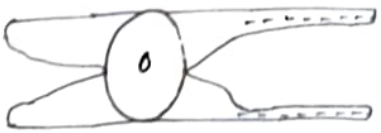
Ans (i) Flat-jawed tongs
(ii) Hollow-bit tongs
(iii) Pick up tongs (iv) Side tongs
(v) Chisel tongs (vi) Link tongs
(vii) Tool/Box tongs



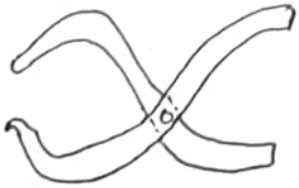
Flat tongs



Rivet or ring tongs



Straight-Lip fluted tongs



Crad tongs

Procedure

① The job is taken and inserted into the open-hearth furnace with the help of the round-hollow bit tongs, and taken out when it becomes yellow hot.

② Upon taking out with the help of those tongs, the job piece is put on the face of the anvil and struck with ball peen hammer from middle to edge.

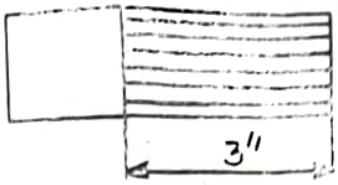
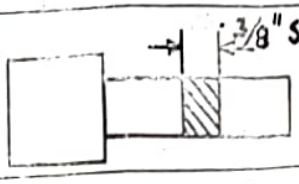
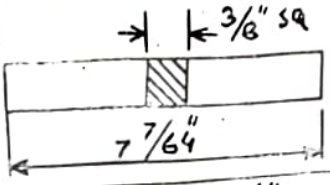
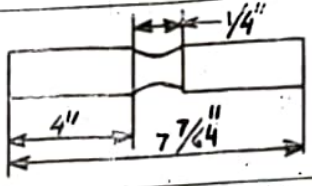
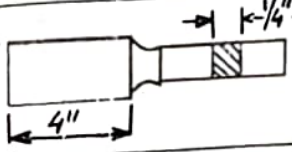
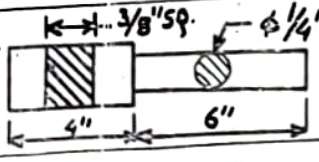
③ After striking, when the job piece cools down such that its emits no light, the piece is made to pass through a measurement gauge. If it does not pass, steps ① and ② are done again. If it does pass the side of the job-piece which was not drawn out is subjected to steps ①, ② and ③. Finally, we get a drawn out job piece of required cross-section.

JADAVPUR UNIVERSITY

MECHANICAL ENGINEERING DEPARTMENT

Forging Shop
Job 1

DRAWING OUT-OPERATION
MATERIAL M.S. BAR $\frac{1}{2}$" Sq. x 4" Long

OPERATION NO.	SKETCH	OPERATIONS	TOOLS	GAUGES
1.		Heat one end of the bar to yellowish heat (1260°c)	Smith's hearth	
2.		Draw out to makes 3/8" sq. section	Anvil, Tongs, hammer	Gauge or calipers & rule
3.		Repeat operation (2) for the other end*	Anvil, Tongs Flatter	Gauge calipers & rule
4.		Necking	Anvil, Tongs hammer Fullers (Top & Bottoms)	
5.		Draw out to make. Sq Section	Anvil Tongs hammer	Gauge or Calipers & Rule
6.		Finish to $\frac{1}{4}$" f round . and out to size	Anvil, Tongs. hammer	Gauge Calipers & Rule

Question :

1. Prepare sketch of the smith's Hearth you have used . How much is the blast pressure ?
2. What fuel is used for the smoths Earth?
3. Sketch an anvil and state the functions of earth part.
4. Sketch and name the different types of tongs.

