

PR- 3 WORKSHOP PRACTICE

CONTENTS

Name of the Experiment	Page No
-------------------------------	----------------

CARPENTRY PRACTICES:-

1.1Name of the carpentry tools and uses	02
1.2Different operations	
a. Sawing	
b. Planning	
c. Chiseling	
1.3Measuring and Marking	05
1.4Different of timber uses by carpenters, substitutions of timbers.	
1.5Jobs	
a. Slot, notch	10
b. Mortise and tenon joint	12
c. Single dovetail Joint	14

2. Turning

Study of S.C lathe and their accessories ,Practice in lathe work	16
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involving various operation such as Turning , Step Turning , Taper Turning ,
Knurling , and external V Threading(one job only).

CARPENTRY

Introduction:

Carpentry may be defined as the process of making wooden components. It starts from a marketable form of wood and ends with finished products. It deals with the building work, furniture, cabinet making. Etc. joinery, i.e., preparation of joints is one of the important operations in all woodworks. It deals with the specific work of carpenter like making different types of joints to form a finished product.

Timber:

Timber is the name given to the wood obtained from well grown trees. The trees are cut, sawn into various sizes to suit building purposes. The word, 'grain', as applied to wood, refers to the appearance or pattern of the wood on the cut surfaces. The grain of the wood is a fibrous structure and to make it strong, the timber must be so cut, that the grains run parallel to the length.

Timber Sizes:

Timber sold in the market is in various sizes and shapes. The following are the common shapes and sizes.

- a. Log - The trunk of the tree which is free from branches.
- b. Balk - The log, sawn to have roughly square cross section.
- c. Post - A timber piece, round or square in cross section, having its diameter or side from 175 to 300mm.
- d. Plank - A sawn timber piece, with more than 275 mm in width, 50 to 150 mm in thickness and 2.5 to 6.5 meters in length.
- e. Board - A sawn timber piece, below 175 mm in width and 30 to 50 mm in thickness.
- f. Reapers- Sawn timber pieces of assorted and non-standard sizes, which do not confirm to the above shapes and sizes.

Classification of Timber:

Wood suitable for construction and other engineering purposes is called timber. Woods in general are divided into two broad categories: Soft woods and Hard woods.

Soft woods are obtained from conifers, kair, deodar, chir, walnut and seemal. Woods obtained from teak, sal, oak, shisham, beach, ash mango, neem and babul are known as hard wood, but it is highly durable.

Another classification of woods is based on the name of the trees like teak, babul, shisham neem, kair, chir, etc.

Seasoning of Wood:

A newly felled tree contains considerable moisture content. If this is not removed, the timber is likely to warp, shrink, crack or decay. Seasoning is the art of extracting the moisture content under controlled conditions, at a uniform rate, from all the parts of the timber. Only seasoned wood should be used for all carpentry works. Seasoning makes the wood resilient and lighter. Further, it ensures that the wood will not distort after it is made into an object.

Characteristics of Good Timber:

The good timber must possess the following characteristics:

- a. It should have minimum moisture content, i.e., the timber should be well seasoned.
- b. The grains of wood should be straight and long.
- c. It must retain its straightness after seasoning.
- d. It should produce near metallic sound on hammering.
- e. It should be free from knots or cracks.
- f. It should be of uniform color, throughout the part of the wood.
- g. It should respond well to the finishing and polishing operations.
- h. During driving the nails and screw, it should not split easily.

Marking and Measuring Tools:

Accurate marking and measurement is very essential in carpentry work, to produce parts to exact size. To transfer dimensions onto the work; the following are the marking and measuring tools that are required in a carpentry shop.

Steel Rule and Steel Tape:

Steel rule is a simple measuring instrument consisting of a long, thin metal strip with a marked scale of unit divisions. It is an important tool for linear measurement. Steel tape is used for large measurements, such as marking on boards and checking the overall dimensions of the work.



Marking Gauge:

It is a tool used to mark lines parallel to the edge of a wooden piece. It consists of a square wooden stem with a sliding wooden stock (head) on it. On the stem is fitted a marking pin, made of steel. The stock is set at any desired distance from the marking point and fixed in position by a screw. It must be ensured that the marking pin projects through the stem, about 3 mm and the end are sharp enough to make a very fine line. A mortise gauge consists of two pins. In this, it is possible to adjust the distance between the pins, to draw two parallel lines on the stock.

