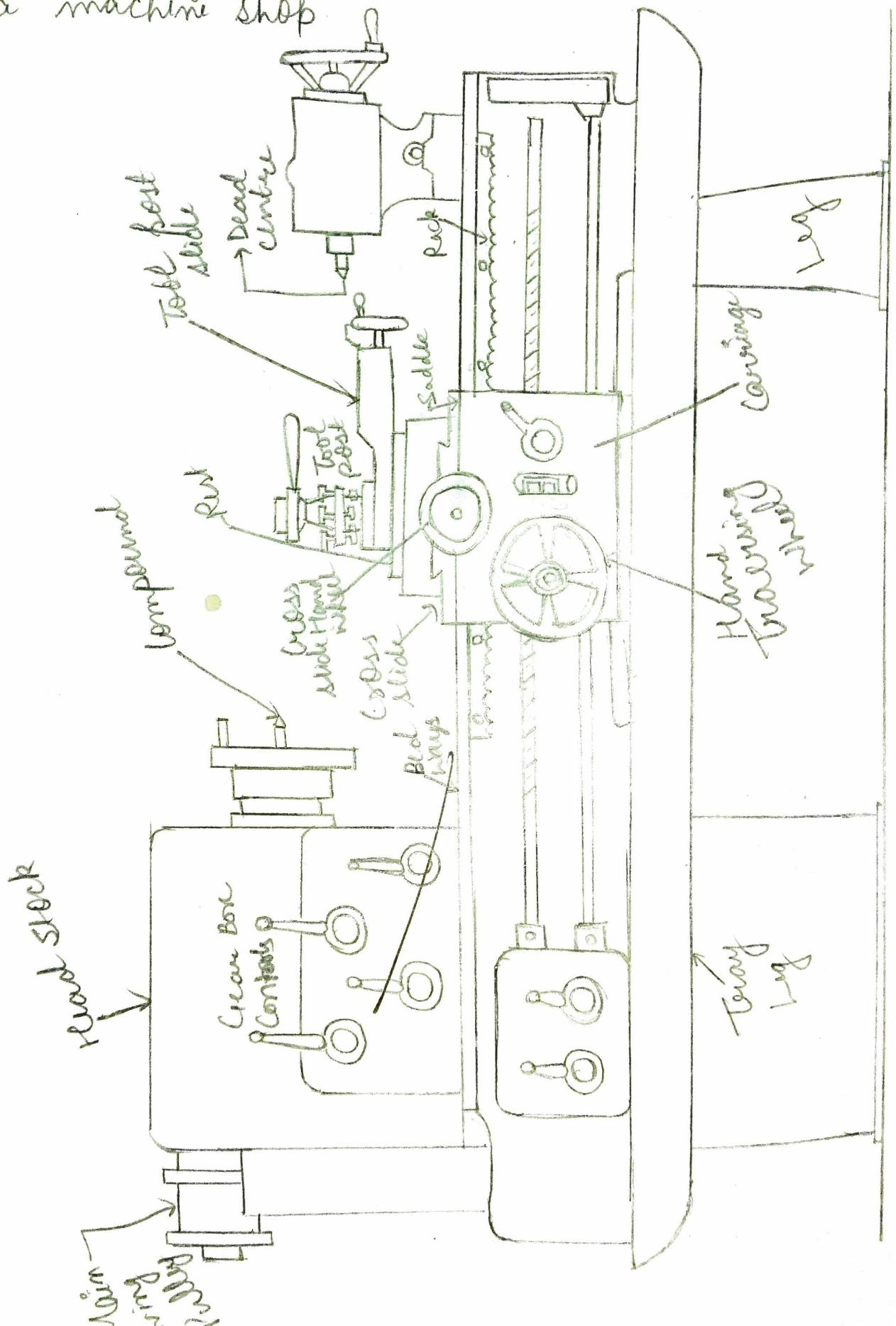


## Particulars of Practicals Performed

S.NO.	PRACTICAL	DATE	PAGE	REMARKS
1.	To study different types of machine tools in a machine shop.	2-12-2020	1-4	Abl 7/12/2020
2.	To prepare a job on the lathe involving facing, outside turning, step turning, taper turning, radius making and parting off	2-12-2020	5-6	Abl
3.	To study various types of tools used in carpentry & to prepare simple types of wooden joints	3-12-2020	7-10	Abl 18/12/2020
4.	To prepare a lap 'T' joint	3-12-2020	11-12	Abl
5.	To study various types of materials used in electrical shop.	19-12-2020	12-15	Abl 30/12/2020
6.	To study various types of material used in sheet metal shop.	29-12-2020		Abl 16/01/2021
7.	To study various types of fitting and making tools used in a fitting shop.	5-1-21		
8.	To study the CNC machine, CNC control panels, setting up the cutting tool to the correct length, CNC lathe, and CNC programming	19-1-21		Abl 22/03/21
9.	To study various types of	26-1-21		



# Lathe Machine



## Practical No. 1

Aim-

To study different types of machine tools used in a machine shop.

