CARPENTARY WORKSHOP

1.1 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. It6 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.

2.2 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.

2.2.1 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.

2.2.2 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.

2.2.3 Seasoning of Wood

A newly felled tree contains considerable moisture content. If this is not removed, the timber is likely to wrap, 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.

2.2.4 Characteristics of Good Timber

The good timber must possess the following characteristics

1. It should have minimum moisture content, i.e., the timber should be well seasoned.
2. The grains of wood should be straight and long.
3. It must retain its straightness after seasoning.
4. It should produce near metallic sound on hammering.
5. It should be free from knots or cracks.
6. It should be of uniform color, throughout the part of the wood.
7. It should respond well to the finishing and polishing operations.
8. During driving the nails and screw, it should not split easily.

2.3 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.

2.3.1 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.

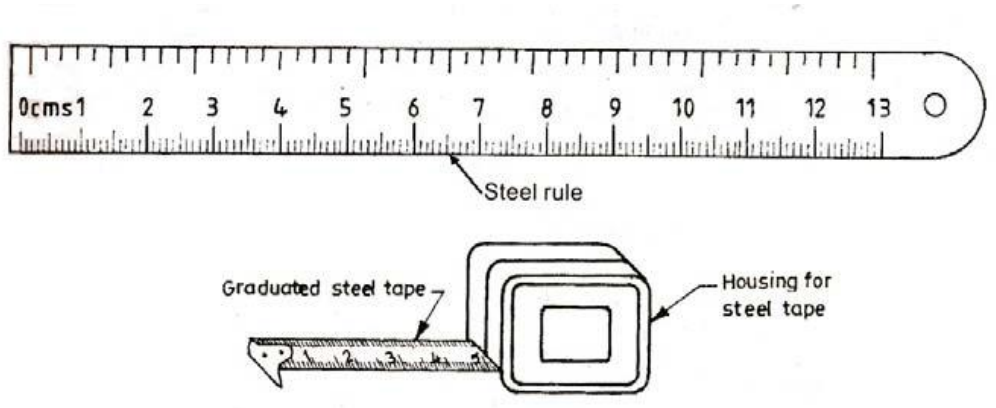
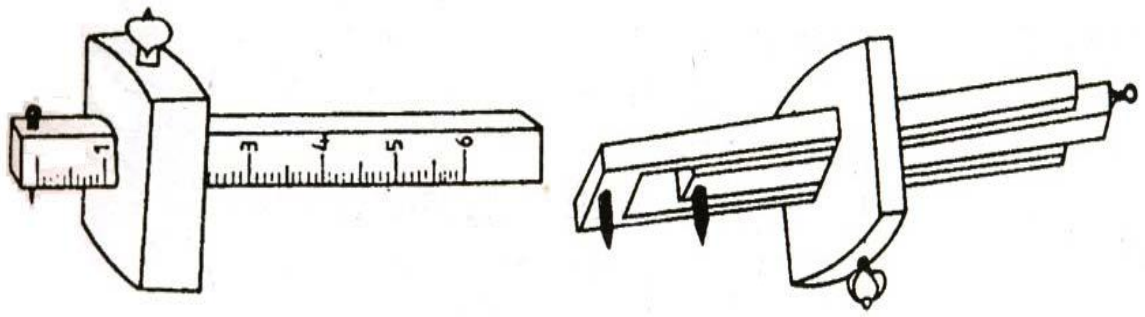


Figure 2.1: Steel rule and Steel tape

2.3.2 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.



a. Marking gauge b. Mortise gauge

Figure 2.2: Marking gauges

2.3.3 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.

Figure 2.3: Try square

2.3.4 Compass and divider

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

2.3.5 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.

2.3.6 Bevel

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.

