

CARPENTRY SHOP

Aim: To study about different hand tools used in carpentry shop.

Theory: Carpentry is the process of shaping timber, using hand tools. The products produced are used in building construction, such as doors and windows etc.

Carpentry work mainly involves the joining together of wooden pieces and finishing the surfaces after shaping them.

Materials used: Basic materials used in Carpentry shop are timber and plywood. Auxiliary materials used are nail, screws, adhesives, paint, varnishes.

TIMBER: timber is the name given to wood obtained from exogenous convealed growing trees. In these trees, the growth is outward from the centre, by adding almost concentric layers of fresh wood every year known as ~~annual~~^{annual} rings. After the full growth, these trees are cut and sawed to convert into rectangular sections of various sizes for engineering purposes. The common shapes are: Log, Balk, Deal, plank, Board, Batten, scantlings.

The timber used for commercial purposes are divided into soft wood and hard wood.

Classification of Timber

1. Exogenous or out ward growing: In these trees, the growth takes place from the centre by the addition of concentric layers of fresh wood every year. These varieties of trees are suitable for building and other engineering uses. These are again classified as:

- Conifers or evergreen trees
- Deciduous or broad leaf trees

The conifers gives soft wood and the deciduous gives hard wood. Common soft wood include Kolai pine, shodaa chair, walnut etc while hard wood are Sal, Teak, rose wood, Sandal, shisham, oak beach, ash ebony, mango, neem, babool etc.

2. Endogenous or in Ward growing timber

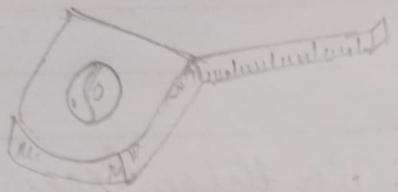
These trees grow inwards i.e. every fresh layer of sap wood is added inside of outside cane, bamboo, coconut.

Plywood: Thick sheet formed by pasting veneers of wood is called ply. Pasted by glues is called plywood.

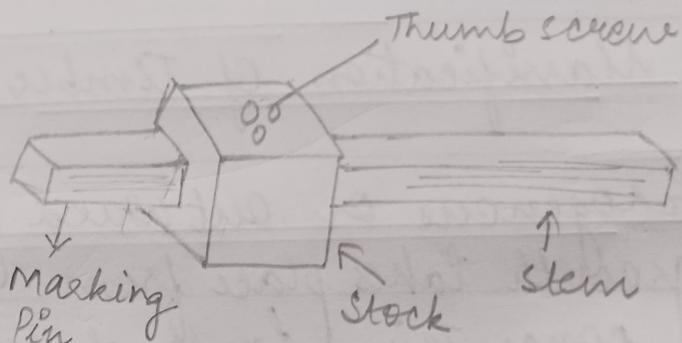
Seasoning: Seasoning of wood carried out for removing the sap and reducing the moisture content the presence of sap & moisture will render the wood unsuitable for engineering works due to uneven shrinkage, crack, warping and decay.

TOOLS REQUIRED:

1. STEEL TAPE: It is used for large dimensions, such as marking on boards and checking the overall dimensions of the work.
2. GAUGES: Gauges are used to mark lines parallel to the edges of a wooden piece.
3. MARLING KNIFE / SCRIBER: Marking knives are used to convert the pencil lines drawn on the wooden surface into deep scratch lines. They are made of steel with a sharp point at one end and flat blade at the other end.
4. BEVEL SQUARE: It is also called sliding level. It is an adjustable try-square used for measuring / marking angles between 0° and 180° .
5. WORK BENCH: This is a table of having sine and raised construction made of hard wood. The sine ranges from 50-80cm in length and about 90cm in width. Two or four carpenters can work at a time on the work bench.
6. BENCH VICE: It consists of jaw fixed on the table side and movable jaw kept in position by means of screw and handle. The body of vice is made of cast iron or steel. It is used for clamping glued pieces or holding the work piece of larger size together for various operations.