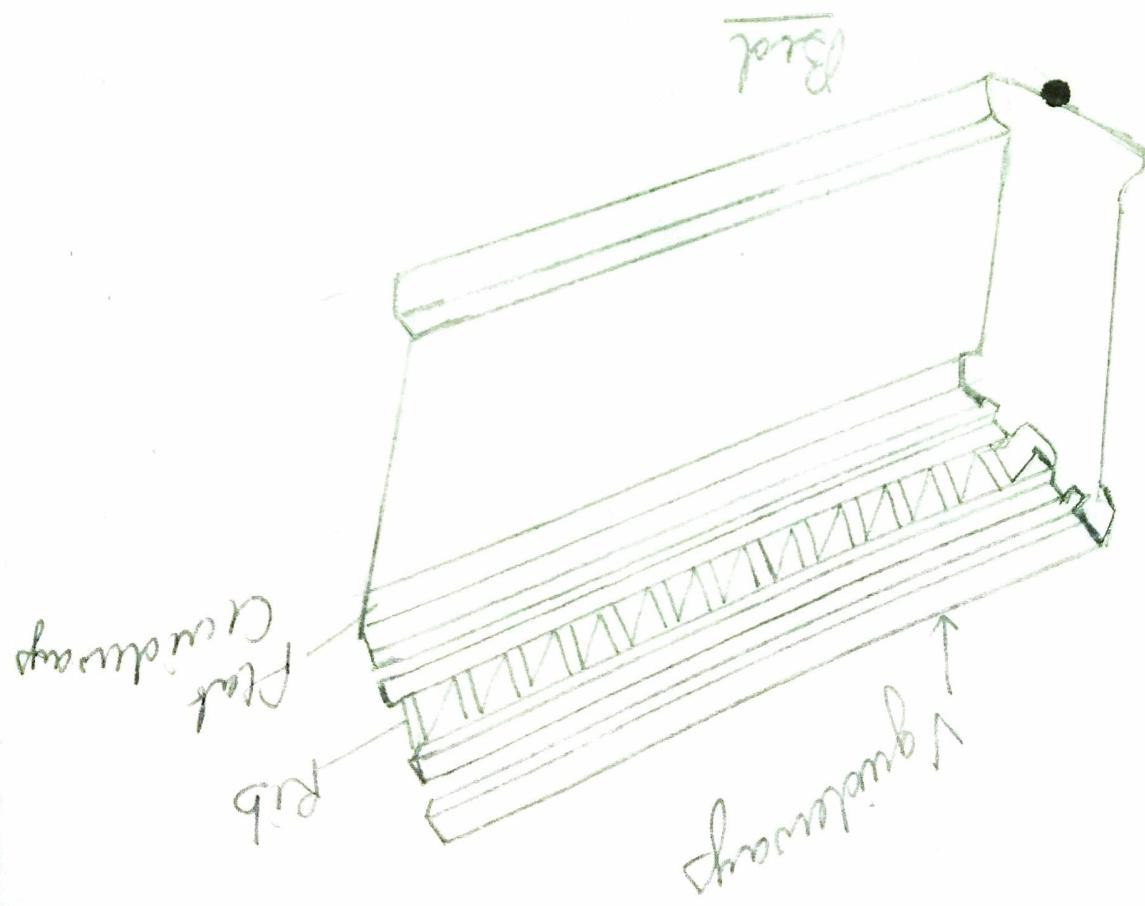
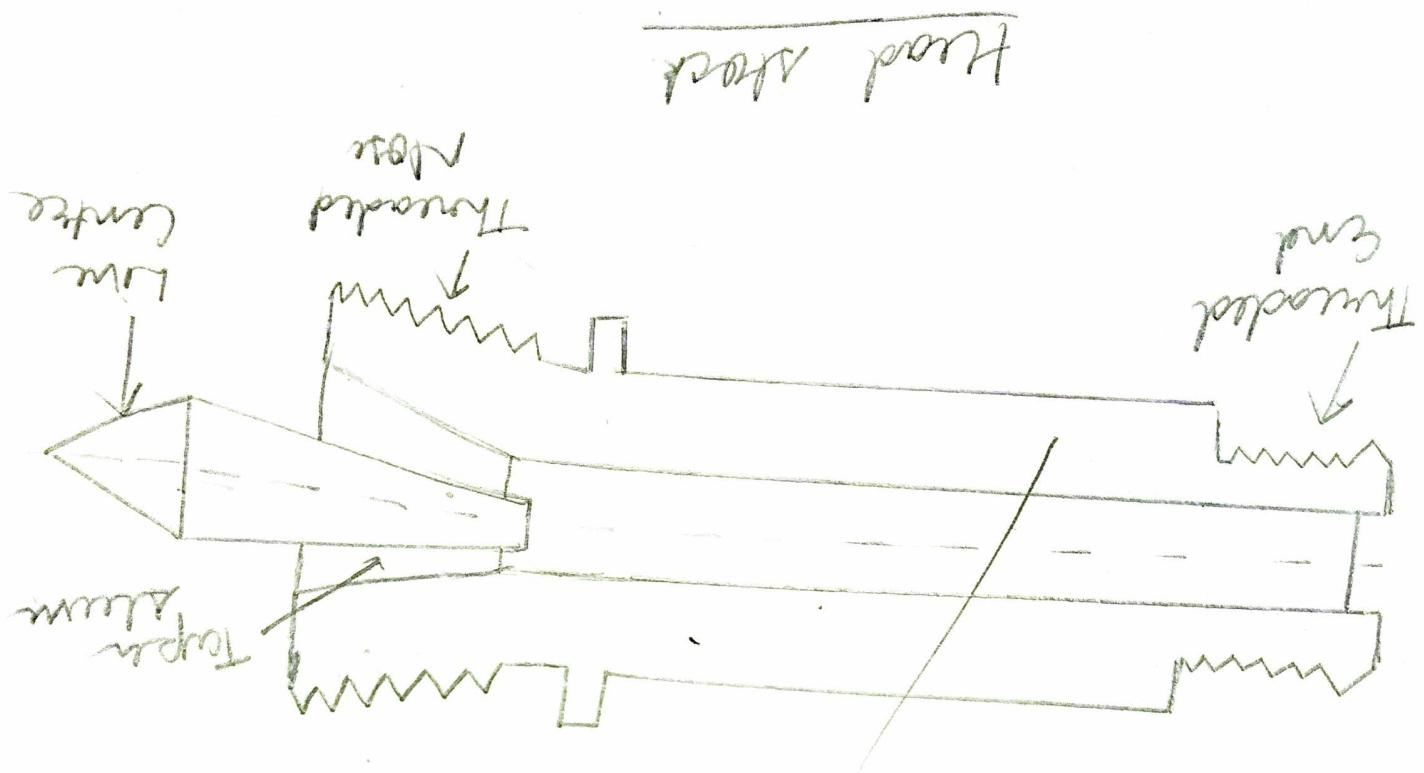
Introduction- A machine tool is a device which performs the function of material removal with the help of tools. The purpose of machine tool is to save time, cost of production and get better output which can not be obtained with hand tools.

The various type of machine tools commonly used in the workshop are:-

- (a) Lathe    (b) Sharpener    (c) Planer    (d) Drilling machine
- (e) Grinding Machine    (f) Milling machine

Lathe:-

- \* A lathe, probably one of the earliest machine tools, is one of the most versatile & widely used machine tool, so, it is also known as a mother machine tool.
- \* The job to be maintained stationary & rotated in the lathe chuck, a cutting tool is advanced which is stationary against the rotating job. Cutting tool material is harder than the workpiece.
- \* Some of the common operations performed on a lathe are facing, turning, drilling etc.



