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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

CENTRAL WORKSHOP

SUBJECT: WORKSHOP PRACTICES
(INTRODUCTION TO CARPENTRY SHOP)

- 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.

Qualities of a 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.

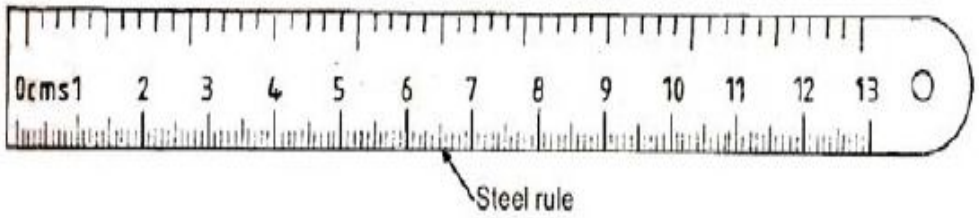
Marking and Measuring Tools:

- 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.

TOOLS USED IN CARPENTRY



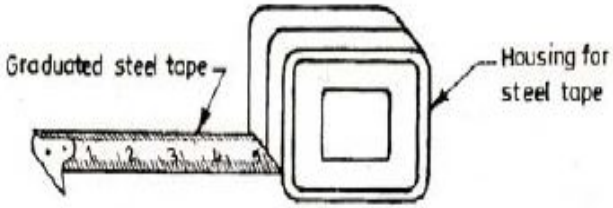
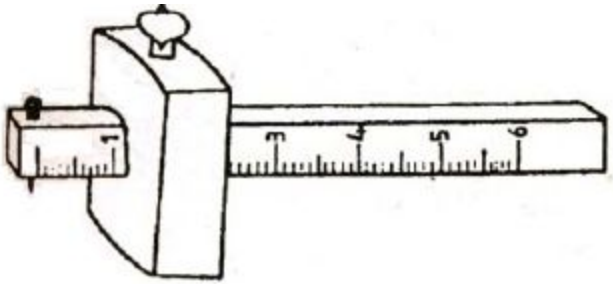
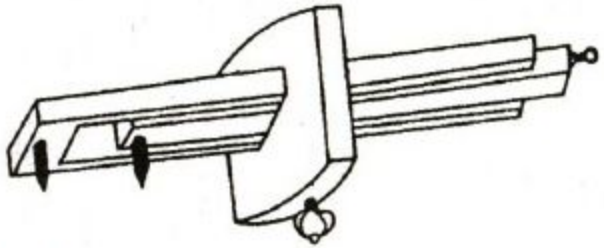


Figure 2.1: Steel rule and Steel tape

Figure 2.3: Try square



a. Marking gauge



b. Mortise gauge

Figure 2.2: Marking gauges

Marking Tools

- 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.

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

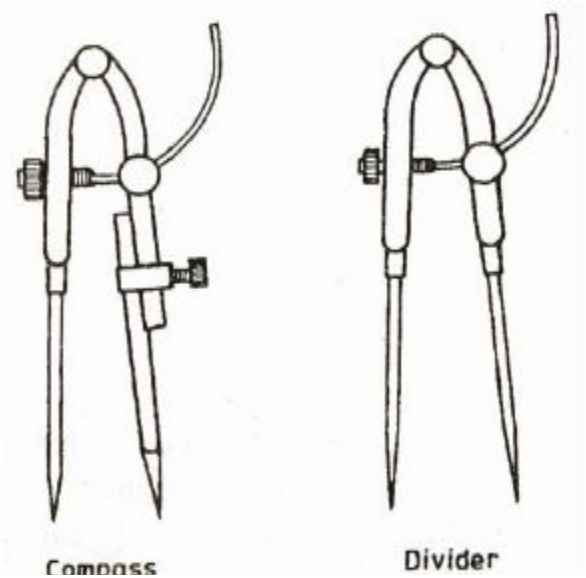
Carpenter's Vice

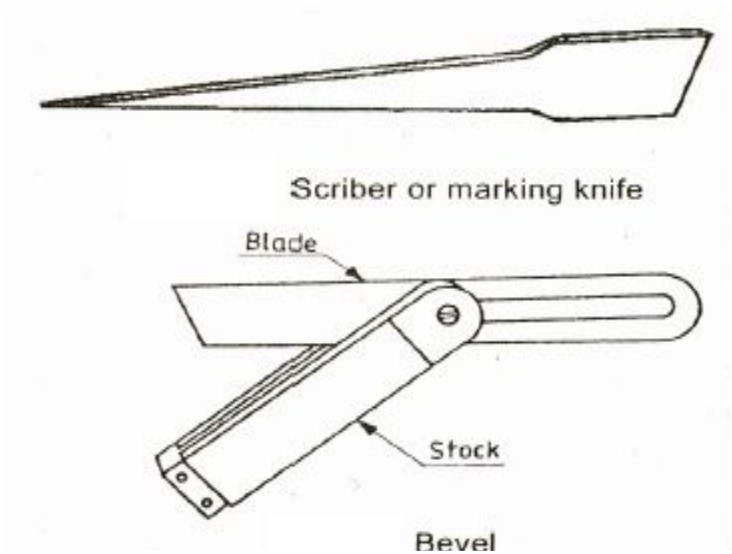
- It is used as a work holding device in a carpenter shop. Its one jaw is fixed to the side of the table while the other is movable by means of a screw and a handle. The Carpenter's vice jaws are lined with hard wooden' faces