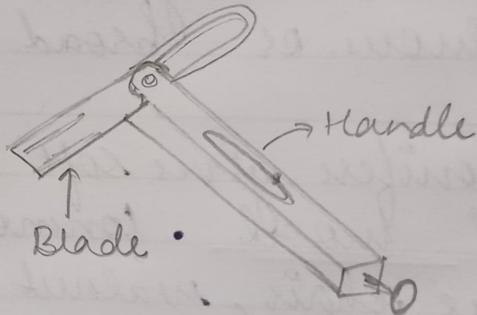
MEASURING
STEEL TAPE



MARKING GAUGE



MARKING
KNIFE



BEVEL SQUARE.

7. C-CLAMP: The clamp is of the shape of letter C & it is used to clamp sheet pieces together as the bar clamp. It is used for holding the planks after gluing.

8. SAW: Saw is a cutting tool which has teeth on one edge & cutting is effected by reciprocating motion of the edge relative to the work piece.

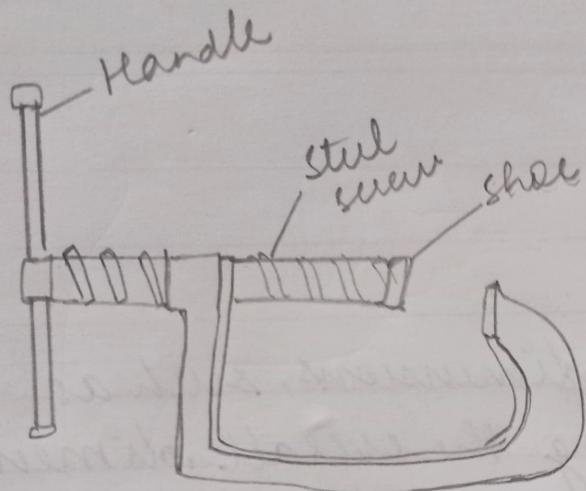
9. WOOD RASP FILES: A finishing tool used to make the wood surface smooth, remove sharp edges, and finish fillets and other inside surfaces. Sharp cutting teeth are provided on its surface for the purpose. This file is exclusively used in wood work.

10. CHISELS:

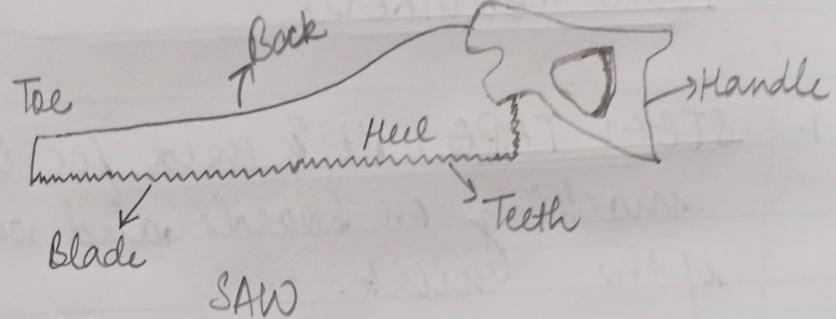
→ Firmer chisels: They have flat blade of 15-50mm width & 125mm length.

→ Dowell tail chisel: These chisels are used for fine and delicate works as well as for cutting corners.

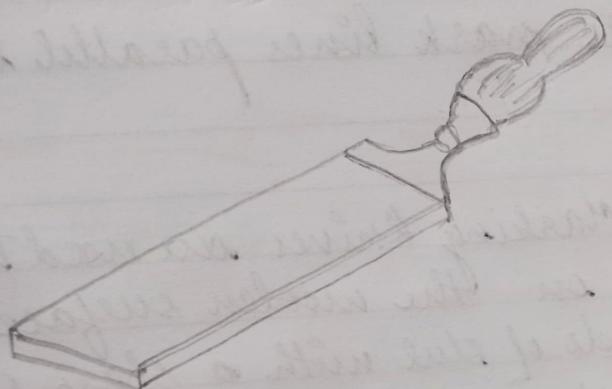
→ Mortise chisel: These chisels are used for heavy and deep cut to remove large quantity of wood. These chisels have width of about 15mm but the blade thickness may range from 6-15mm.