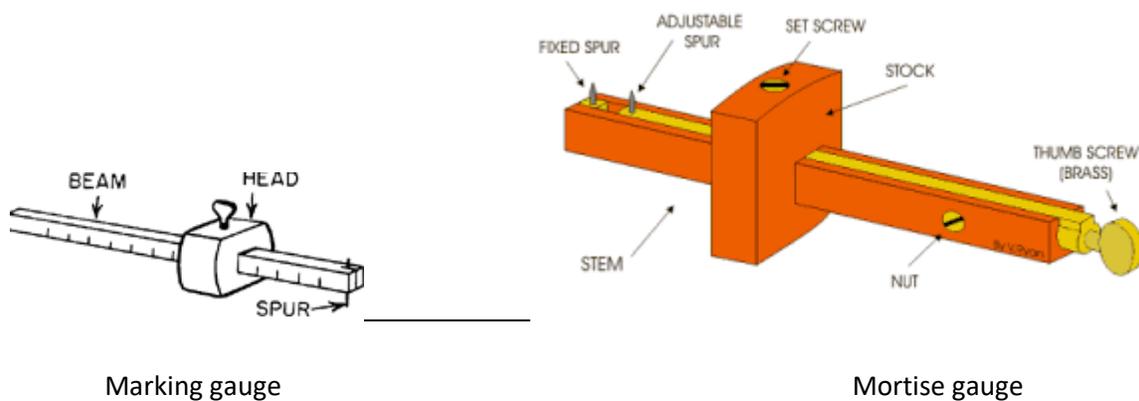


Fig: Marking Gauges

Try - Square:

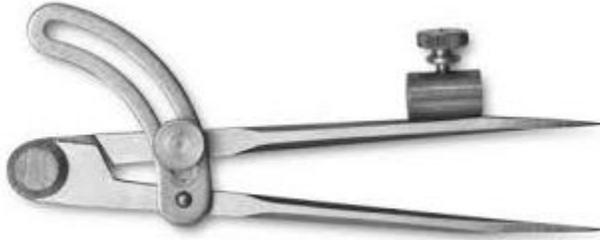
It is used for marking and testing the squareness and straightness of planed surfaces. It consists of a steel blade, fitted in a cast iron stock. It is also used for checking the planed surfaces for flatness. Its size varies from 150 to 300 mm, according to the length of the blade. It is less accurate when compared to the try-square used in the fitting shop.



Fig: Try Square

Compass and Divider:

Compass and divider, are used for marking arcs and circles on the planed surfaces of the wood.



Scriber or Marking Knife:

It is used for marking on timber. It is made of steel having one end pointed and the other end formed into a sharp cutting edge.



Bevel Square:

It is used for laying-out and checking angles. The blade of the bevel is adjustable and may be held in place by a thumb screw. After it is set to the desired angle, it can be used in much the same way as a try-square. A good way to set it to the required angle is to mark the angle on a surface and then adjust the blade to fit the angle



Holding Tools:

Carpenter's Vice:

It is used as a work holding device in a carpenter shop. Its one jaw is fixed to the side of the table while the other is movable by means of a screw and a handle. The Carpenter's vice jaws are lined with hard wooden' faces.



Fig: Carpenters Vice

C-Clamp:

It is used for holding small works.



Bar Cramp:

It is made of steel bar of T-section, with malleable iron fittings and a steel screw. It is used for holding wide works such as frames or tops

Planing Tools:

Planing is the operation used to produce flat surfaces on wood. A plane is a hand tool used for this purpose. The cutting blade used in a plane is very similar to a chisel. The blade of a plane is fitted in a wooden or metallic block, at an angle.