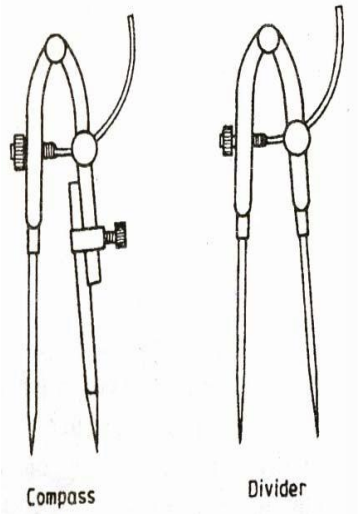


Figure 2.4: Compass and Divider

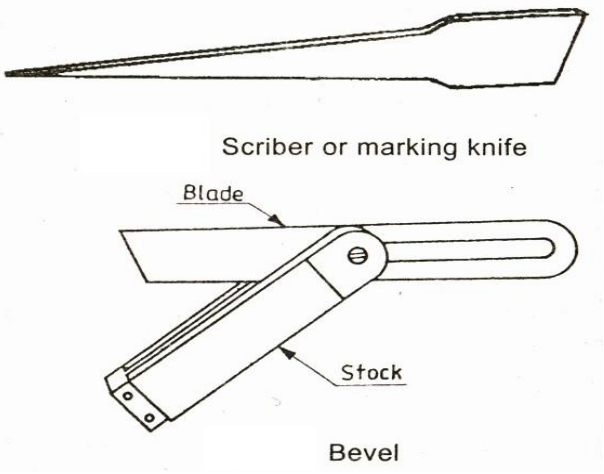


Figure 2.5: Scriber and Bevel

2.4 HOLDING TOOLS

2.4.1 Carpenter's vice

Figure 2.6 shows the carpenter's bench vice, 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.

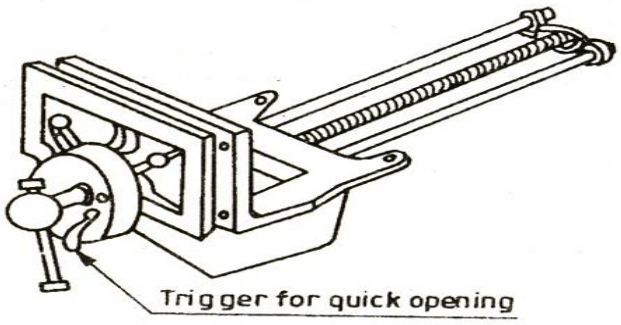


Figure 2.6: Carpenters vice

2.5 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.

2.5.1 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.

2.5.2 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.

2.5.3 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.

2.5.4 Plough plane

It is used to cut grooves, which are used to fix panels in a door. Figure 2.9 shows the various types of planes mentioned above.

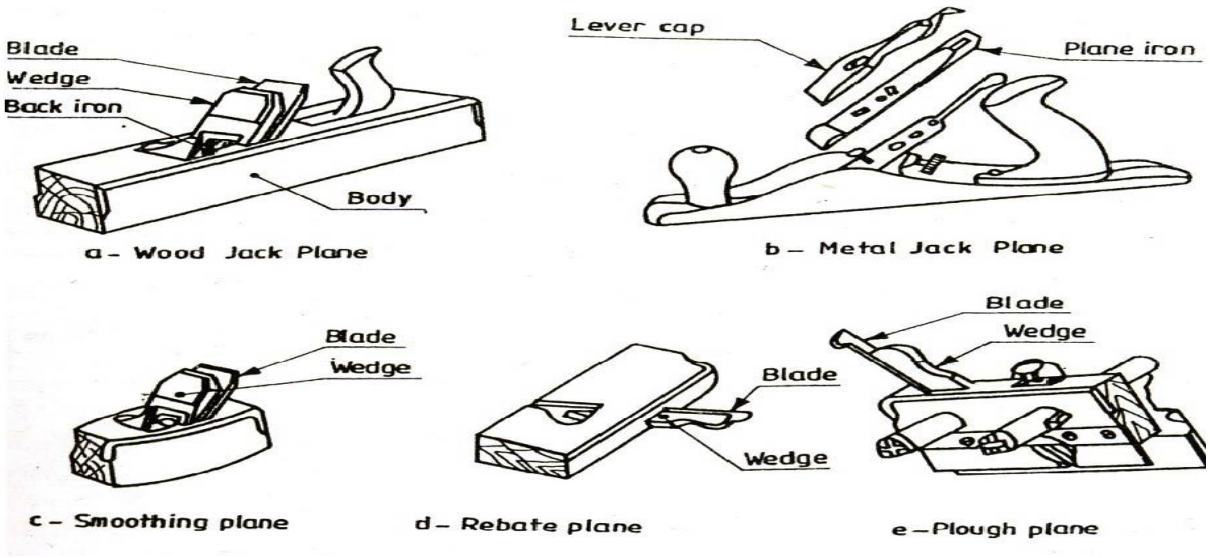


Figure 2.9: Types of planes

2.6 CUTTING TOOLS

2.6.1 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.