C CLAMP

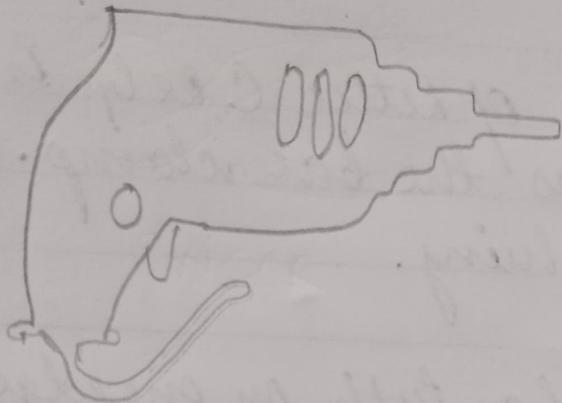


SAW

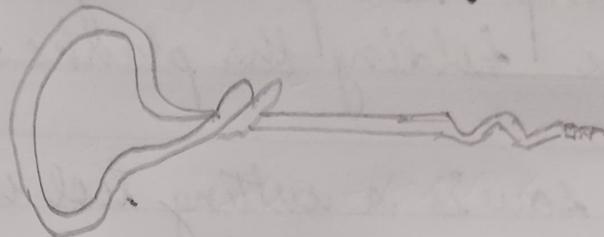


FILE

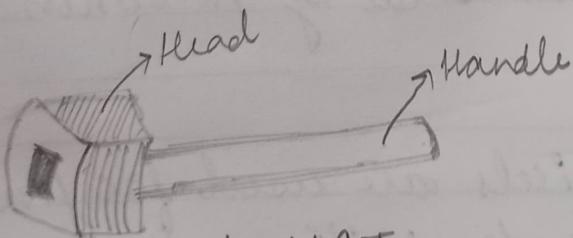
11. WOODEN JACK PLANE: its main part is a wooden block called sole, in which steel blade having knife edge is fixed at an angle with help of wooden wedge. The angle of blade is kept about 45° to bottom surface of the blade.
12. METAL JACK PLANE: it serves the same purpose as wooden jack plane but facilitates smoother operations and better finish. Its body is made from grey iron casting with the side and sole machined and ground to better finish.
13. HAND DRILL: it is used for drilling small holes. A straight shank drill is used with this tool. It is small, light in weight & may be conveniently used than the brace.
14. GIMLET: it has cutting edges like a twist drill. used for drilling large diameter holes with the hand pressure.
15. MALLET: it is a wooden headed hammer of round or rectangular section. The striking face is made flat. Mallet is used for cutting tools and has wooden handle.



HAND DRILL

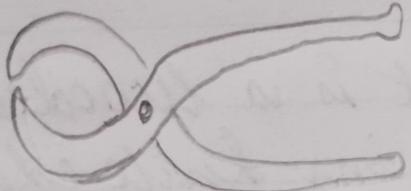


GIMLET

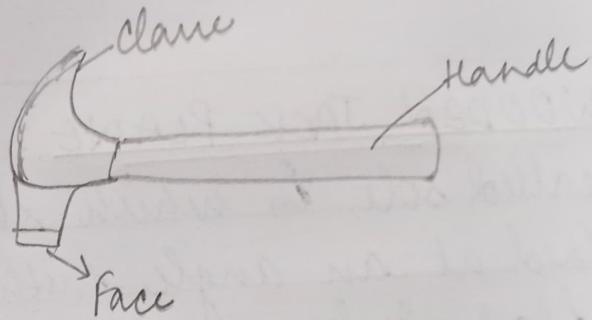


MALLET

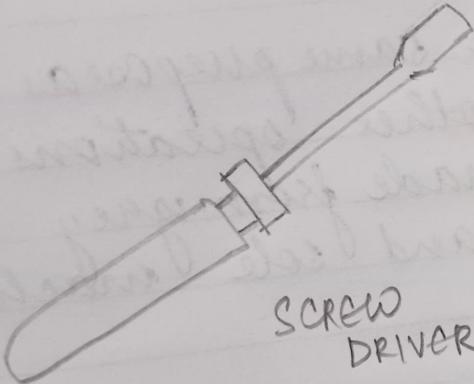
16. CLAW HAMMER: This is a hammer having steel head and wooden handle. The flat face of the head and claw portion for extracting nails out of the wood.
17. PINCER: It is made of two forged steel arms with a hinged joint and is used for pulling out small nails from wood.
18. SCREW DRIVER: It is used for driving wood screws into wood or unscrewing them.



PINCER



CLAW HAMMER



SCREW
DRIVER

FITTING SHOP

Aim: To study about different hand tools used in fitting shop.