C-Clamp

- It is used for holding small works

TOOLS USED IN CARPENTRY





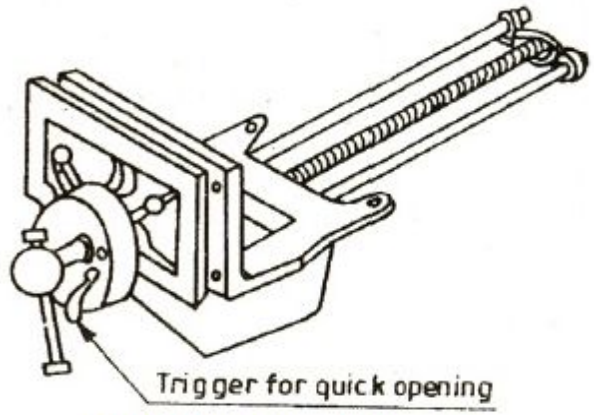


Figure 2.6: Carpenters vice

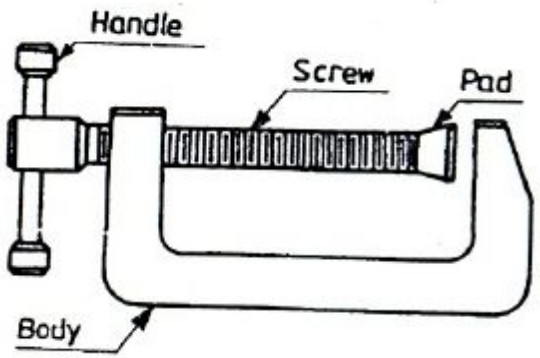
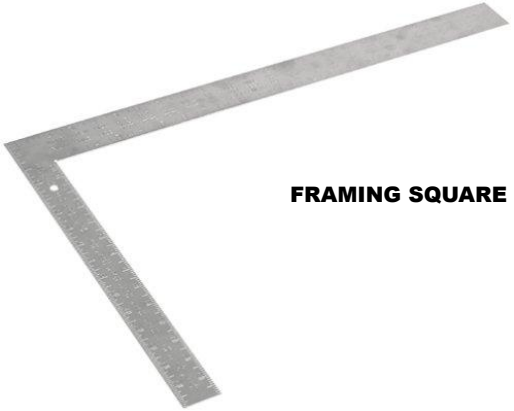


Figure 2.7: C-clamp

MEASURING AND MARKING

CHALK LINE

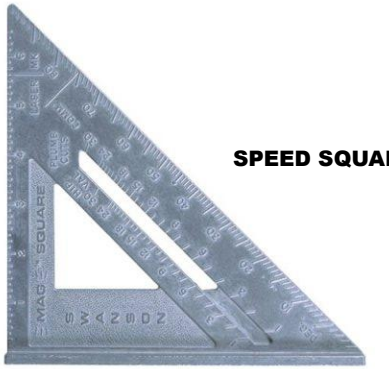
TAPE MEASURE



FRAMING SQUARE

PENCIL

BEVEL GAUGE



SPEED SQUARE

COMBO SQUARE

LEVEL

SHARPIE

POWER DRILLING TOOLS

ELECTRIC DRILL MOTOR

TWIST TYPE DRILL BIT FOR WOOD OR METAL

PHILLIPS SCREWDRIVER BIT

BATTERY POWERED ELECTRIC DRILL MOTOR (CORDLESS)

SPADE (OR PADDLE) TYPE DRILL BIT FOR WOOD <u>ONLY!</u>

POWER HAND SAWS

JIG SAW OR
SABRE SAW

RECIPROCATING SAW

CIRCULAR SAW

STATIONARY POWER SAWS

RADIAL ARM SAW

TABLE SAW

PLIERS

ARC JOINT PLIERS (CHANNEL LOCKS)

LOCKING PLIERS (VISE GRIPS)

FENCING TOOL

DIAGONAL CUTTERS

LONG-NOSE PLIERS

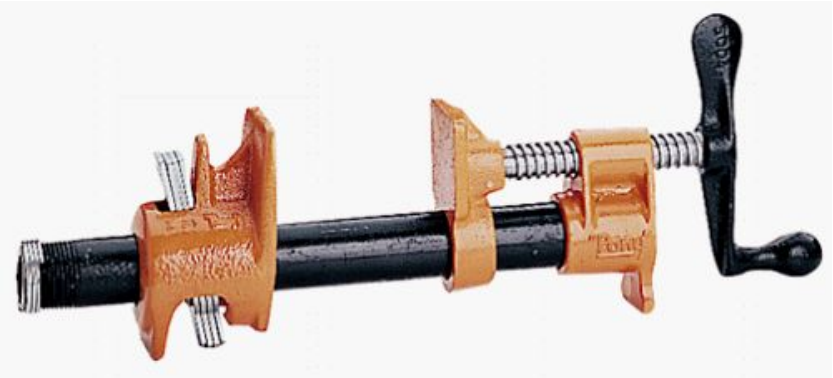
LINEMAN PLIERS

SLIP-JOINT PLIERS

CLAMPING TOOLS

C-CLAMPS

BAR CLAMPS



PIPE CLAMP

HAMMERS

CLAW HAMMER

RIP HAMMER

BALL PEIN HAMMER

SLEDGE HAMMER

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.