Name Tathagata Sur Class BCSE-UG1 Roll 030

Class Teacher Prof. Dipanjan Saren Dated 20/04/2024

JUP - 214 2011-2012/1500

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 15/04/2024

EXPERIMENT

EXERCISE No. 05

NAME Tathagata Sur

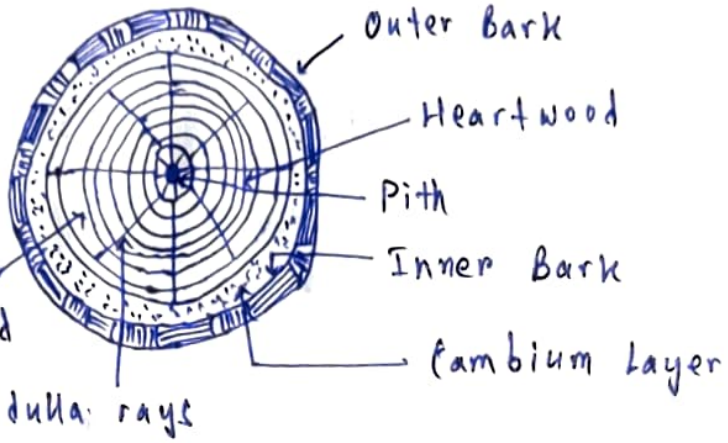
CLASS B.I.S.E. - UG1 SEC A1 ROLL No. 002310501030

TITLE : Carpentry Shop

OBJECT :

(1) Sketch the cross section of an exogeneous trees. Discuss the various parts of this tree.

Ans =



An exogeneous tree has three major parts:-

(a) Crown Part: It consists of leaves and small branches.

(b) Trunk Part: The central position called log, timber etc.

(c) Root Part: It is underneath the soil line.

(2) What is the difference between hard wood and soft wood?

Ans =

Hardwood	Softwood
(i) Hardwood trees belong to angiosperms.	(i) Softwood trees belong to gymnosperms.
(ii) Hard, denser, heavier and does not split or break easily.	(ii) Light, less dense and tends to split more and easier to cut.
(iii) More expensive.	(iii) Economical.
(iv) Grows at a slower rate.	(iv) Grows faster than hardwood.
(v) More resistant to fire.	(v) Less resistant to fire.

Name T. Sun

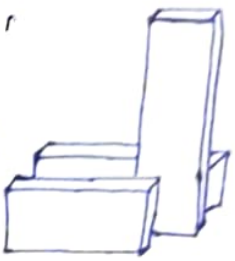
Roll 030

(vi) Have xylem with vessels to transport water throughout the tree.	(vi) These trees lack vessels and have medullary rays and tracheids to transport water.
(vii) It is mostly used to produce high durable and high quality furniture. E.g.- willow, mapple, teak	(vii) These have a wide range of applications such as windows, doors, medium-density, fiberboard, paper etc. E.g.- pine cedar, Landres

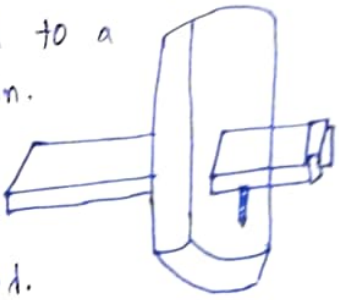
(3) Write the name with neat sketches, the various types of tools used in carpentry.

Ans = Different kinds of hand tools used in carpentry are:-

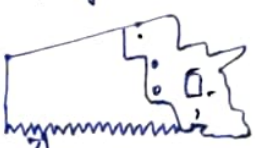
(i) Try square:- The squares are used for marking and testing angles of 90°. It consists of a steel blade, riveted into hard wood block which has a protective brass plate on its working surface.



(ii) The Marking Gauge:- It has one marking point. It goes an accurate cut-line parallel to a true-edge, usually with the grain.