## Principal parts of Lathe:-

### 1. Bed -

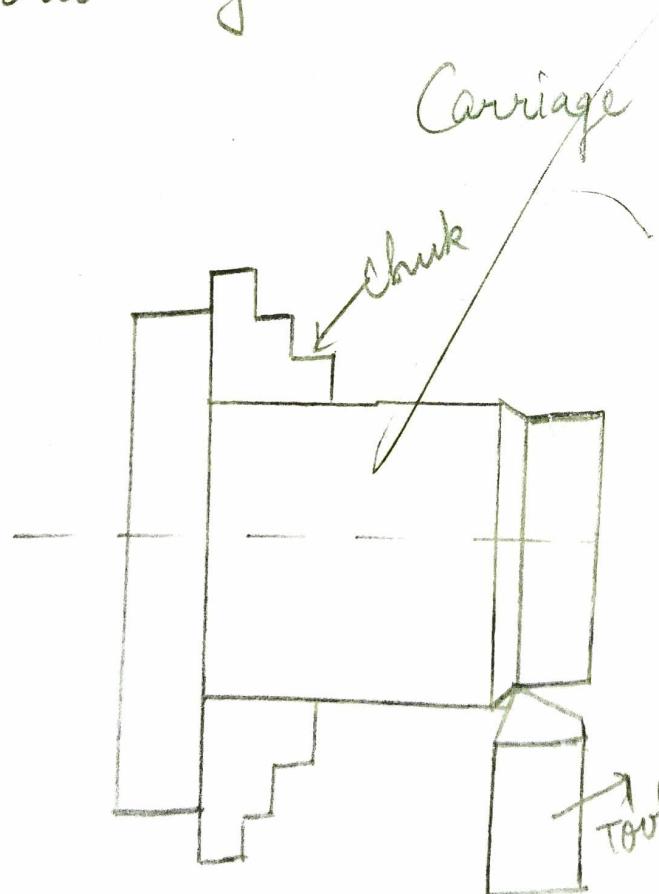
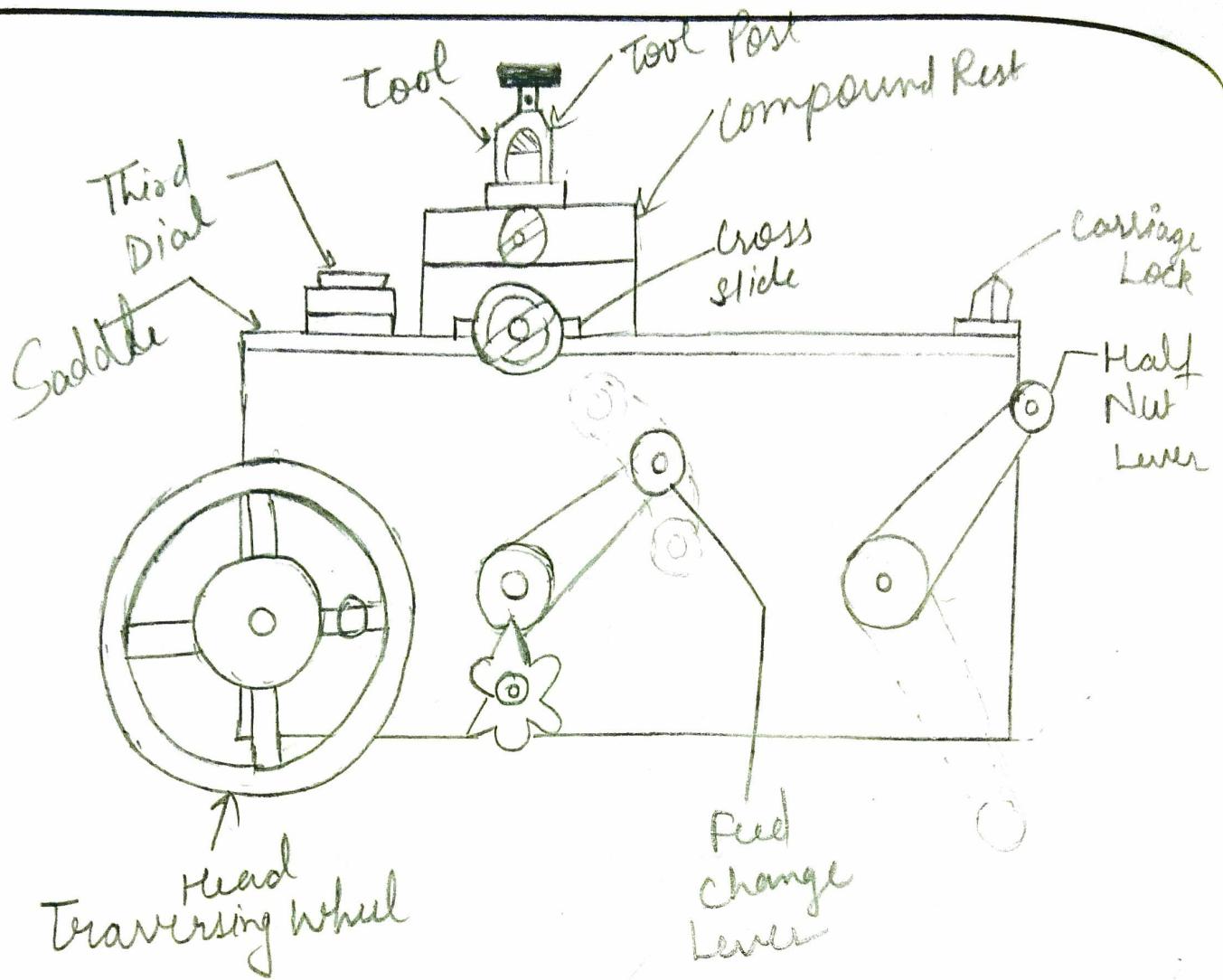
- \* It is the base of the foundation of the lathe.
- \* It is a heavy rugged and single machine piece casting made to support the working parts of the lathe.
- \* On the top of the bed there are two sets of guide ways. Outer ways and inner ways. Outer ways is for the carriage & the inner way for the tailstock.
- \* The guide ways are of two types - wide flat guide ways and inverted V guide ways.

### 2. Head stock -

- \* The head stock is permanently fastened on the inner ways at the left side of the bed.
- \* A live centre and sleeve, a face plate or a chuck can be fitted to the spindle nose to hold and drive the work.

### 3. Tail stock:-

- \* It is situated at the right hand end of the bed and is mounted on the inner guide ways.
- \* Tail stock can be locked in any position along the bed of the lathe by tightening the clamp lever or nut.