Types of Planes:

Jack Plane

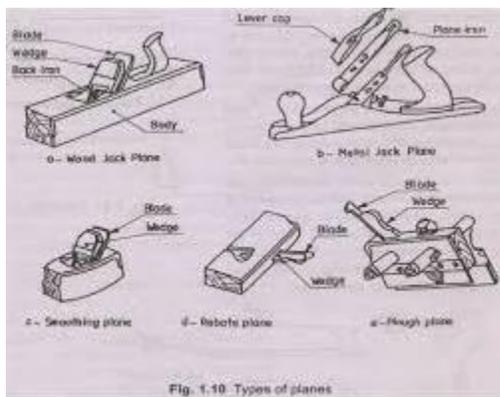
It is the most commonly used general purpose plane. It is about 35 cm long. The cutting iron (blade) should have a cutting edge of slight curvature. It is used for quick removal of material on rough work and is also used in oblique planing.

Smoothing

It is used for finishing work and hence, the blade should have a straight cutting edge. It is about 20 to 25 cm long. Being short, it can follow even the slight depressions in the stock, better than the jack plane. It is used after using the jack plane

Rebate Plane

It is used for making a rebate. A rebate is a recess along the edge of a piece of wood, which is generally used for positioning glass in frames and doors. Plough Plane It is used to cut grooves, which are used to fix panels in a door. The following figure shows the various types of planes mentioned above.



Cutting Tools:

Saws:

A saw is used to cut wood into pieces. There are different types of saws, designed to suit different purposes. A saw is specified by the length of its toothed edge.

Types of Saws:

Cross-Cut Saw or Hand Saw It is used to cut across the grains of the stock. The teeth are so set that the saw kerf will be wider than the blade thickness. This allows the blade to move freely in the cut, without sticking.

Rip Saw :

It is used for cutting the stock along the grains. The cutting edge of this saw makes a steeper angle, i.e., about 60° whereas that of crosscut saw makes an angle of 45° with the surface of the stock.

Tenon Saw:

It is used for cutting the stock either along or across the grains. It is used for cutting tenons and in fine cabinet work. However, it is used for small and thin cuts. The blade of this saw is very thin and so it is stiffened with a thick back steel strip. Hence, this is sometimes called as back-saw. In this, the teeth are shaped like those of cross-cut saw.

Compass Saw:

It has a narrow, longer and stronger tapering blade, which is used for heavy works . It is mostly used in radius cutting. The blade of this saw is fitted with an open type wooden handle.

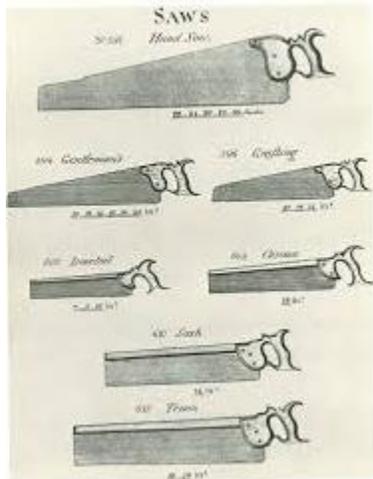


Fig: Types of Saws

Chisels:

Chisels are used for cutting and shaping wood accurately. Wood chisels are made in various blade widths, ranging from 3 to 50 mm. They are also made in different blade lengths. Most of the wood chisels are made into tang type, having a steel shank which fits inside the handle. These are made of forged steel or tool steel blades.

Types of Chisels:

Firmer Chisel:

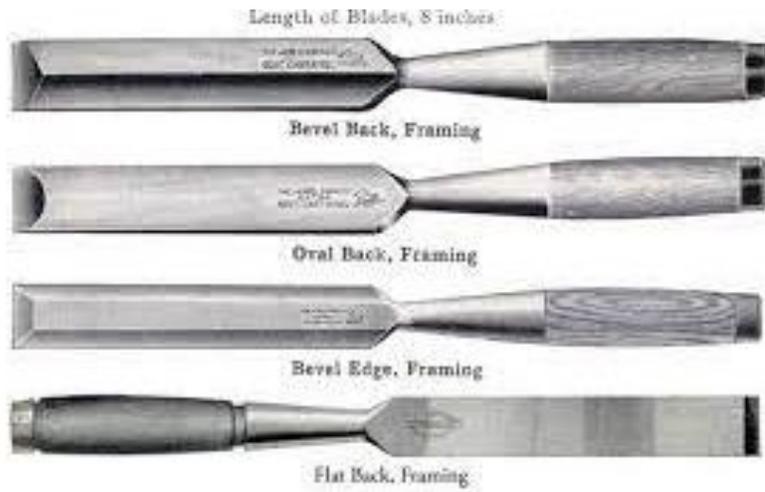
The word 'firmer' means 'stronger' and hence firmer chisel is stronger than other chisels. It is a general purpose chisel and is used either by hand pressure or by a mallet. The blade of a firmer chisel is flat, as shown in figure.