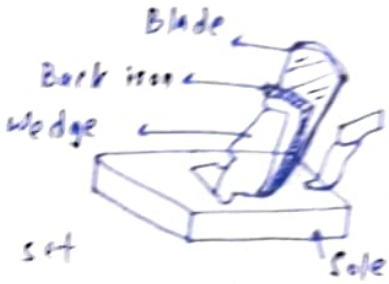


(iii) Handsaw:
They are used for cutting across the grain in thick wood.

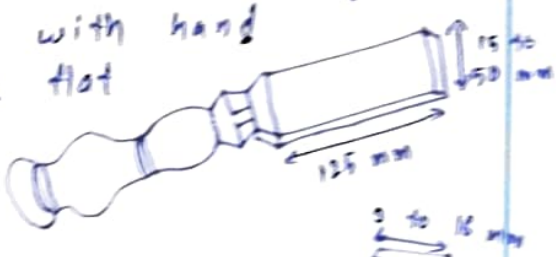


They are 600 to 650 mm long with 8-10 teeth per 25 mm. The action of the teeth is that of a series of knives which severe fibres and force out wast wood in the form of saw dust.

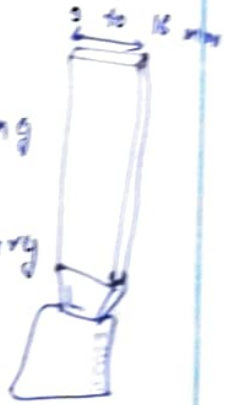
(iv) Jack plane:- It is used for trimming up a piece of wood. It consists of a block of wood into which the blade is fixed by a wooden wedge. The blade is set an an angle of 45° to the sole. On the cutting blade, another blade is fixed called cap iron or black iron which causes to curl whey they are cut. Jack planes are available from 350 to 425 mm in length with blade about 50-75 mm wide



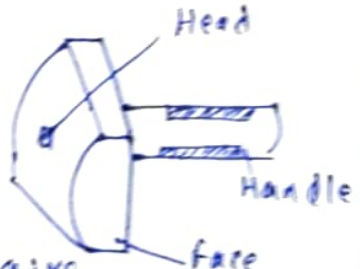
(v) Firmer chisel: It is most useful for general purposes and maybe used with hand pressure or mallet. It has flat blade about 125 mm long. The width varies from 15 to 50 mm.



(vi) Mortise chisel: It is used for chopping out mortises. These chisels are designed to withstand heavy work. These have heavy deep blade with a generous shoulder or collar to withstand the force of the mallet blows on the handle.



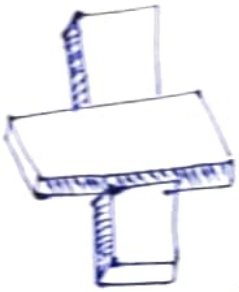
(vii) Mallet: It is a wooded headed hammer of round or rectangular cross-section. The striking face is made flat to work. A mallet is used to give light blows to cutting tools with wooden handles.



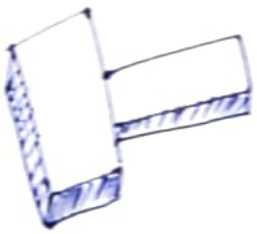
(viii) Rasps and files:- These are useful for cleaning up some curved surfaces. for instance, certain concave shapes are so small that the spoke shave cannot enter them and here file is invaluable. Strathes left by file can be removed by scraper and glass paper.

(Q4) Sketch the various wood working joints.

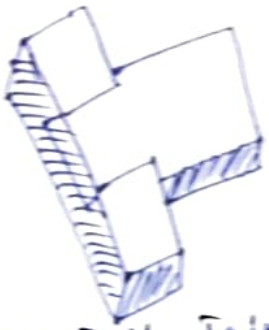
Ans:-



Cross lap joint



Tee joint



Dove Tail Joint

(Q5) What are the various operations that can be performed in carpentry shop?

Ans:- The different operations that can be done to finish the work into desired shape and size are:-

(i) Marking (ii) Sawing (iii) Planning
(iv) Chiselling (v) Boring (vi) Grooving
(vii) Rosetting (viii) Moulding

Procedure

(1) A block of wood is sawed off and is levelled off using the jack plane.