Plain Turning

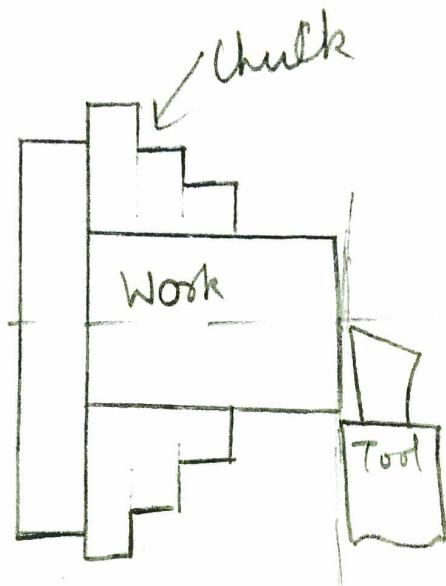


Step Turning

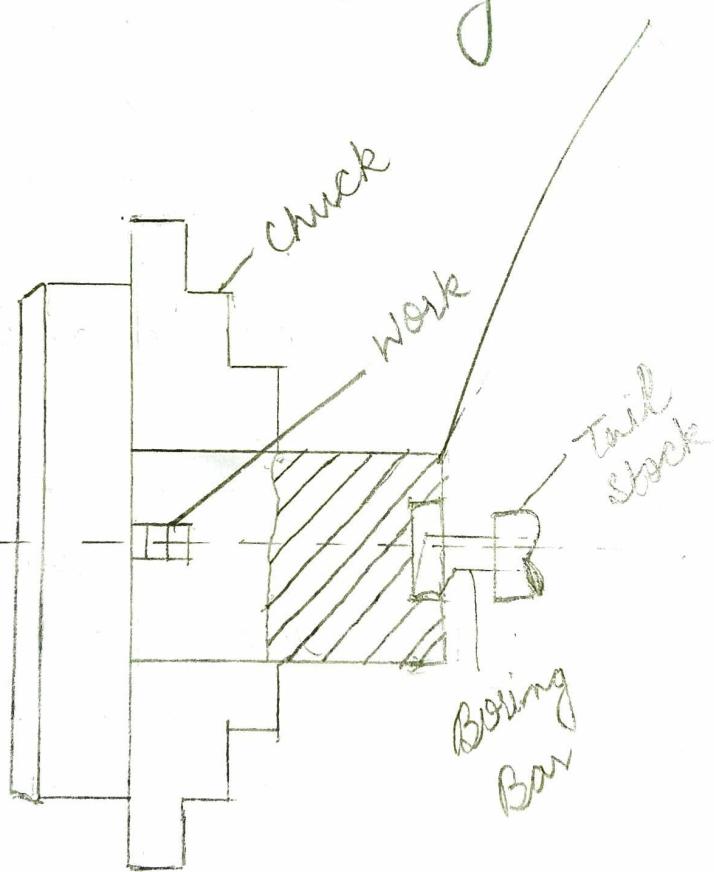
4. Carriage:- The carriage controls and supports the cutting tool.
- (i) Saddle - It is an H-shaped casting mounted on the top of the lathe ways between the head stock and tail stock.
- (ii) Cross slide - It is mounted on the saddle. It provides the cross movement to the cutting tool. It supports the compound rest.
- (iii) Compound rest - It is mounted on the top of the cross-slide and is used to support the cutting tool.
- (iv) Tool post - It is mounted above the compound rest. It clamps the cutting tool or cutting tool holder in a desired position.
- (v) Apron - It is fastened to the saddle and contains the feeding mechanism.

### Lathe Operations

1. Centering - If the chuck is three jaw type, then centering is not required because it is a self centered chuck. But for four jaw, centering is needed.
2. Facing - Facing is the operation of machining the ends of a piece of work to produce the flat surface.



Facing



Boring

AB  
3/12/80 20

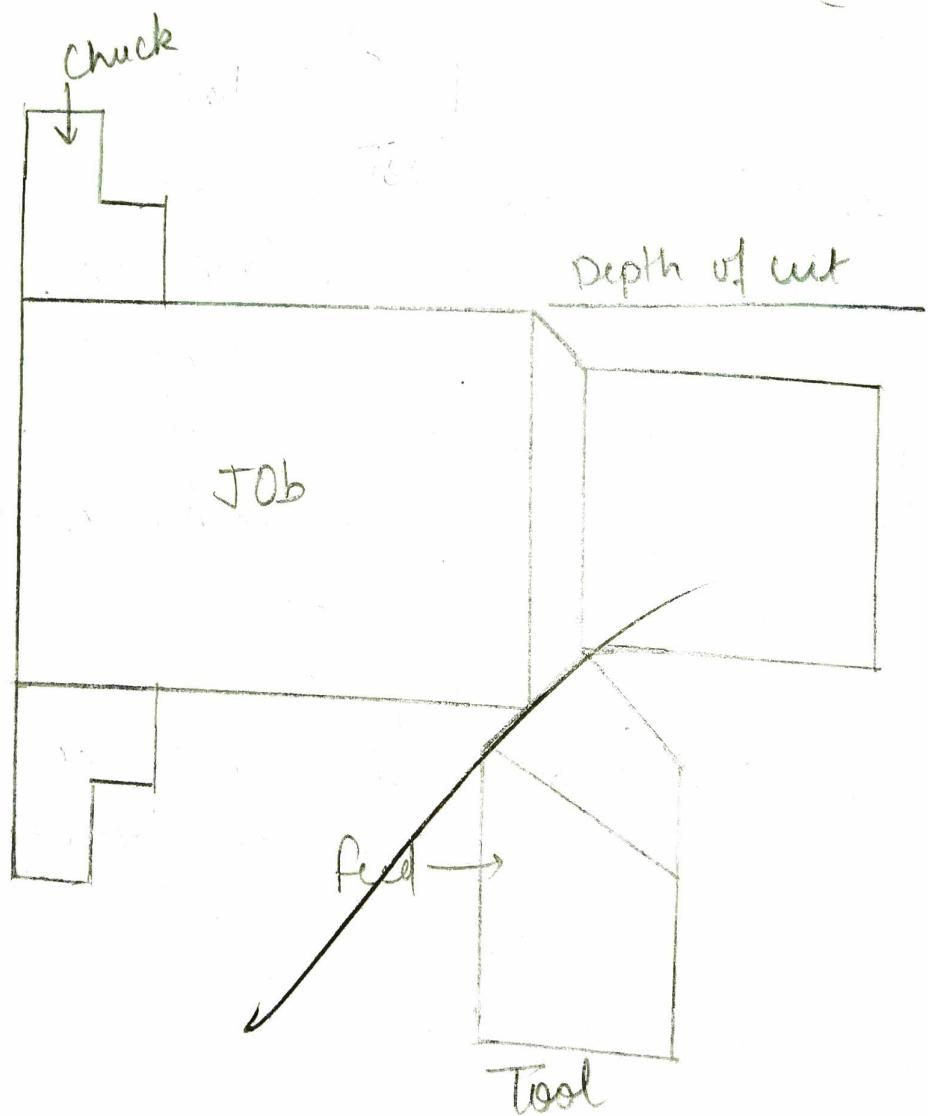
3. Plain Turning - It is an operation removing excess amount of material from the surface. The operation is done to reduce the diameter of the work piece.
4. Step turning - It is an operation of producing various types of different diameters in the work piece.
5. Taper turning - It is an operation of producing an external conical surface on a work piece. Most commonly taper turning is done by swivelling compound rest method.  
 $\alpha$  is the angle through which compound rest is swivelled  $\tan \alpha = (D-d)/2l$   
 $D$  = <sup>large</sup> diameter of work piece  
 $d$  = smaller diameter of work piece  
 $L$  = Axial length of the work piece on which taper is performed.  
 $\text{Taper } (\alpha) = (D-d)/2L$
6. Boring - It is an operation of enlarging hole already made in a work piece. In this operation, boring tool is held in the tool post.

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## Practical No-2

Aim - To prepare a job on the lathe involving facing, outside turning, step turning, taper turning <sup>& radii</sup>, making and parting off.

Tool used - Lathe Machine, Parting tool, Vernier calliper and spanners etc.