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 planning.

Smoothing Plane

- 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.

Planning Tools

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 about

TOOLS USED IN CARPENTRY

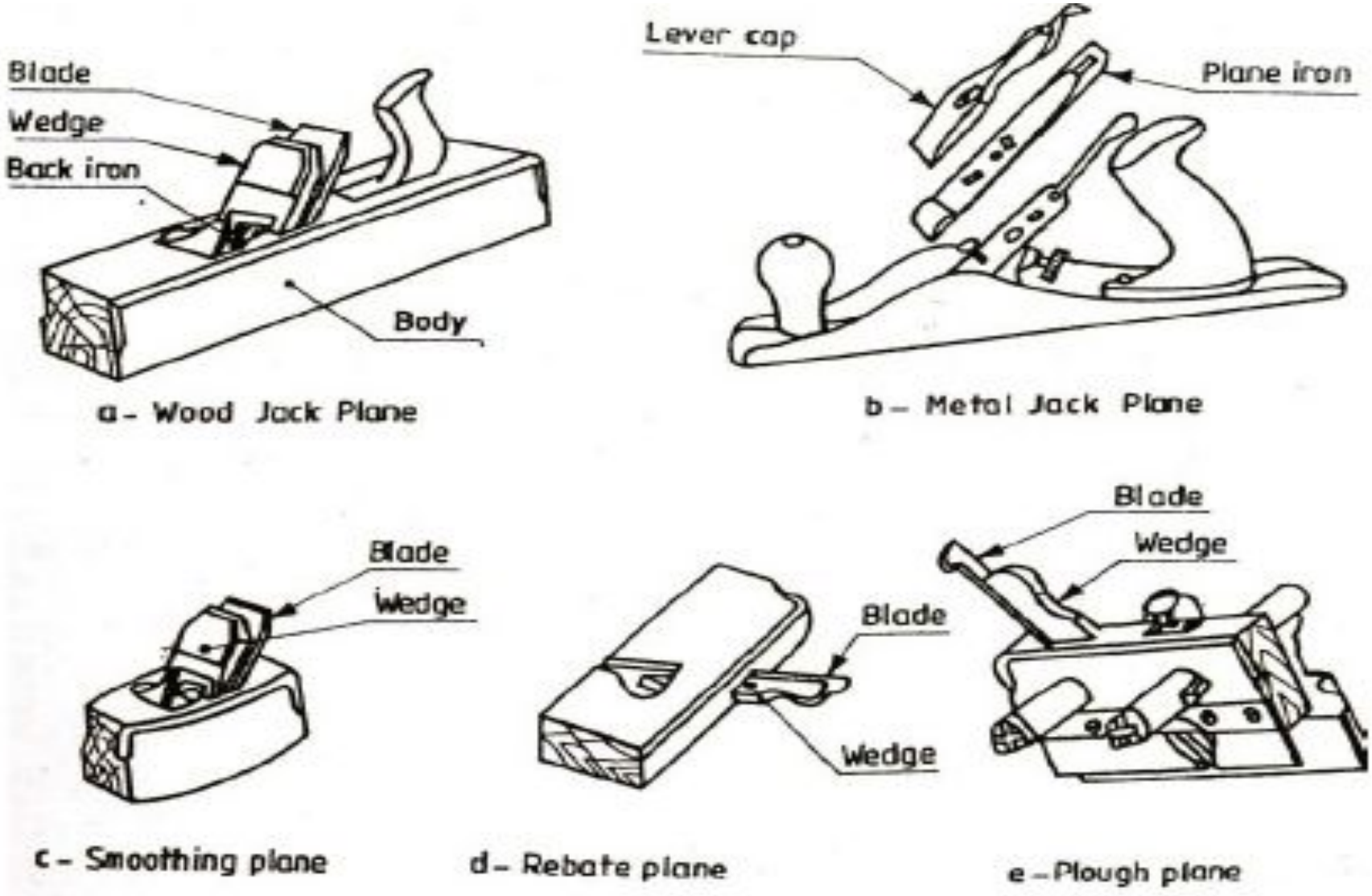


Figure 2.9: Types of planes

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.