Dovetail Chisel :

It has a blade with a beveled back, as shown in Figure, due to which it can enter sharp corners for finishing, as in dovetail joints.

Mortise Chisel:

It is used for cutting mortises and chipping inside holes, etc. The cross-section of the mortise chisel is proportioned to withstand heavy blows during mortising. Further, the cross-section is made stronger near the shank.



EXPERIEMNT:- 01

AIM OF THE EXPERIEMNET:-

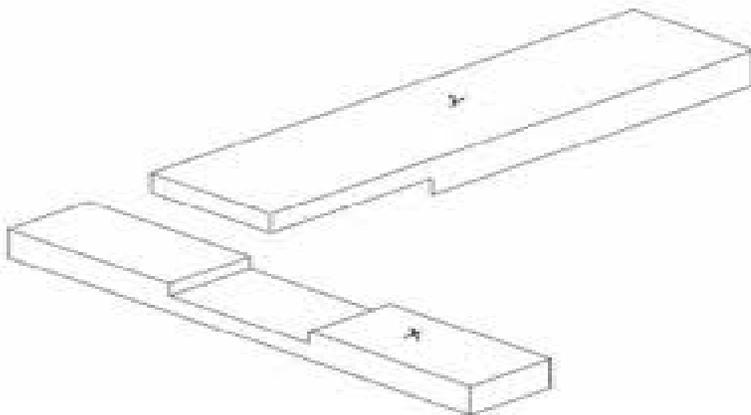
To prepare a T lap joint.

TOOLS AND EQUIPMENT REQUIRED:-

SL. NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Carpenter's Vice	600mm	01
02	Steel Rule	300mm	01
03	Jack Plane	250mm	01
04	Try Square	150mm	01
05	Marking Gauge	150mm	01
06	Firmer Chisel	25mm	01
07	Mortise Chisel	6mm	01
08	Cross Cut Saw	300mm	01
09	Tenon Saw	250mm	01
10	Scriber	150mm	01
11	Mallet	0.25Kg	01

RAW MATERIAL REQUIRED:-

SL NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Wood Size	(50X50X250)mm	01



T-LAP JOINT

PROCEDURE:

- The give raw material is checked to ensure its correct size.
- The reaper is firmly clamped in carpenter vice and any two adjacent faces are planed by the jack plane and two faces are checked for squareness with the try square.
- Marking gauge is set and lines are drawn at 30 and 45 , to mark the thickness and width of the model respectively.
- The excess material is first chiseled out with firmer chisel and then palned to correct size
- The mating dimensions of the parts are then marked using scale and marking gauge.
- Using cross-cut saw, the portions to be removed are cut in both the pieces, followed by chiseling and also the parts are separated by cross cutting, using the tenon saw.
- The ends of both the parts are chiseled to the exact length.
- A fine finishing is given to the parts,if required so that, proper fitting is obtained.
- The parts are fitted to aslightlyto tight joint.

CONCLUSION:The T-Lap joint is thus made by following the above sequence of operation.