Theory: Components may be produced by working on metal either on a machine tool or on the bench. Sometimes it becomes necessary to replace or repair a component which must fit accurately with another component on re-assembly.

This involves a certain amount of hand fitting. The assembly of machine tools, jigs, gauges etc. involves certain amount of bench work. The accuracy of work done depends upon the experience and skill of the fitter. Metal removal at the bench

requires the use of number of simple hand tools and considerable manual effort. Working on components with hand tools and instruments, mostly on workbenches is generally referred to as,

"fitting work". The hand operations in bench work consist of fitting, chipping, scraping, sawing, drilling, tapping, grinding etc.

Material Used: Mild steel also known as plain-carbon steel and low carbon steel, is now the most common form of steel because its price is relatively low while it provides material properties that are acceptable for many applications. It contains a small percentage of carbon approximately 0.05 - 0.25%. It is strong, tough, malleable and ductile. It has a relatively low tensile strength, but it is cheap and easy to form making it suitable for use in many applications.

Tools Required:

- MEASURING TOOLS

1. STEEL RULE: It is used for measurement of length. It is usually graduated in millimetres and inches. Its least count is 0.5mm. For accurate reading, it is necessary to read vertically to avoid errors arising out of parallax.

2. SCRIBBER: It is a slender steel tool used to scribe or mark lines. It is made up of high carbon steel which is hardened.

3. PUNCH: It is a marking tool used for marking 'by dots'. - Three types:

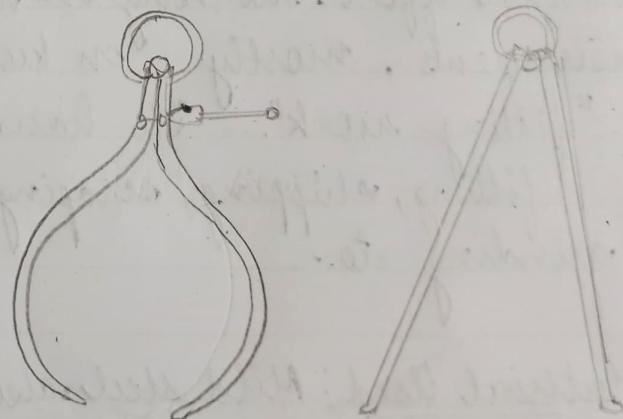
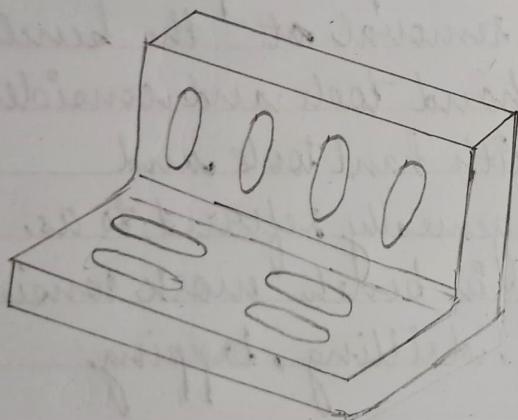
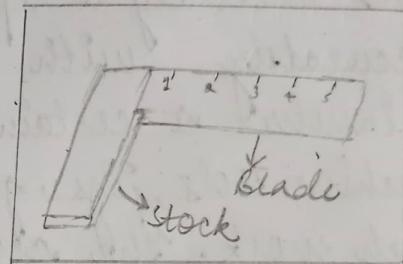
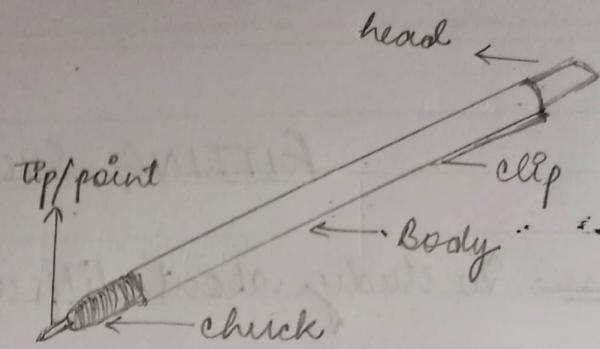
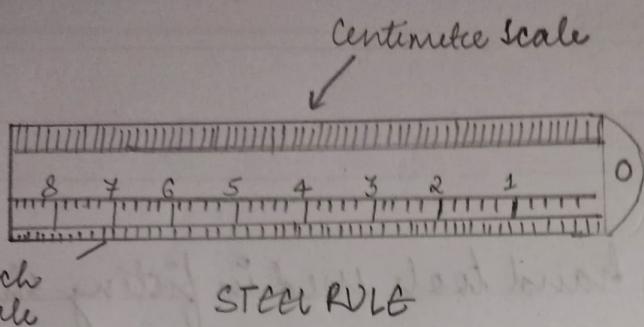
- Centre Punch (90°) → It is used for locating centre of holes.
- Dot Punch (60°) → It is used for weakness marking.
- Pick Punch (30°) → It is used for light punch marks.