## Practical No - 2

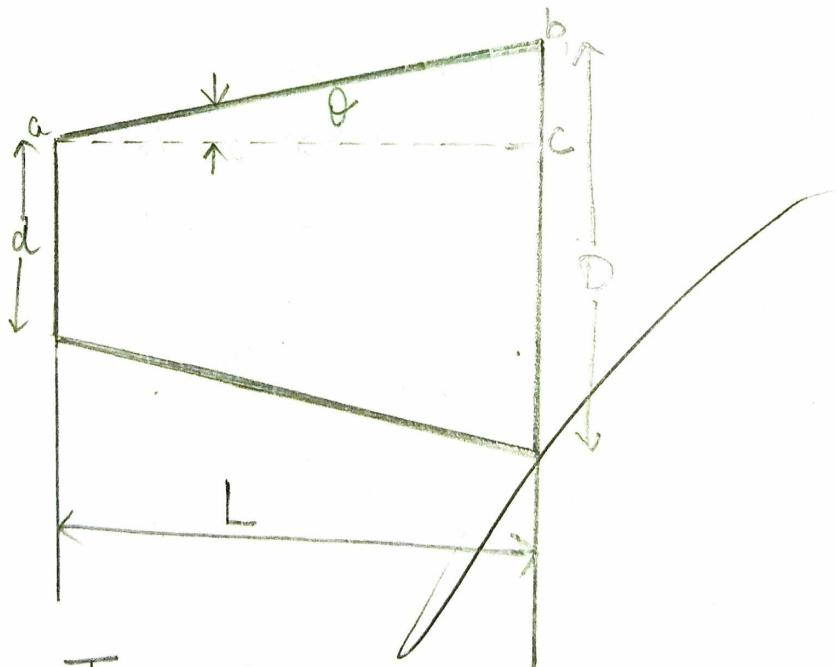
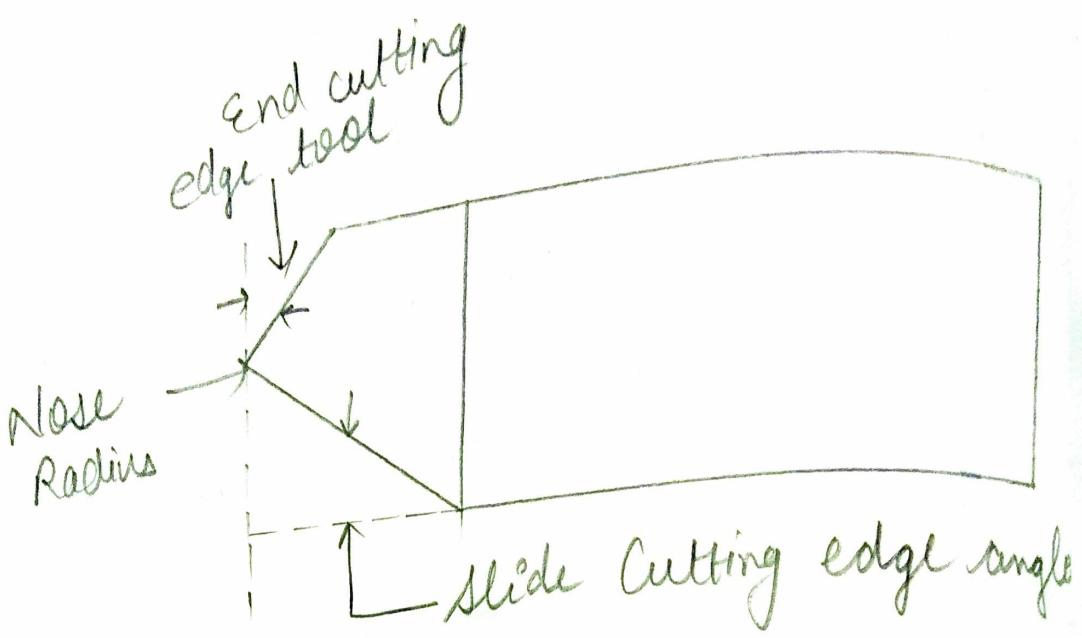
Object To prepare a job on the lathe involving facing, outside turning, step turning, taper turning, radius making and parting off.

Tool Used - Lathe Machine, Parting tool, Vernier Caliper and Spanners etc.

### Theory

1. Turning operation:- Cutting tool slowly moves slowly over the revolving job at a high speed.
2. Feed - It is a distance along the bed, traversed by the tool in one revolution of the work. It depends upon the depth of cut & finishing.
3. Speed - Speed at which the job is revolving is expressed as r.p.m. Linear cutting speed is more for softer materials and less for the harder materials.
4. Depth of cut - The depth of cut is the perpendicular distance measured from the machined surface to the uncut surface of work piece.

### Procedure



Taper turning

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18/12/20

1. Fix the M.S. rod in a three jaw chuck, in such a way so that the job projects about 90mm from the face of chuck.
2. Fix single point cutting tool of HSS material in the tool post of lathe machine.
3. Select proper job for 32 mm diameter mild steel rod and for HSS tool, it should be around 400 rpm.
4. For facing operation, material is removed from the end of the rod. Tool tip is penetrated about 0.5mm into the centre of the job and is slowly moved towards circumference.
5. For outside turning, tool is set at the right angle to the job. The tool is moved along length of bed.
6. For taper turning, the required angle is worked out as  $\tan \theta = (D - d)/2l$

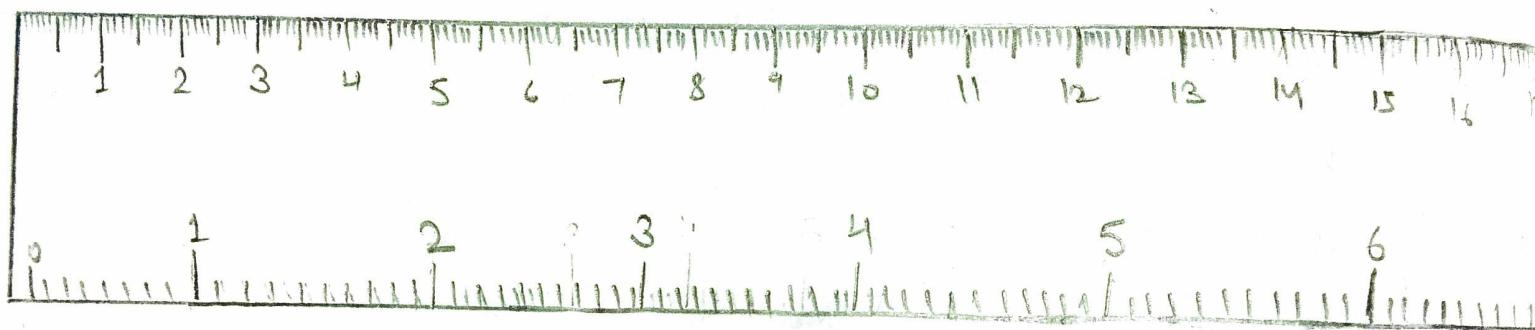
Material :- M.S round piece.

Result :- Job made & self inspected as per drawing.