2.6.1.1 Cross cut 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.

2.6.1.2 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.

2.6.1.3 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.

2.6.1.4 Compass saw

It has a narrow, longer and stronger tapering blade, which is used for heavy works (Fig. 1.13). It is mostly used in radius cutting. The blade of this saw is fitted with an open type wooden handle.

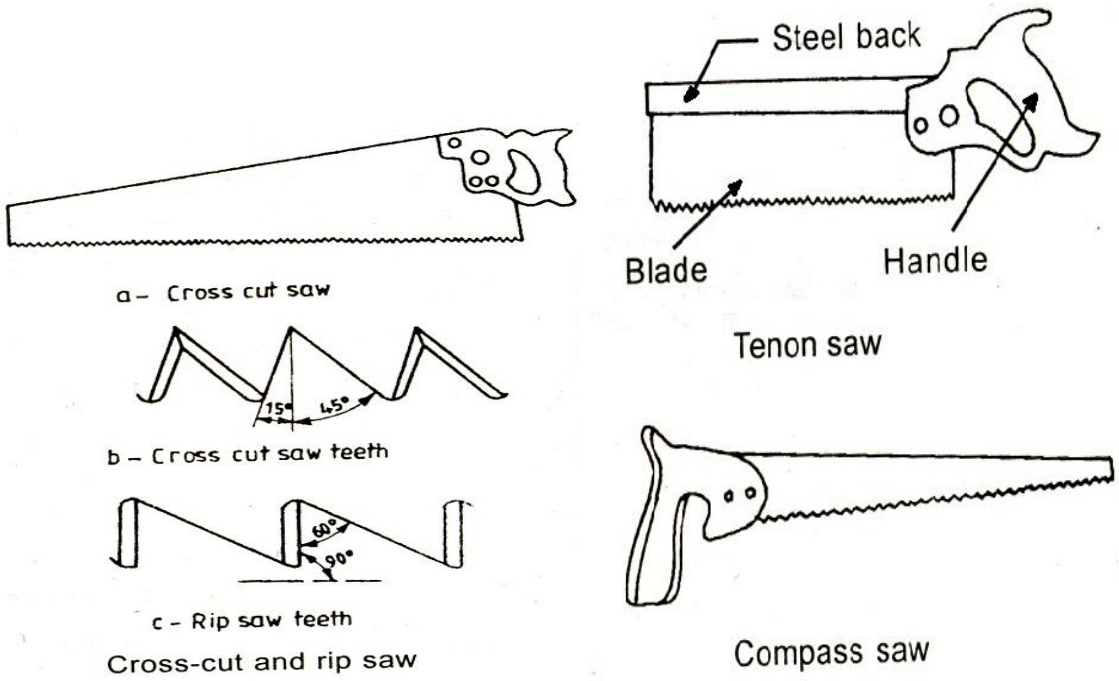


Figure 2.10: Types of saws

2.6.2 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.

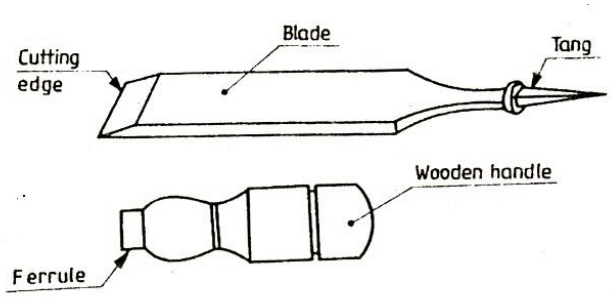


Figure 2.11: Parts of chisel

2.6.2.1 Firmer chisel

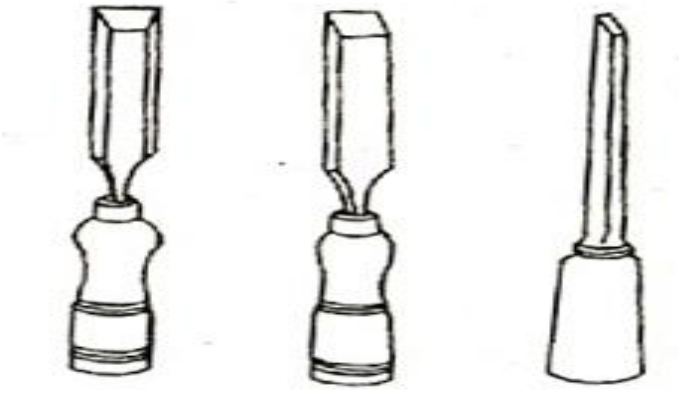
The word 'firmer' means 'stronger' and hence firmer chisel is stronger than other chisels. It is a general purpose chisel and is used either by hand pressure or by a mallet. The blade of a firmer chisel is flat, as shown in Figure 2.12 a.