TOOLS USED IN CARPENTRY

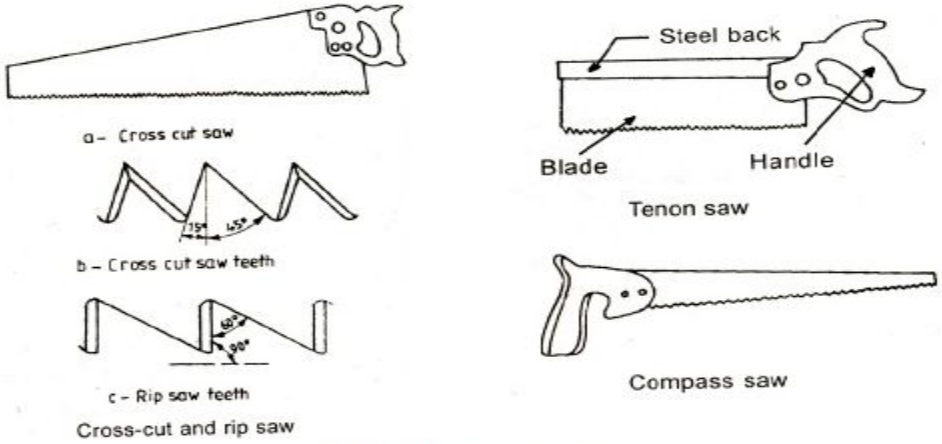


Figure 2.10: Types of saws

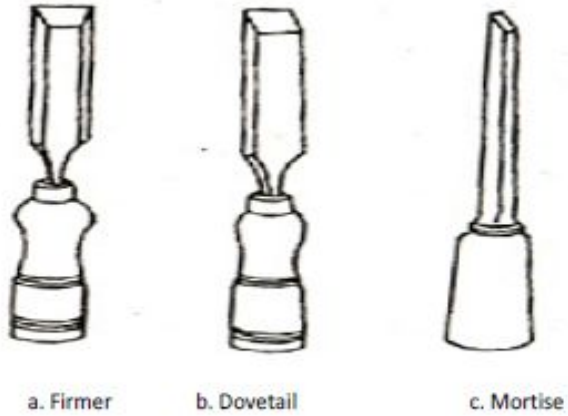


Figure 2.12: Types of chisels

Figure 2.13: Drilling tools

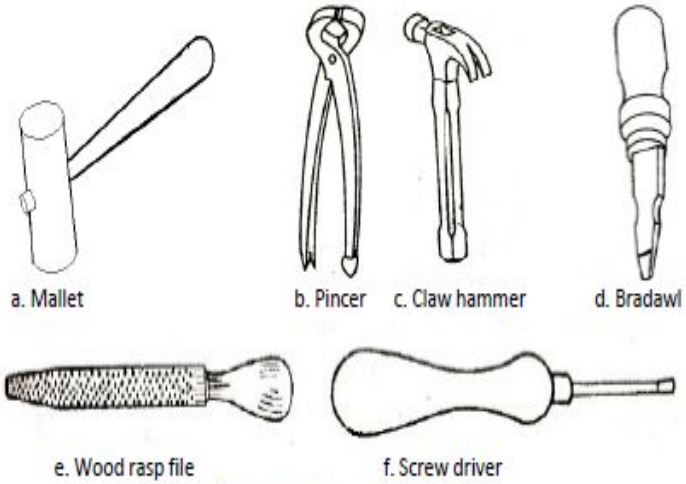


Figure 2.14: Miscellaneous tools

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 comers 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..