EXPERIEMNT:- 02

AIM OF THE EXPERIEMNET:-

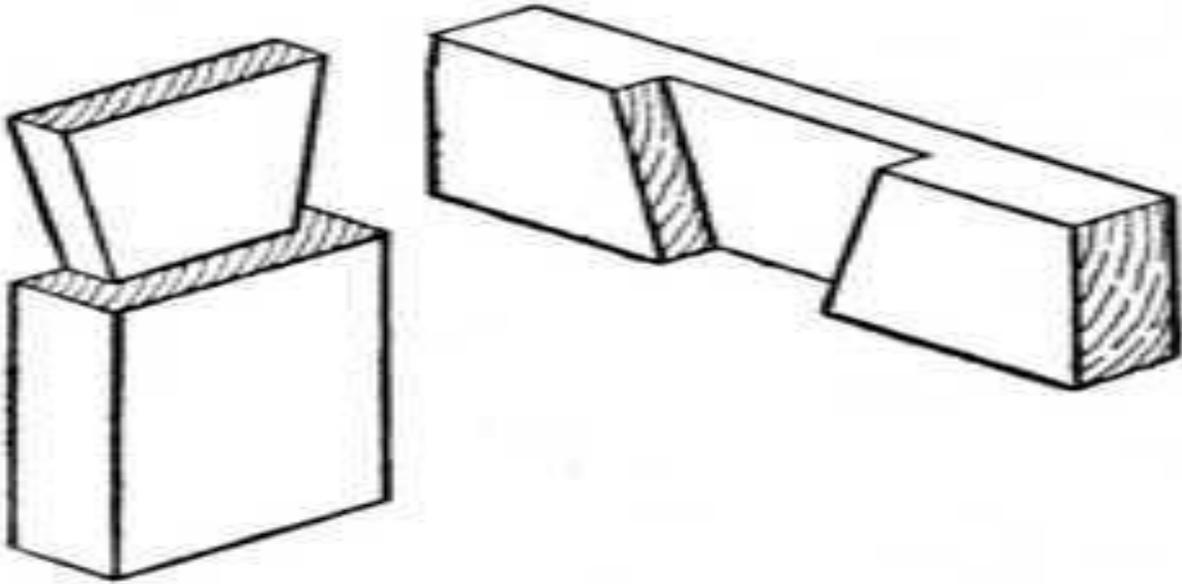
To prepare a single Dove Tail joints

TOOLS AND EQUIPMENT REQUIRED:-

SL. NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Carpenter's Vice	600mm	01
02	Steel Rule	300mm	01
03	Jack Plane	250mm	01
04	Try Square	150mm	01
05	Marking Gauge	150mm	01
06	Firmer Chisel	25mm	01
07	Mortise Chisel	6mm	01
08	Cross Cut Saw	300mm	01
09	Tenon Saw	250mm	01
10	Scriber	150mm	01
11	Mallet	0.25Kg	01

RAW MATERIAL REQUIRED:-

SL NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Wood Size	(50X50X250)mm	01



PROCEDURE:

- The give raw material is checked to ensure its correct size.
- The material is firmly clamped in the carpenter's vice and any two adjacent faces are planed by the jack plane and checked for straightness.
- The adjacent face is then planed and the faces are checked for squareness with the try square.
- Marking gauge is set and lines are drawn at 30 and 45mm to mark the thickness and width of the model respectively.
- The excess material is first chiselled out with the firmer chisel and then planed to correct size.
- The matching dimension of the part X and Y are then marked using the scale and marking gauge.
- Using the cross cut saw the portions to be removed in part Y (Tenon) is cut followed by chiselling.
- The part X and Y are separated by cross cutting with the tenon saw.
- The ends of both the part are chiselled to exact length.
- A fine finishing is given to the parts if required so that proper fitting is obtained.
- The parts are fitted to obtain a slightly tight joint.

CONCLUSION: -The single Dove Tail joint is thus made by following the above sequence of operations.