2.6.2.2 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.

2.6.2.3 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.



a. Firmer b. Dovetail c. Mortise

Figure 2.12: Types of chisels

2.7 DRILLING AND BORING TOOLS

2.7.1 Carpenter's brace

It is used for rotating auger bits, twist drills, etc., to produce holes in wood. In some designs, braces are made with ratchet device. With this, holes may be made in a corner where complete revolution of the handle cannot be made. The size of a brace is determined by its sweep.

2.7.2 Auger bit

It is the most common tool used for making holes in wood. During drilling, the lead screw of the bit guides into the wood, necessitating only moderate pressure on the brace. The helical flutes on the surface carry the chips to the outer surface.

2.7.3 Hand drill

Carpenter's brace is used to make relatively large size holes; whereas hand drill is used for drilling small holes. A straight shank drill is used with this tool. It is small, light in weight and may be conveniently used than the brace. The drill bit is clamped in the chuck at its end and is rotated by a handle attached to gear and pinion arrangement.

2.7.4 Gimlet

It has cutting edges like a twist drill. It is used for drilling large diameter holes with the hand pressure.

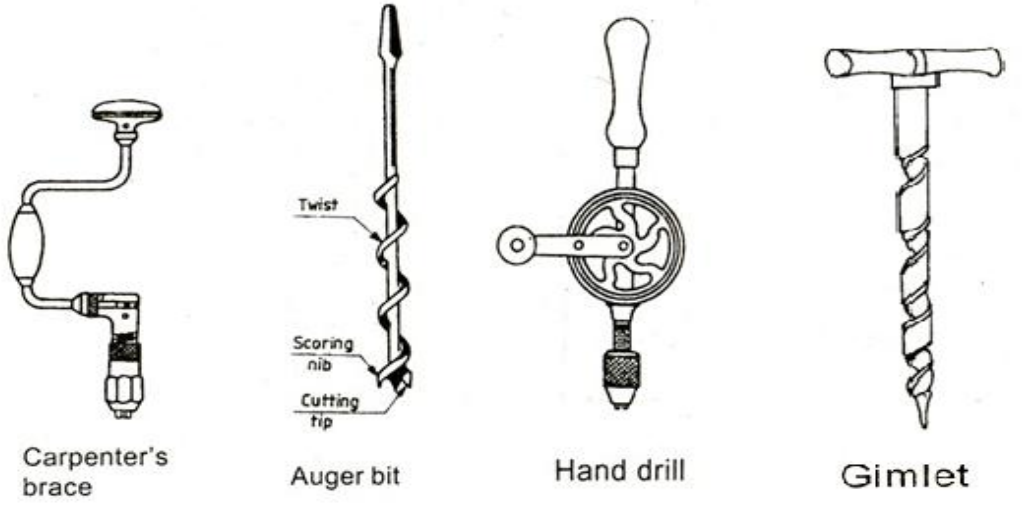


Figure 2.13: Drilling tools

2.8 MISCELLANEOUS TOOLS

2.8.1 Mallet

It is used to drive the chisel, when considerable force is to be applied, which may be the case in making deep rough cuts. Steel hammer should not be used for the purpose, as it may damage the chisel handle. Further, for better control, it is better to apply a series of light taps with the mallet rather than a heavy single blow.

2.8.2 Pincer

It is made of two forged steel arms with a hinged joint and is used for pulling • Jout small nails from wood. The inner faces of the pincer jaws are beveled and the outer faces are plain. The end

of one arm has a ball and the other has a claw. The beveled jaws and the claw are used for pulling out small nails, pins and screws from the wood.

2.8.3 Claw hammer

It has a striking flat face at one end and the claw at the other, as shown in figure. The face is used to drive nails into wood and for other striking purposes and the claw for extracting relatively large nails out of wood. It is made of cast steel and weighs from 0.25 kg to 0.75 kg.