WOOD JOINTS

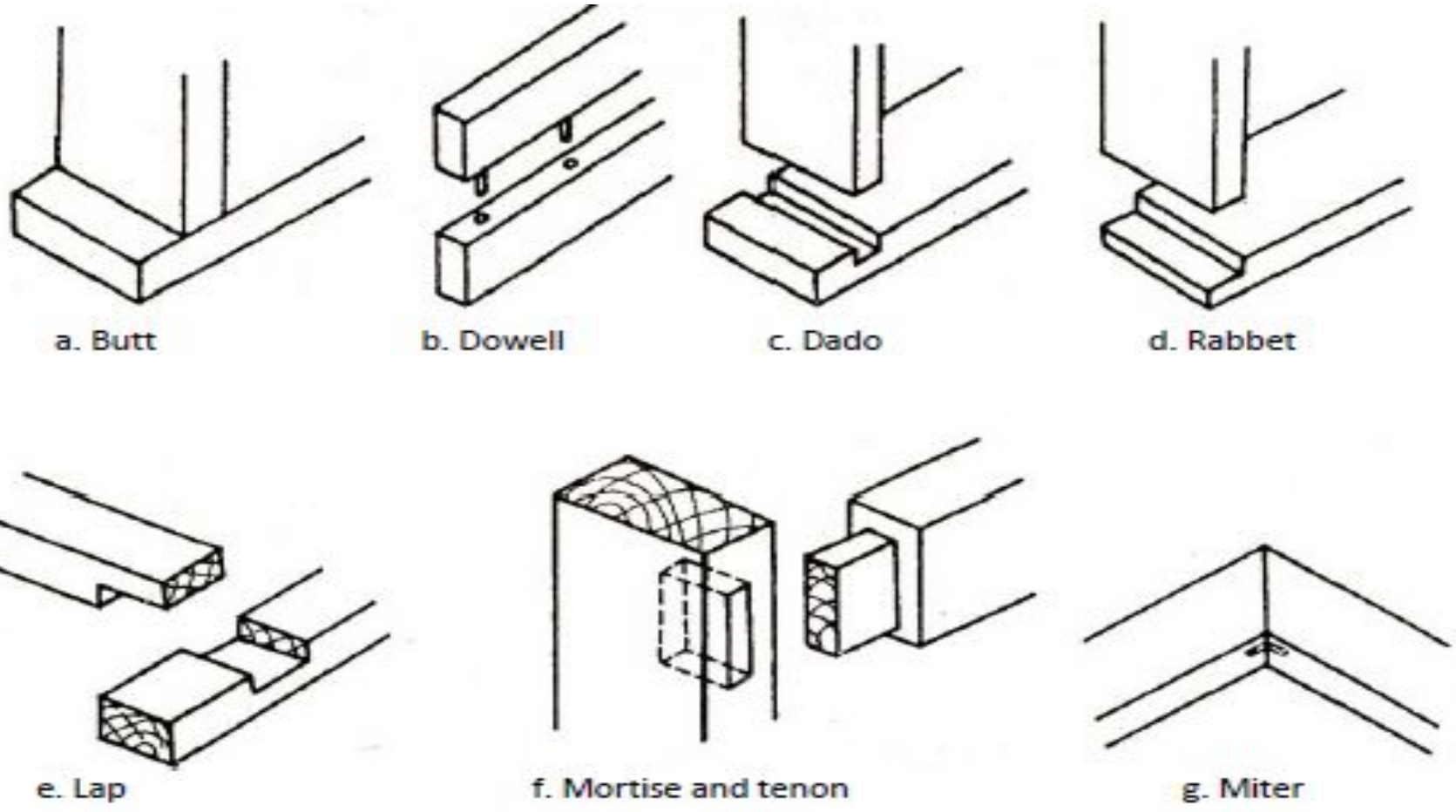