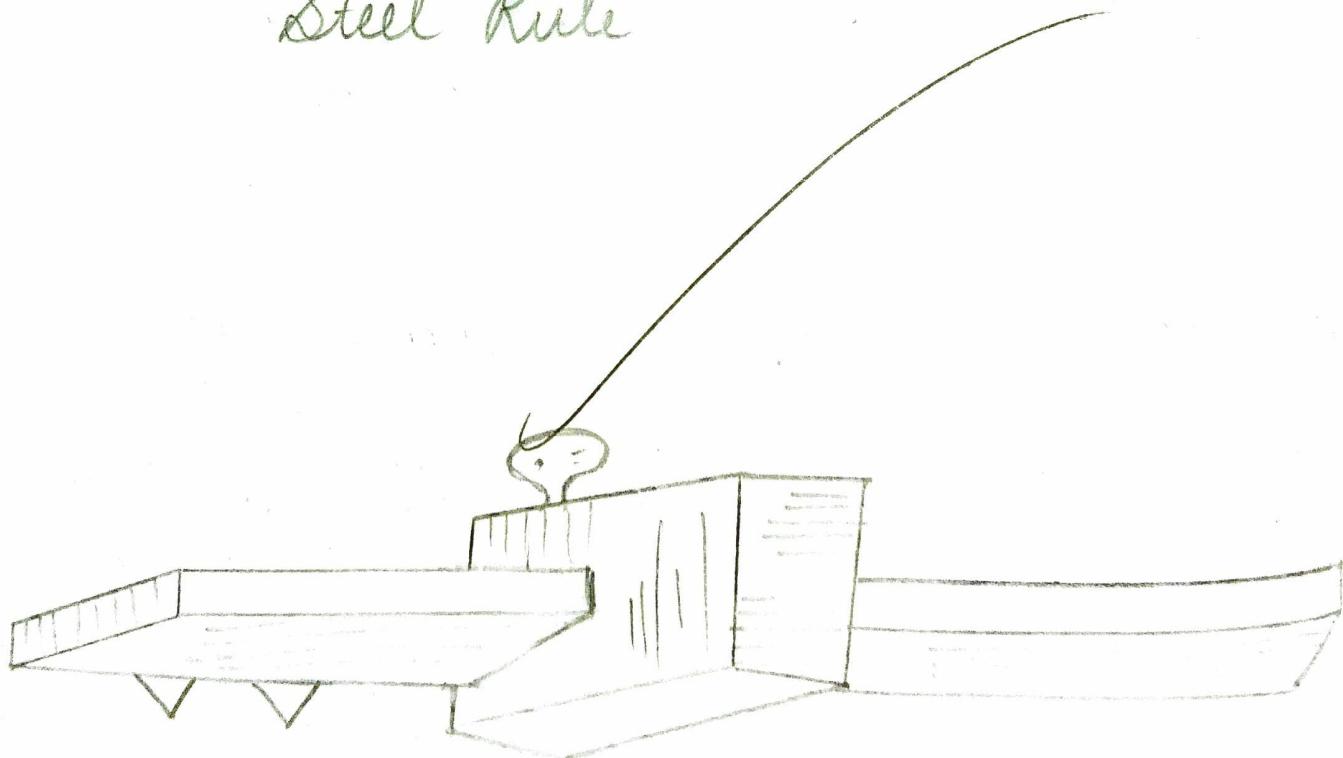
Job  
18/12/2020

### Practical No - 3

Aim - To study various types of tools used in carpentry and to prepare simple types of wooden joints.



Steel Rule



Mortise Gauge

### Practical No - 3

Aim - To study various types of tools used in carpentry and to prepare simple types of wooden joints.

Various types of tools used in carpentry are:-

1. Measuring tools
2. Marking Tools
3. Cutting tools
4. Planing tools
5. Drilling & boring tools
6. Striking Tools
7. Sharpening tools
8. Holding devices.

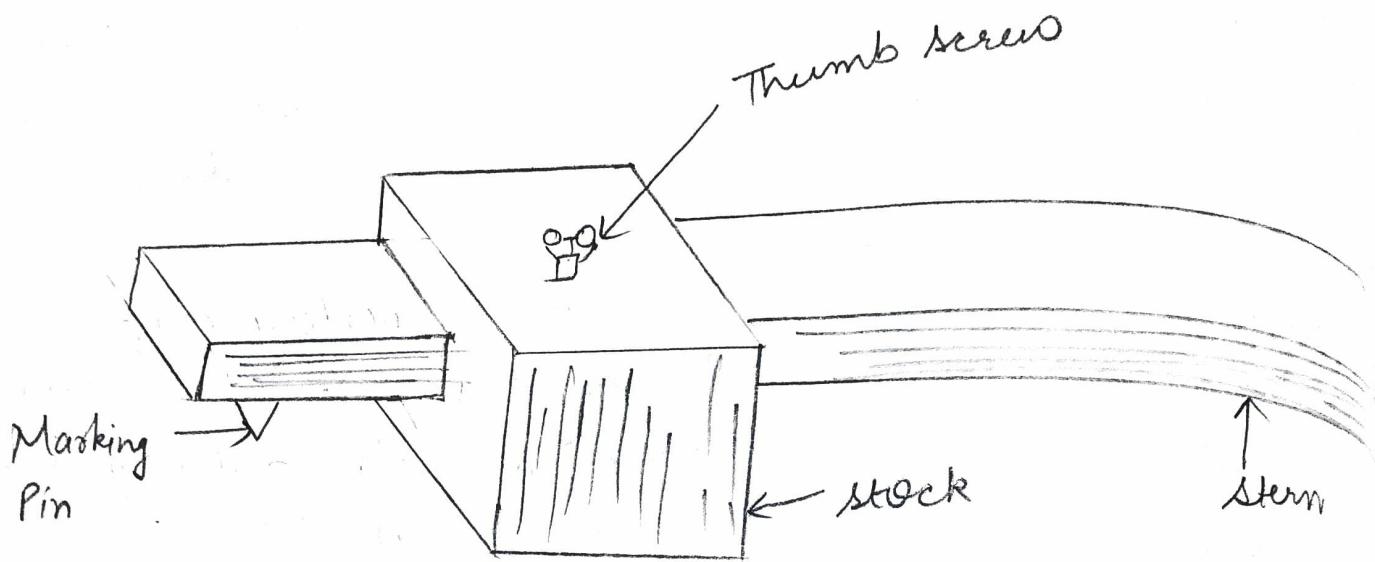
Introduction - Carpentry may be defined as the process of making wooden components. It starts from a marketable form of wood and ends with a finished product. It deals with the building work, furniture, cabinet making etc.