2.8.4 Screw driver

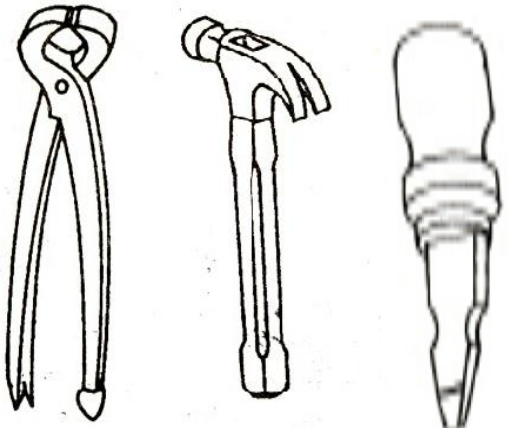
It is used for driving screws into wood or unscrewing them. The screw driver of a carpenter is different from the other common types, as shown in figure. The length of a screw driver is determined by the length of the blade. As the length of the blade increases, the width and thickness of the tip also increase.

2.8.5 Wood rasp file

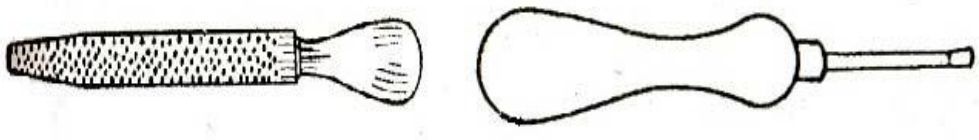
It is a finishing tool used to make the wood surface smooth, remove sharp edges, finish fillets and other interior surfaces. Sharp cutting teeth are provided on its surface for the purpose. This file is exclusively used in wood work.

2.8.6 Bradawl

It is a hand operated tool, used to bore small holes for starting a screw or large nail.



a. Mallet b. Pincer c. Claw hammer d. Bradawl



e. Wood rasp file f. Screw driver

Figure 2.14: Miscellaneous tools

2.9 WOOD JOINTS

There are many kinds of joints used to connect wood stock. Each joint has a definite use and requires lay in out, cutting them together. The strength of the joint depends upon amount of contact area. If a particular joint does not have much contact area, then it must be reinforced with nails, screws or dowels. The figure 2.15 shows some commonly used wood joints.