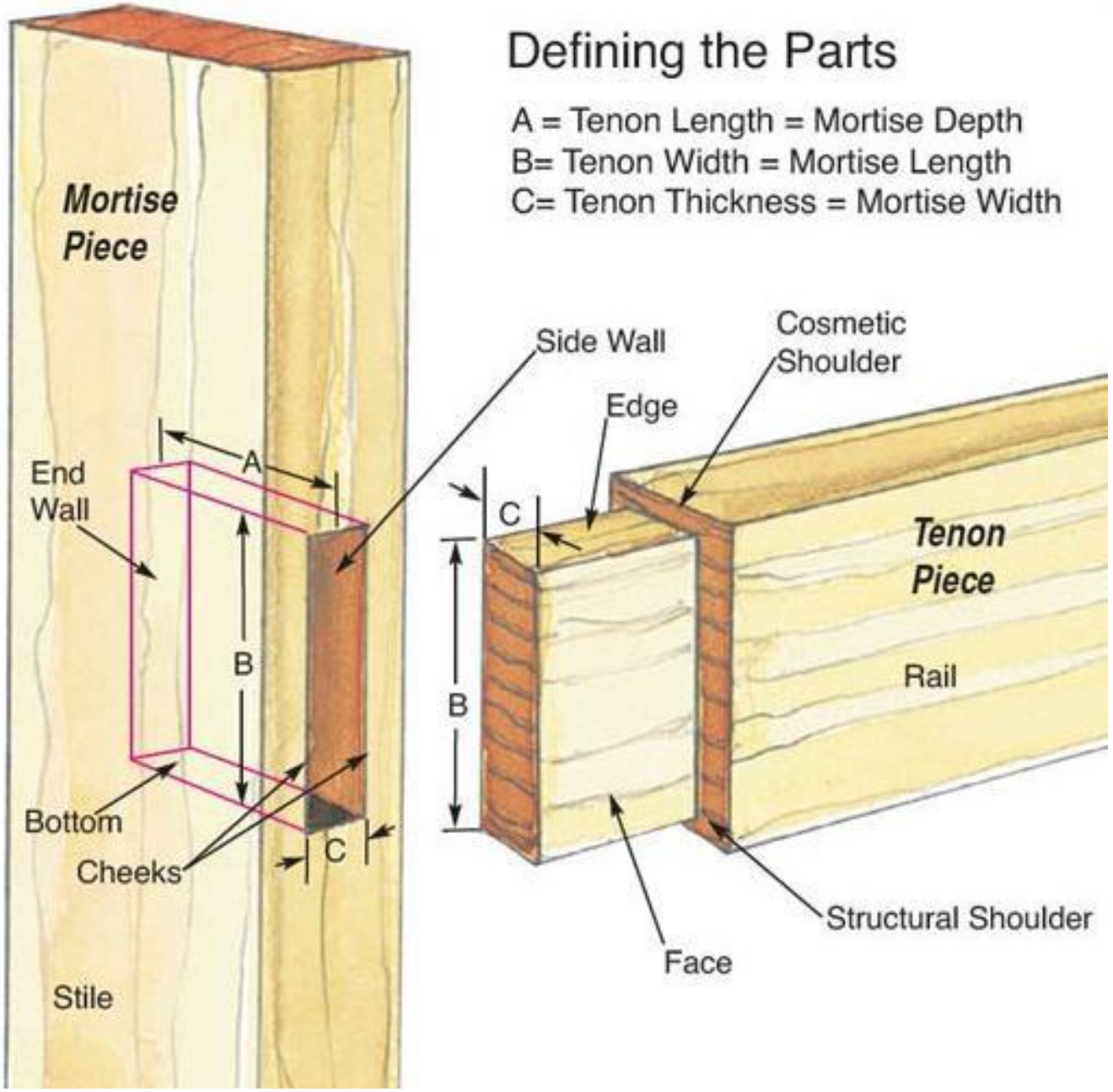
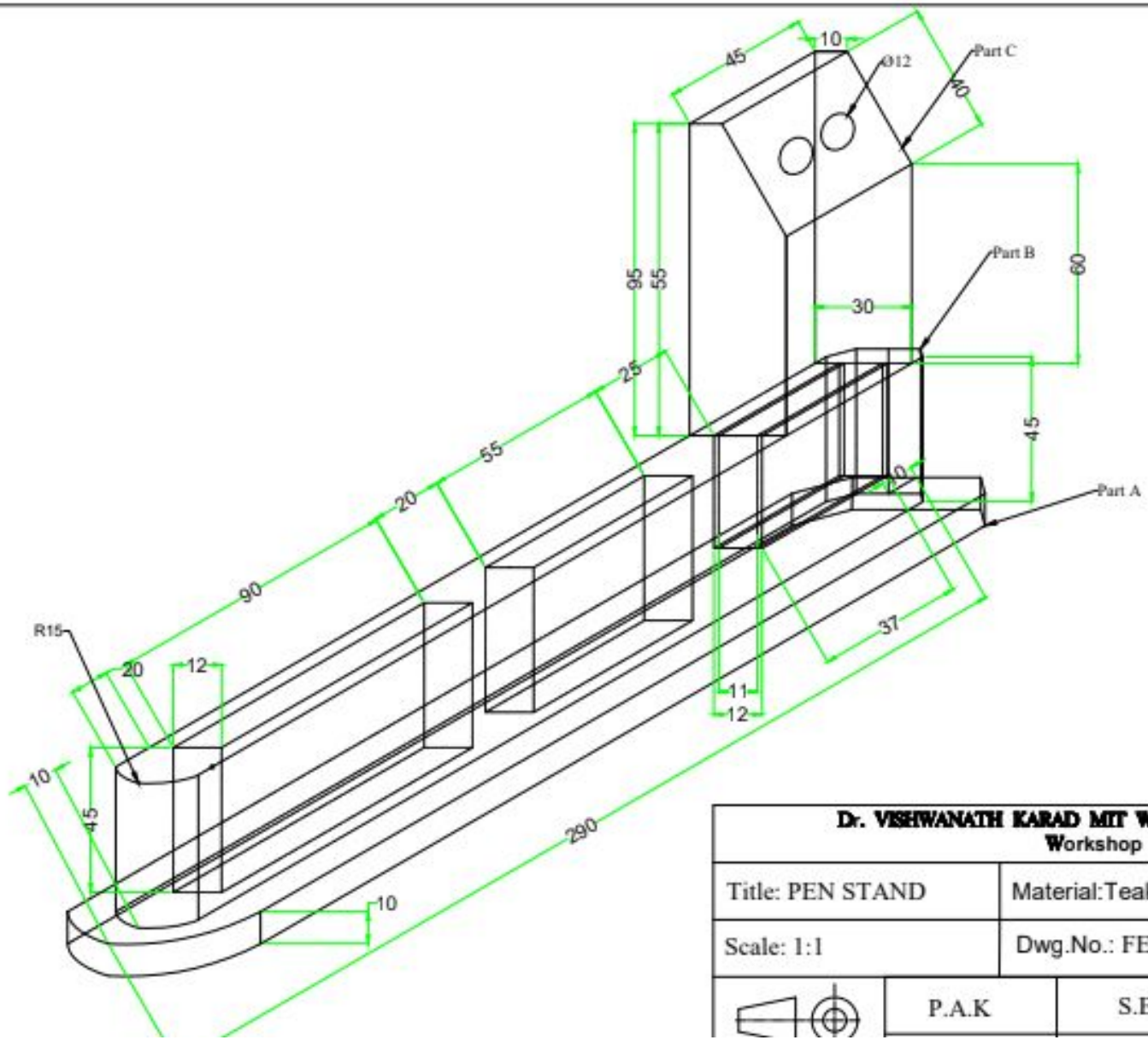