(2) Using the marking gauge a center line along the length and breadth is made.

(3) Using the hand saw, the wooden block is divided into two equal parts.

(4) The centre of each block is marked and the liner are equally drawn, to the width of the block.

(5) The marked pieces are attached to the bench vice and the centre marked squares are sawed off.

(6) The centre pieces are finally removed using chisel and mallet. Finishing touches and remaining splinters are removed so that both pieces fit perfectly.

Tool - List

1. Jack-plane
2. Hand saw
3. Mallet
4. Marking gauge
5. Try square
6. Chisel

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Department of Mechanical Engineering

DATE 06/05/2024

EXPERIMENT Moulding

EXERCISE No. 06

NAME Tathagata Sur

CLASS BISE - UG1 SEC A1 ROLL No. 002310501030

TITLE : Moulding Shop

OBJECT :

(Q1) Define moulding.

Ans: Moulding is the process of manufacturing by shaping liquid molten or pliable raw material using a rigid frame called mold. A mold itself is made using a pattern. It is the mid-operation of casting.

(Q2) Name the different tools used in hand moulding, stating their use.

Ans: (i) Shovel: It is used for transferring sand from one place to another.

(ii) Riddle: It is used to seperate unwanted particles from sand.

(iii) Rammer: It is used for ramming to compress sand around pattern as well as moulding box.

(iv) Trowell: It is used for making a surface for the moulding box to be plain. It is also used for transferring sand and for repairing mould.

(v) Slick: A double ended spoon used for finishing and repairing small surfaces of mould.

(vi) Lifter: To remove unwanted particles from mould.

(vii) Strike-off bar: Used to seperate excess sand from mould.

(viii) Sprue pin: Used to prepare riser and runner.

(ix) Gate cutter: It is used to prepare a passage or gate between runner and mould.

(x) Swab: It is used to moisture edges of the mould.

(xi) Mallet: Used for Light blowing or striking

(xii) Vent Rod: Used for ventilating mould by removing hot air and moisture after hot molten material is poured.

(xiii) Draw Spike: Used to remove pattern from the mould.

(xiv) Moulding board: moulding box is rested on this to hold the sand.

(xv) The upper position is cope. The lower portion is drag in Moulding Box.

(Q3) Explain briefly the main constituents of moulding sand.

Ans = (a) Sand (b) Coal dust (c) Clay (d) Bentonite [Bonding Material] (e) Moisture (2-8%)

(Q4) Classify and discuss various types of moulding sand.

Ans = (i) Green Sand: It is a prepared mixture of silica sand with 18-30% clay, with moisture content of 6-8%. Clay and water furnish the bond for green sand. It is soft, Light, porous and retains its shape.