4. TRY SQUARE: It is used for measuring right angle of a job and for checking squareness of many types of small works. The blade is made of hard steel and the beam of steel.

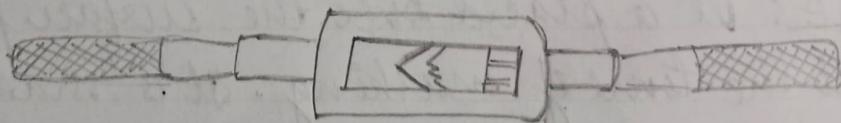
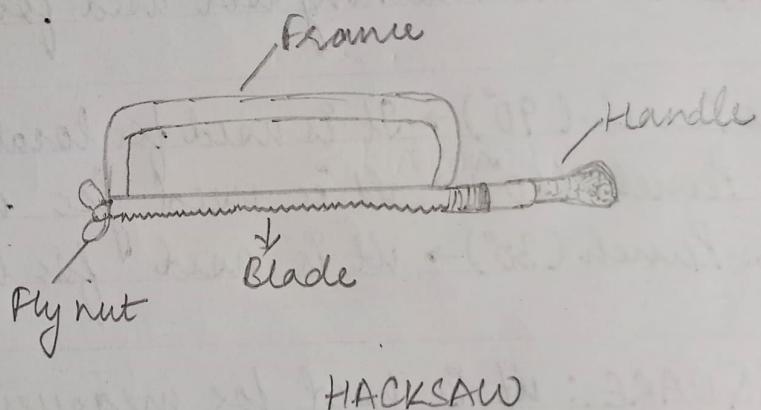
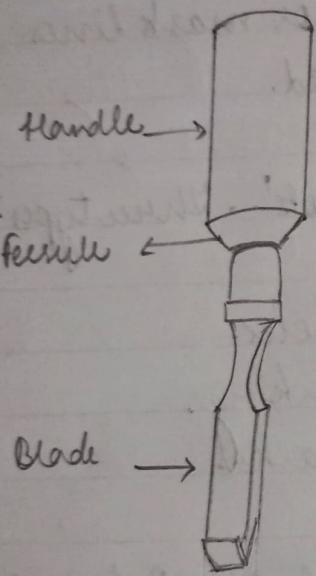
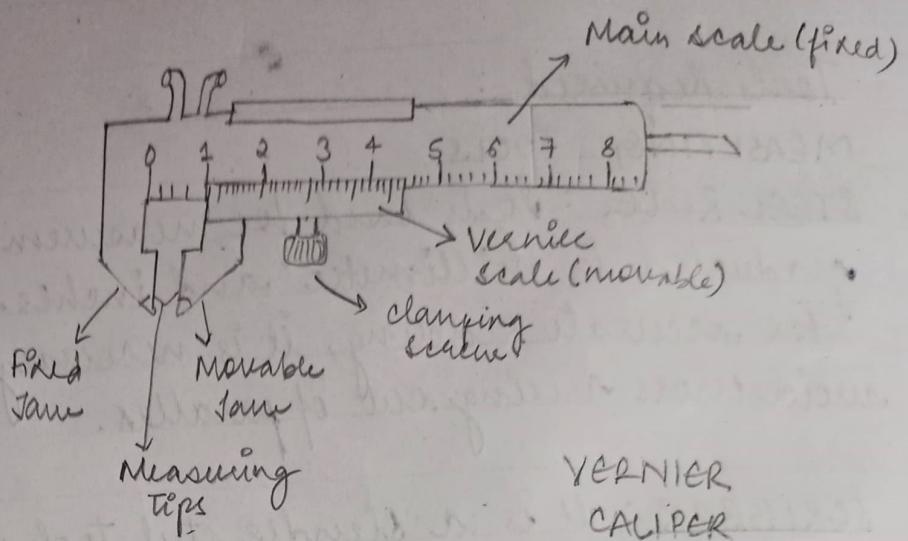
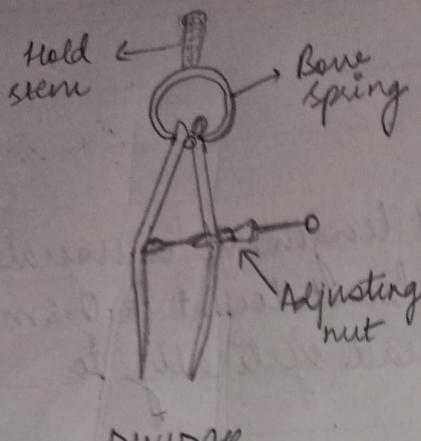
5. Angle plate: It is placed over the surface plate for supporting jobs at the time of marking. It is made of cast iron.