Figure 2.15: Common wood joints


Defining the Parts
A = Tenon Length = Mortise Depth
B= Tenon Width = Mortise Length
C= Tenon Thickness = Mortise Width
Mortise Piece
End Wall
A
B
Bottom
Cheeks
C
Stile
Side Wall
Cosmetic Shoulder
Edge
C
B
Tenon Piece
Rail
Structural Shoulder
Face



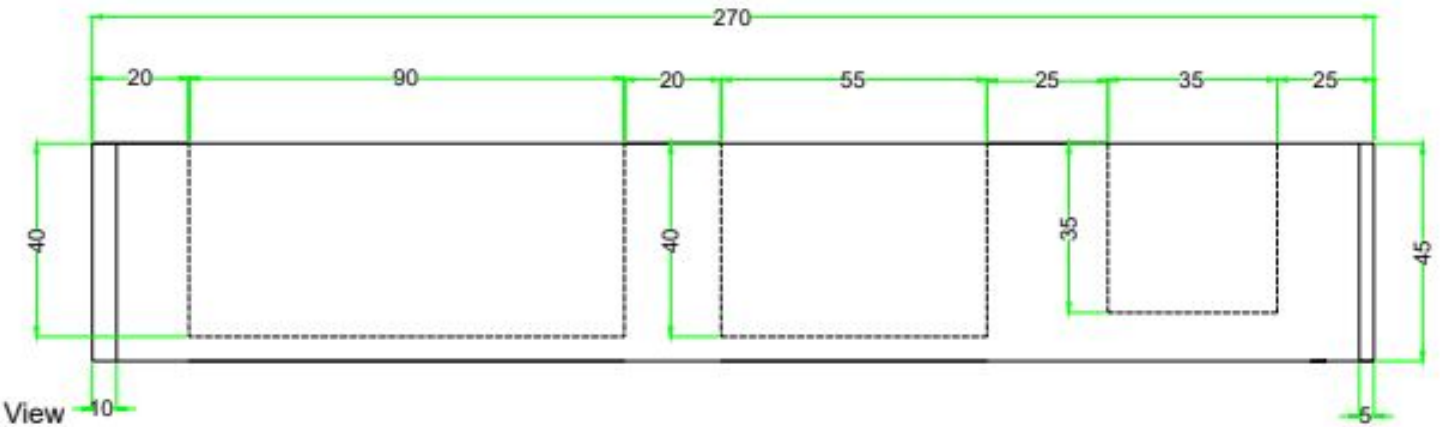
OPERATIONS PERFORMED:

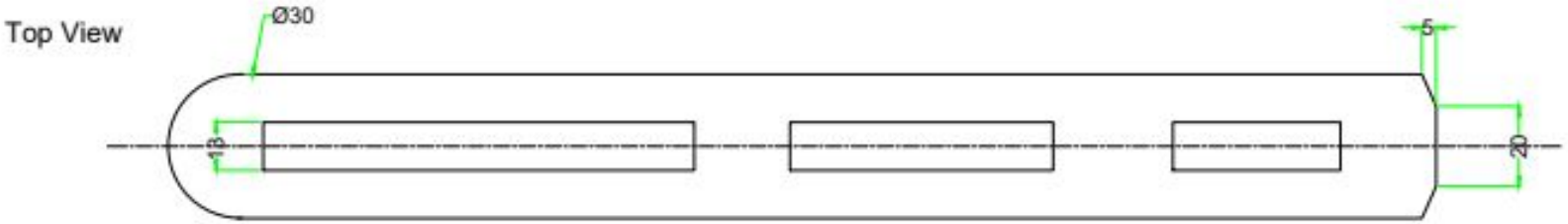
1. Marking
2. Sawing
3. Chiseling
4. Planning
5. Drilling
6. Slotting
7. Fitting
8. polishing

Raw Material:
Part A - 300 x 70 x12 mm
Part B - 300 x 35 x 50 mm
Part C: 130 x 50 x 35 mm

All Dimensions are in mm.

Dr. VISHWANATH KARAD MIT WORLD PEACE UNIVERSITY, PUNE Workshop Department		
Title: PEN STAND	Material:Teak Wood	Tolerance= +/- 1mm
Scale: 1:1	Dwg.No.: FE/W/S PRAC./CARP. I/2019-20/TRI I	
	P.A.K	S.B.K	G.P.B.	





OPERATIONS PERFORMED:

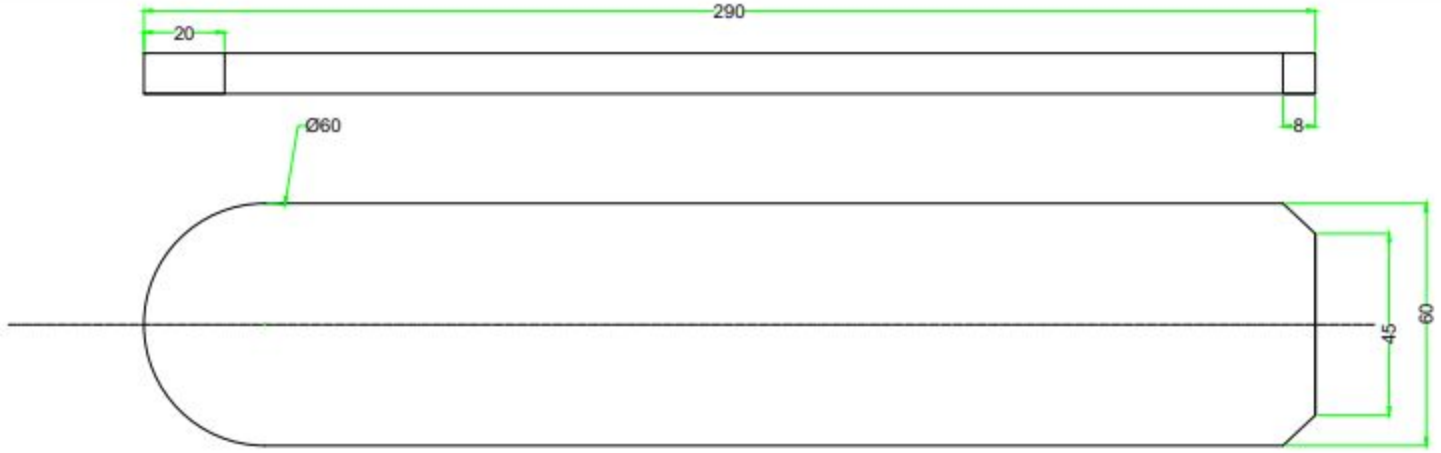
1. Marking
2. Sawing
3. Chiseling
4. Planning
5. Drilling
6. Slotting
7. Fitting
8. polishing