EXPERIEMNT NO:- 03

AIM OF THE EXPERIEMNET:-

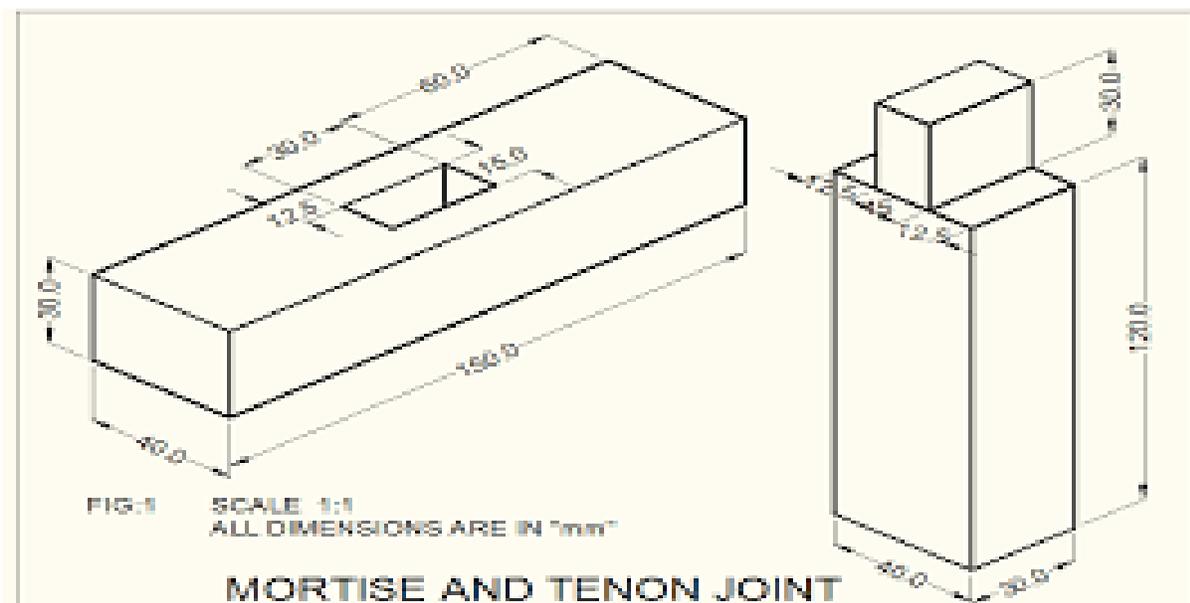
Cutting of slot, notch, mortise and tenon.

TOOLS AND EQUIPMENT REQUIRED:-

SL. NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Carpenter's Vice	600mm	01
02	Steel Rule	300mm	01
03	Jack Plane	250mm	01
04	Try Square	150mm	01
05	Marking Gauge	150mm	01
06	Firmer Chisel	25mm	01
07	Mortise Chisel	6mm	01
08	Cross Cut Saw	300mm	01
09	Tenon Saw	250mm	01
10	Scriber	150mm	01
11	Mallet	0.25Kg	01

RAW MATERIAL REQUIRED:-

SL NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	Wood Size	(50X50X250) mm	01



PROCEDURE:

- The given raw material is checked to ensure its correct size.
- The material is firmly clamped in the carpenter's vice and one of its faces are planed by the jack plane and checked for straightness.
- The adjacent face is then planed and the faces are checked for squareness with the try square.
- Marking gauge is set and lines are drawn at 30 and 45mm to mark the thickness and width of the model respectively.
- The excess material is first chiselled out with the firmer chisel and then planed to correct size.
- The matching dimension of the part X and Y are then marked using the scale and marking gauge.
- Using the cross cut saw the portions to be removed in part Y (Tenon) is cut followed by chiselling.
- The material to be removed in Part X (Mortise) is carried out by using the mortise and firmer chisel.
- The part X and Y are separated by cross cutting with the tenon saw.
- The ends of both the part are chiseled to exact length.
- Finish chiseling is done where ever needed so that the parts can be fitted to obtain a near tight joint.

CONCLUSION: -The mortise and tenon joint is thus made by following the above sequence of operations.