6. OUTSIDE CALLIPER: It is a device used for measuring and transferring the outside dimensions of component.

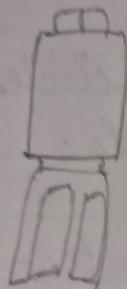
7. INSIDE CALIPER: It is used for measuring inside dimension of components.



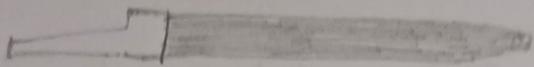
8. DIVIDERS: It is used for marking, drawing arcs, circles, laying out perpendicular lines, bisecting lines etc.
9. VERNIER CALIPER: It is a precision measuring instrument of outside diameter, inside diameter and depth. The least count of vernier calliper is 0.001 inch system, 0.02 mm metric system
- CUTTING AND FINISHING TOOLS.
10. CHISELS: chisel is a single point cutting tool. It is used for removing surplus metal or for cutting slots. The tools are made from 0.9% to 1% carbon steel of octagonal or hexagonal section.
11. HACKSAW: It is a multi-point cutting tool. It is used for cutting metal by hand with a frame which holds a thin blade, finally in position. The blade has a number of cutting teeth. The number of teeth per inch is selected on the basis of types of jobs.
12. TAPS AND TAP WRENCHES: A tap is a hardened steel tool, used for cutting internal threads in a drilled hole. Hand taps are usually supplied in sets of three for each diameter and thread size, each set consists of a taper tap, intermediate tap and plug or bottoming up.



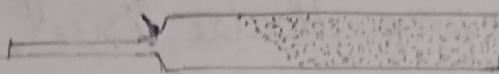
13. REAMER: It is a multi-point cutting tool used for enlarging and finishing previously drilled holes to accurate size. Reaming produces high quality surface finish and dimensional accuracy to close limits. Also small holes which cannot be finished by other processes can be finished.
14. FILES: A file is a hardened steel tool, having slant parallel rows of cutting edges on its surfaces. They are classified according to their shape, cutting teeth & grade of teeth:
- FLAT FILE: They are of rectangular cross-section. The edges along width of these files are parallel up to $\frac{2}{3}$ rd of length, and they taper towards the point. The faces are double cut and the edges single cut. Used for filing & finishing external & internal surfaces.
 - HAND FILE: similar to the flat files in their cross-section. The edges along the width are parallel throughout the length. The faces are double cut. used for filing surfaces which are at right angles to surface already finished.
15. HAMMER: A hammer is a tool that consists of a heavy piece of metal at the end of a handle.



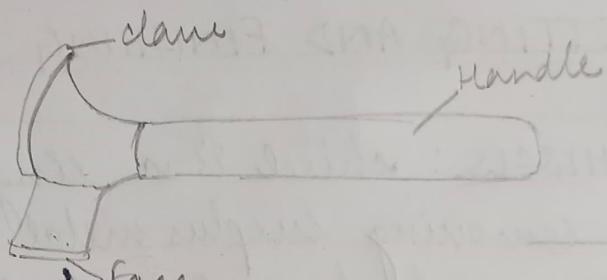
REAMER



FLAT FILE



HAND FILE



HAMMER