Raw Material:
Part C: 300 x 50 x 35 mm

Part B

All Dimensions are in mm.

Dr. VISHWANATH KARAD MIT WORLD PEACE UNIVERSITY, PUNE Workshop Department			
Title: PEN STAND			Tolerance= +/- 1mm
Scale: 1:1	Dwg.No.: F.Y. B.Tech./WSP/TIN/2019-20/TRI I		
First Angle	P.A.K.	S.B.K.	G.P.B.
	Prepared by	Checked by	Approved by	Issued on



Part A

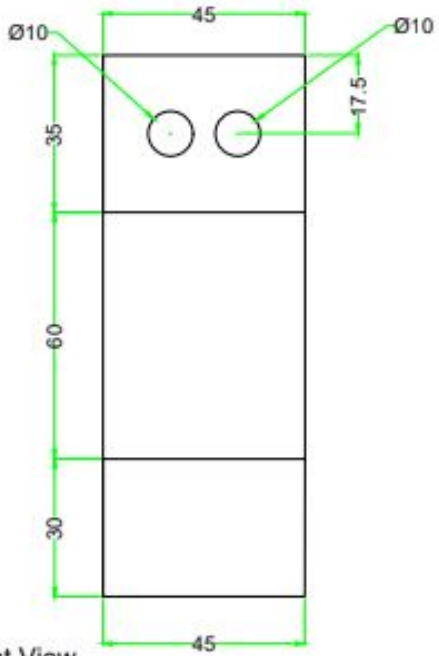
OPERATIONS PERFORMED:

1. Marking
2. Sawing
3. Chiseling
4. Planning
5. Drilling
6. Slotting
7. Fitting
8. polishing

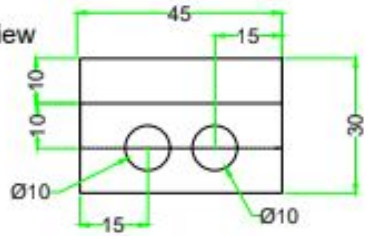
Raw Material:
Part A - 300 x 70 x12 mm

All Dimensions are in mm.

Dr. VISHWANATH KARAD MIT WORLD PEACE UNIVERSITY, PUNE Workshop Department			
Title: PEN STAND			Tolerance= +/- 1mm
Scale: 1:1	Dwg.No.: F.Y. B.Tech./WSP/TIN/2019-20/TRI I		
	P.A.K.	S.B.K.	G.P.B.



Front View



Top View

Part C

OPERATIONS PERFORMED:

1. Marking
2. Sawing
3. Chiseling
4. Planning
5. Drilling
6. Slotting
7. Fitting
8. polishing

Raw Material:
Part C: 130 x 50 x 35 mm

All Dimensions are in mm.

Dr. VISHWANATH KARAD MIT WORLD PEACE UNIVERSITY, PUNE Workshop Department			
Title: PEN STAND			Tolerance= +/- 1mm
Scale: 1:1	Dwg.No.: F.Y. B.Tech./WSP/TIN/2019-20/TRI I		
	P.A.K.	S.B.K.	G.P.B.
First Angle	Prepared by	Checked by	Approved by	Issued on

SAFE PRACTICES IN CARPENTRY SHOP

The following are some of the safe and correct work practices in carpentry shop, with respect to the tools used

1. Tools that are not being used should always be kept at their proper places.
2. Make sure that your hands are not in front of sharp edged tools while you are using them.
3. Use only sharp tools. A dull tool requires excessive pressure, causing the tool to slip.
4. Wooden pieces with nails, should never be allowed to remain on the floor.
5. Be careful when you are using your thumb as a guide in cross-cutting and ripping.
6. Test the sharpness of the cutting edge of chisel on wood or paper, but not on your hand.
7. Never chisel towards any part of the body.
8. Do not use chisels where nails are present. Do not use chisel as a screw driver.
9. Do not use a saw with a loose handle.
10. Always use triangular file for sharpening the teeth.
11. Do not use a saw on metallic substances.
12. Do not use mallet to strike nails.
13. Do not use plane at the places, where a nail is driven in the wood.