#### Measuring Tools

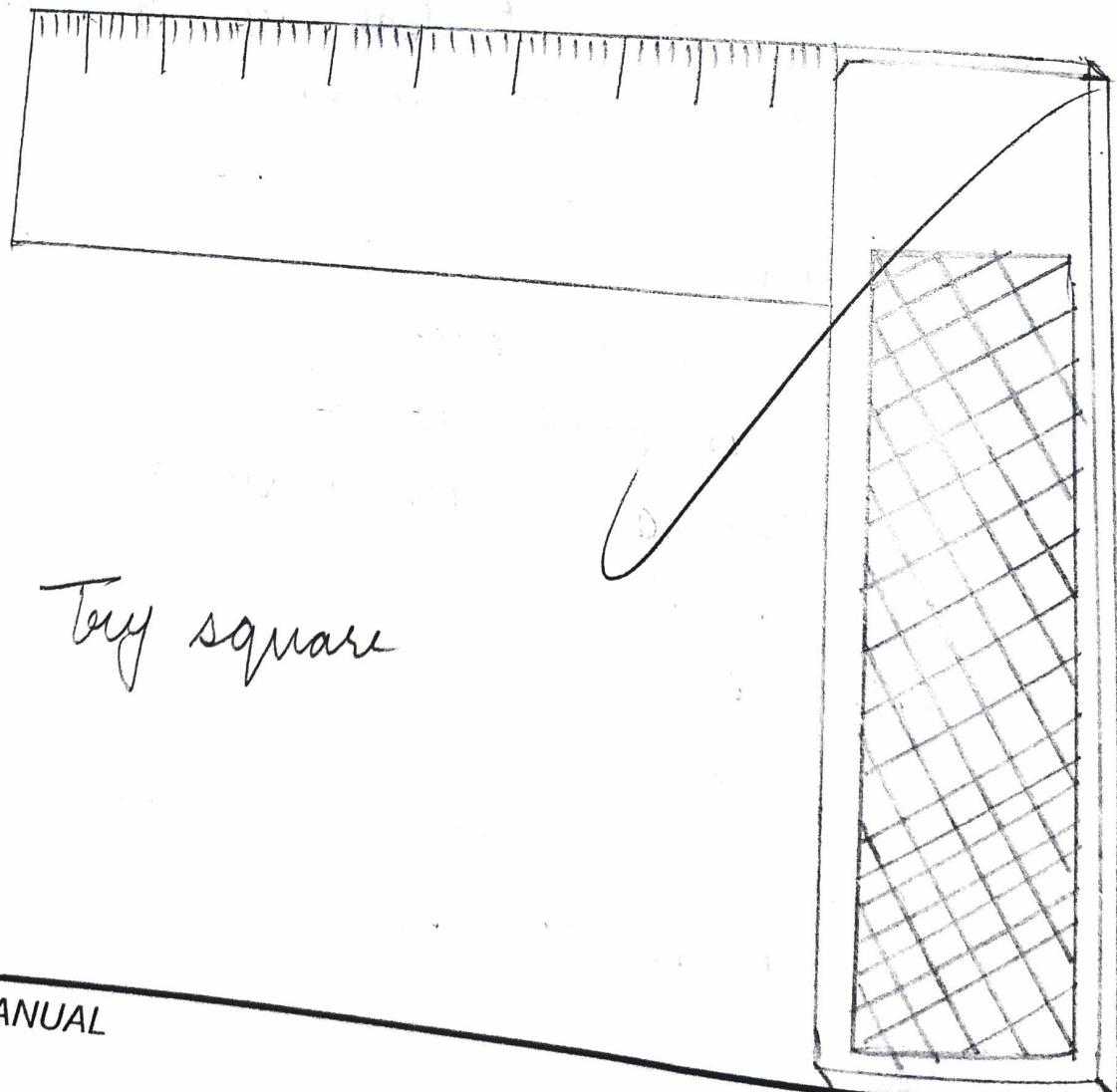
Steel Rule - It is made up of stainless steel and is marked with centimeter scale and inch scale.

#### Marking Tools •

Mortise Gauge - It is used to draw two parallel lines. Its working is similar to marking gauge.



Marking Gauge



Try square

but it has two pins instead of one in marking gauge. In some mortise gauges, one pin is fixed while the other is movable.

**Marking Gauge** - It is used to scribe the line parallel to and at a desired distance from a finished face or edge. Stock is the movable portion and can be adjusted at any position on the stem with the help of the thumb screw.

**T try square** - It is used to draw parallel lines at right angles or to check the true ness of the planned surface.

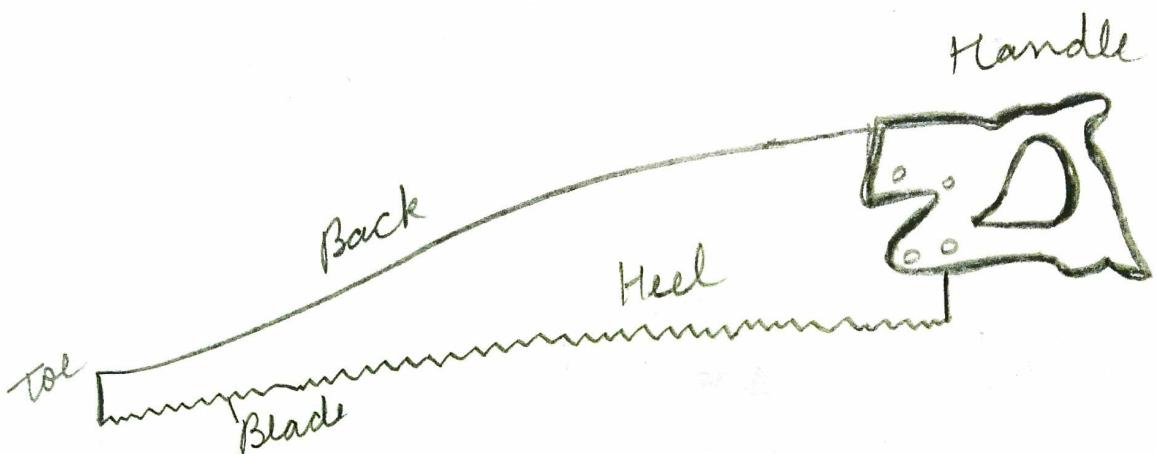
### Cutting Tools

(A)

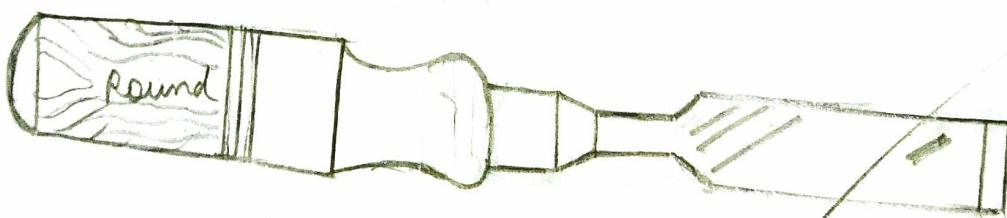
**Saws** - A saw consists of a thin spring steel blade with a wooden handle. The front of the saw is called toe.

1. **Rip saw** - It is a hand saw measuring 30cm to 75 cm long (length of blade). The width of the blade is about 150mm to 160mm near the handle and 60 mm to 70mm at the toe.

**Cross cut saw** - This saw is provided with two handles, one at each end. It is used for cutting



Rip Saw



Firmer chisel

heavy timber logs Two persons are employed on cross cut saw.

(B) Chisels - It is a flat thick piece of tool steel, whose one edge is ground to form a cutting edge & the other is provided with a wooden handle.  
Firmer Chisel - It is a medium duty tool used for general work. It carries a wide blade. It is used for taking wider cuts and banishing flat surfaces.

Mortise Chisel - It is used for taking heavy cuts so more material removals are possible by this chisel.

Wooden Jack Plane - The main cutting part is known as blade or iron cutter is fitted in the stock such a way that it remains at angle of  $45^\circ$  with the sole.

Iron Jack Plane - It gives better surface finish and is more durable than the wooden jack plane. Its use is similar to the Wooden jack Plane.