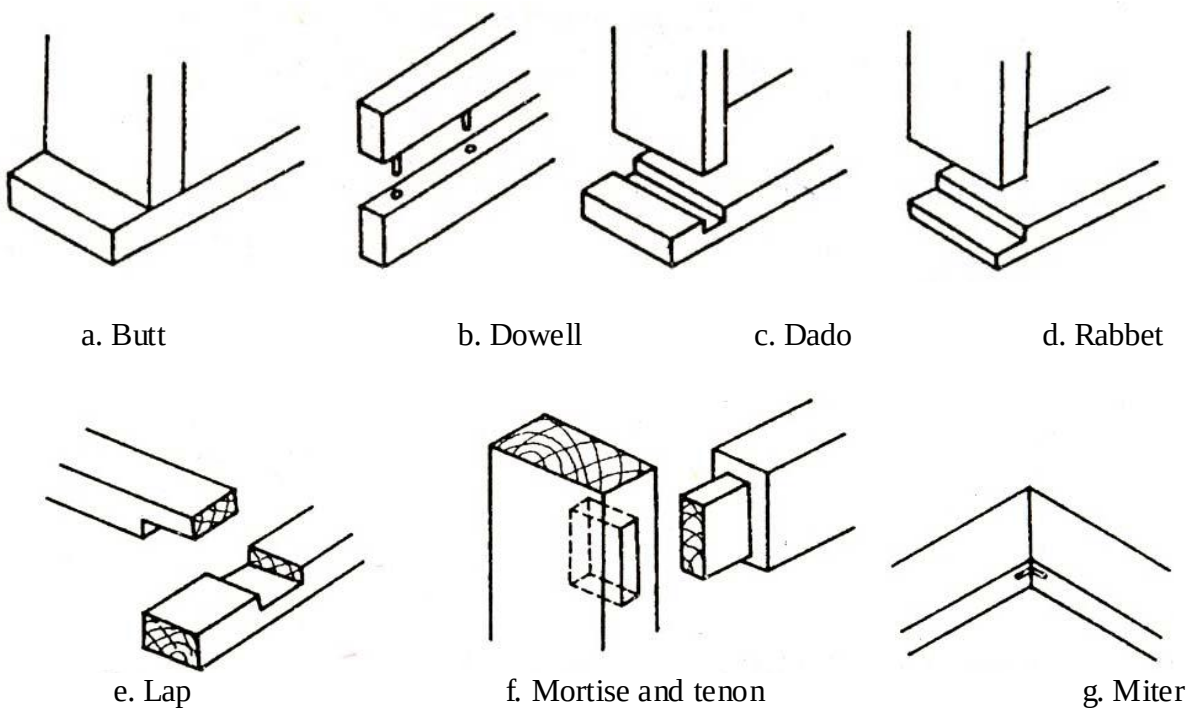


Figure 2.15: Common wood joints

2.9.1 Lap joints

In lap joints, an equal amount of wood is removed from each piece, as shown in figure 2.16. Lap joints are easy to layout, using a try •]square and a marking gauge. Follow the procedure suggested for sawing and removing the waste stock. If the joint is found to be too tight, it is better to reduce the width of the mating piece, instead of trimming the shoulder of the joint. This type of joint is used for small boxes to large pieces of furniture.

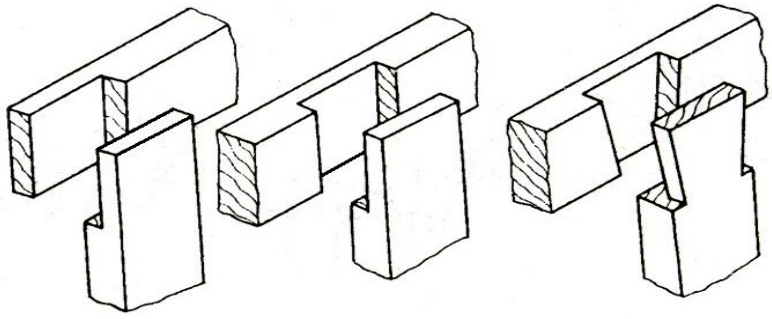


Figure 2.16: Lap joints

2.9.2 Mortise and Tenon Joints

It is used in the construction of quality furniture. It results in a strong joint and requires considerable skill to make it. The following are the stages involved in the work.
a. Mark the mortise and tenon layouts.
b. Cut the mortise first by drilling series of holes within the layout line, chiseling out the waste stock and trimming the corners and sides.
c. Prepare the tenon by cutting and chiseling.
d. Check the tenon size against the mortise that has been prepared and adjust it if necessary.

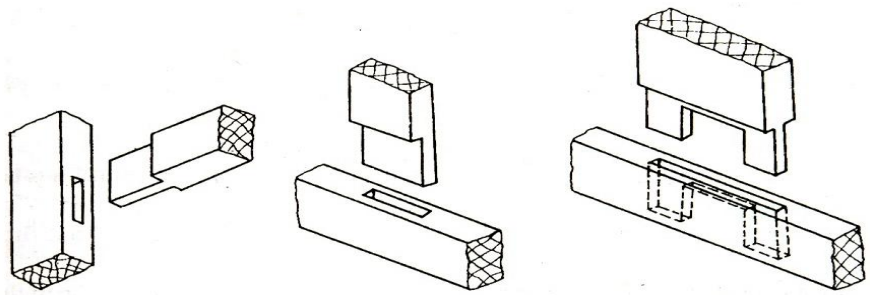


Figure 2.17: Mortise and Tenon joints

2.9.3 Bridle joint

This is the reverse of mortise and tenon joint in form. The marking • Jout of the joint is the same as for mortise and tenon joint. This joint is used where the members are of square or near square section and unsuitable for mortise and tenon joint.

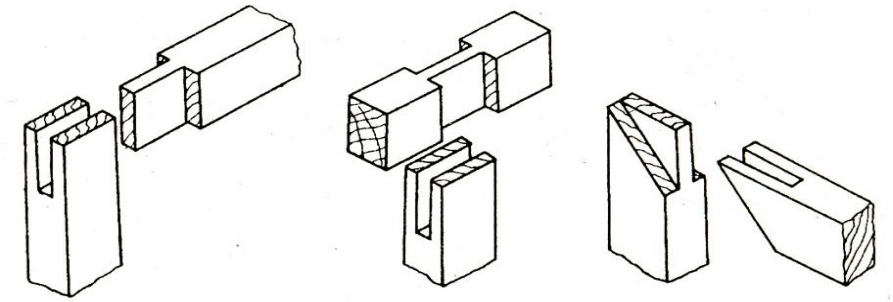


Figure 2.18: Bridle joint