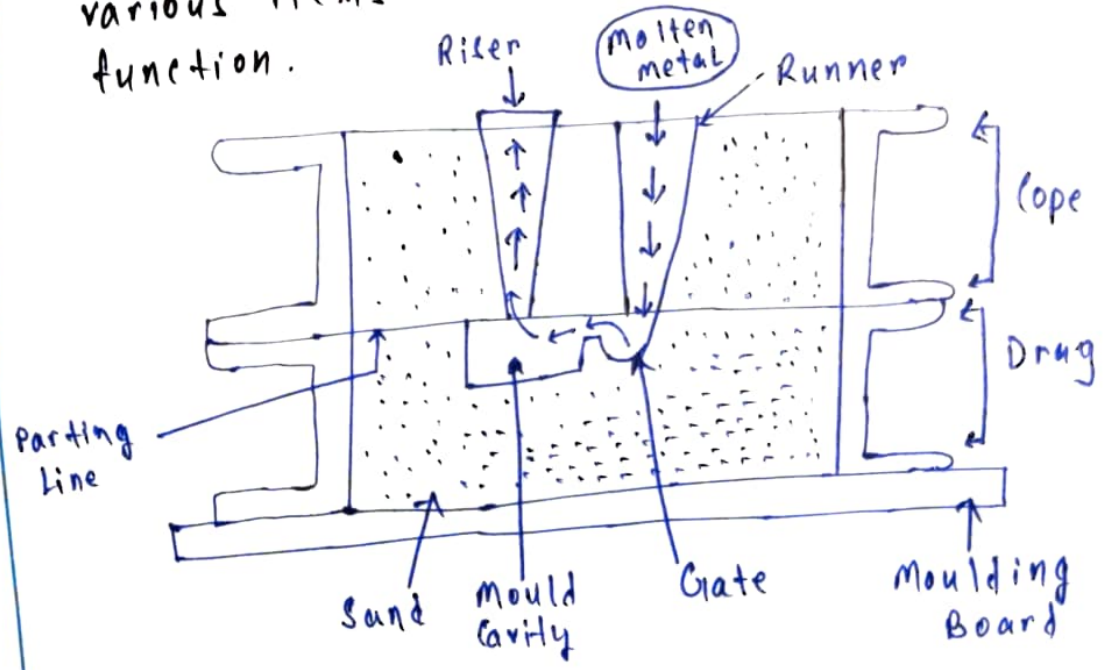
(ii) Dry Sand: Green sand that has been dried or baked in suitable oven after the making of mold and cores is called dry sand. It possesses more strength, rigidity and thermal stability.

(iii) Skindried Sand: The upper surface is dried by applying heat and it can be used quickly.

(iv) Loam Sand: It has 18% moisture content and 30-50% clay content.

(v) Parting Sand: Parting sand without binder and moisture is used to keep the green sand not to stick to the pattern and also to allow the sand to the parting surface of the cope and drag to seperate clinging.

(Q5) Sketch a complete mold and indicate on its various items related to it and their function.



Tool List

① Pattern/Reversing gear handle of Lathe:-
Pattern is originally used to produce duplicates by acting as a form. The dimensions are slightly enlarged to counteract the shrinking of the casting as it solidifies and cook in the mould.

② Cope Box:- It acts as the 2-post casting flask which is the wooden/metal frame to provide support.

③ Screw pins (Runner and Riser):- The runner provides connected channels that convey the molten metal to different parts of the mold while the riser is the vertical channel that provide a continuous flow of molten metal to eliminate shrinkage due to solidification.

④ Litter:- It is a finishing tool used to repair the mould and finishing the mould sand. It is also used to remove loose sand from mould.

⑤ Strike/Plainer:- Used to level the sand so as to help in creating the mould.

⑥ Venting Rod:- To create vents so as to aid in the escape of gases.

⑦ Clearer:- Used to remove any mold remnants that may have adhered to the casting.

⑧ Rammer:- It is a tool for ramming, ie. packing the sand in a mould by raising and dropping the sand, patter/flank on a table.

Pegs:- These are used to secure the flask in place.

Procedure

(1) The pattern is placed at the centre of the flask on the board.
(2) Dry facing sand is sprinkled on the board and pattern to provide a non-sticky layer.
(3) Freshly prepared molding sand of requisite quality is now poured into the drag upto a specific thickness.
(4) Rest of the drag flask is completely filled with backup sand and uniformly rammed to compact the sand.
(5) After the ramming is over, the excess sand is completely scraped using a flat bar to the level of flask edges, and a vent wire is used to make holes to remove the gases. The runner and riser is inserted and the cope box is then put on the drag and fresh moulding sand is poured.
(6) The sand is adequately rammed, excess sand is scraped and the runner and riser are withdrawn from the flask, while the cope is seperated from the drag and any loose sand is blown off.
(7) A gate is created and the pattern is seperated out carefully, while the cope box is put again and the sand is used to check the allignment/ convection of the mould.