EXPERIEMNT NO:- 04

AIM OF THE EXPERIEMNET:-

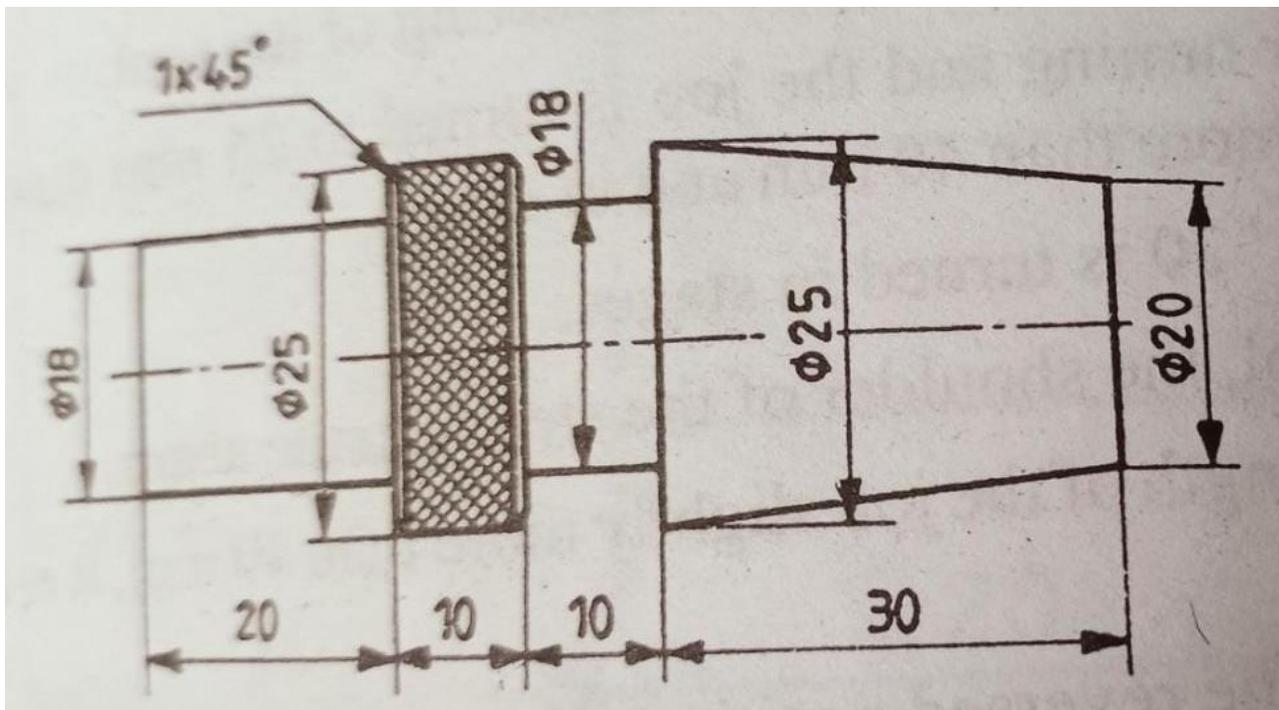
To turn a model as given in figure.

TOOLS AND EQUIPMENT REQUIRED:-

Round nose tool, Parting tool, Knurling tool, steelrule, outside caliper.

RAW MATERIAL REQUIRED:-

SL NO	NAME OF THE ITEMS	SPECIFICATION	QUANTITY
01	R.M.M.S	\$28*75	01



PROCEDURE:

- The round nose tool is centered for facing operation.
- The given Rod is fixed in the chuck such that, above 40 mm is projecting for chuck.
- The end is faced and checked for the centering of the tool.
- The tool is set for turning to 25 mm diameter in a stage, to a length of slightly more than 40.

- Now the step f 18”20 is turned in a stage.
- An under cut is taken with the parting tool , to a depth of 3 mm after 30 mm length and also the shoulder is corrected at 20 mm length.
- The knurling tool is fixed in the tool post and the knurling operation is completed.
- Both the edges of knurling are chamfered.
- The job is reversed and held in the chuck on f 18” 20
- The remaining length is turned to f 25.
- The end is faced until the total length is 70 mm.

NOTE:- If the excess length to be removed is substantial ; it will done by parting, followed by facing.

- The end id faced until the total length is 70 mm.
- Under cutting the step \$ 18*10 is done with a parting tool and the shoulders are corrected.
- The taper angle is calculated , using the formula,

$$\frac{D-d}{2L} = \tan A$$

D= Diameter of the big end of taper.

d=Diameter of the small end of the taper.

L= Length of taper

- The compound rest is set to taper angle.
- The taper is turned in stages, using the compound slide feeding and cutting from right to left.

CONCLUSION: -The model consisting of step turning, knurling, taper turning is thus made , by following the sequence of operations as mentioned above.