Rasp - It is also known as rasp file. It is a

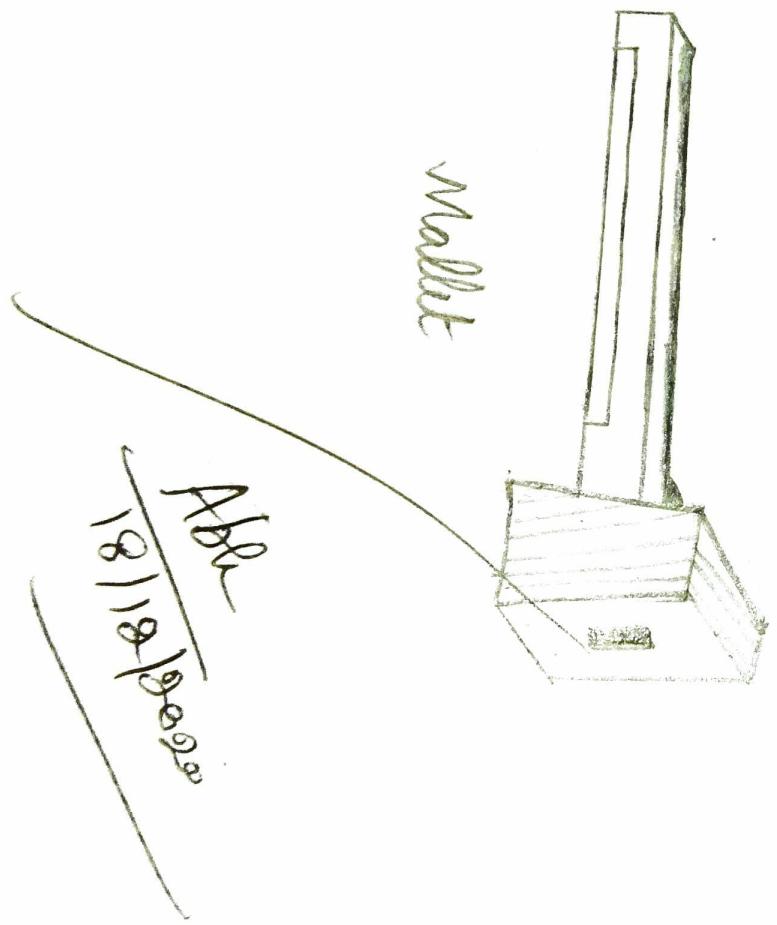
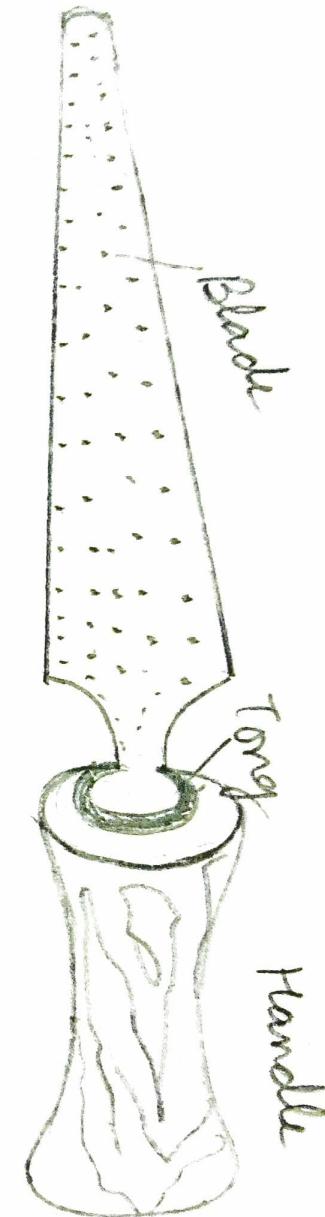


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Rasp File



It is a finishing tool used to make the wood surface smooth, remove sharp edge etc. Sharp cutting teeth is provided on the surface.

~~Claw Hammer~~ - It is used for striking as well as for pulling the nails from the wood. The claw face is used for pulling out the nails and the head face is used to drive the nails.

~~Mallet~~ - It is used to strike the chisel that have wooden handles. It is made up of hard wood.

~~Bench Hook~~ - Bench hook is used to prevent work from moving forward when being planed. So, it is very simple type of holding tool.

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18/12/2009~~

## Practical No 4.

Objective - To prepare a Lap  $67^{\circ}$  joint.

Material used :- Carpenter's vice, jack plane, try square, marking gauge, firmer chisel, Rip saw, Rasp file, mallet, claw hammer, wood



T-joint

## Practical No-4.

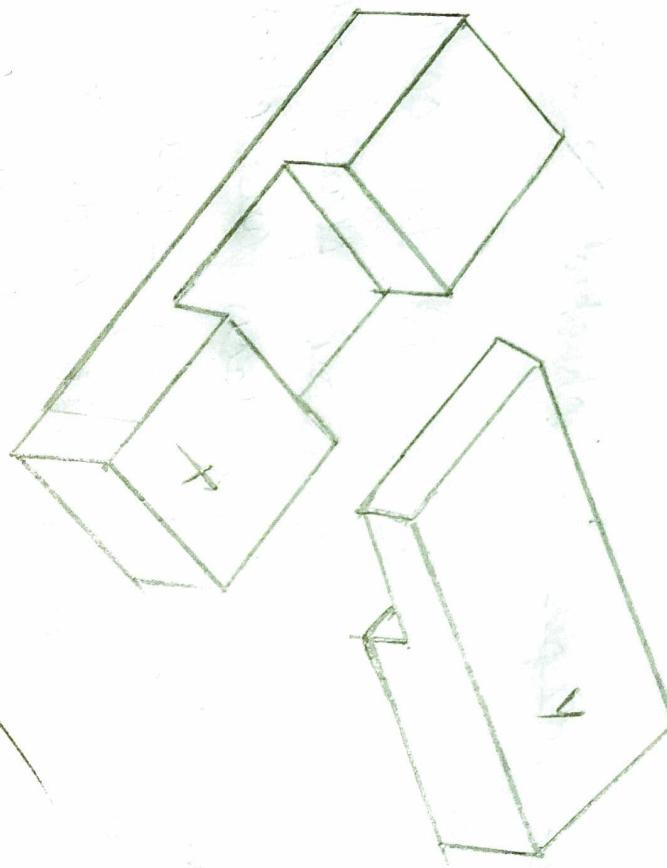
Objective - To prepare a Lap T-joint.

Materials used - Carpenter's vice, jack plane, try-square, marking gauge, 25 mm former chisel, cross cut saw, Rip saw, Rasp file (smaller), claw hammer, wood.

### Procedure

1. The given square is checked to ensure its correct size.
2. The square is firmly in the carpenter's vice. Two adjacent planes are planed by the jack plane and the two faces are checked for squareness with the try-square.
3. Marking gauge is set and lines are drawn at 30 and 75 mm, to mark the thickness and width model respectively.
4. The mating dimensions of the parts X & Y are then marked using scale and marking gauge.
5. Using the rip saw, the positions to be removed are cut in both the pieces and also the parts X & Y are separated by cross cutting.
6. The ends of both the parts are chiseled to the exact lengths.

T-lap joint



Result - The T-lap joint is thus formed by following the above sequence of operations

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