

**WORKSHOP MANUFACTURING
PRACTICE (WMP)
1ST YEAR B.TECH**

Carpentry

Lecture By:

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WORKSHOP PRACTICE: (60 HOURS) [L: 0; T: 0; P: 4 (2 CREDITS)]

1. MACHINE SHOP (10 HOURS) AND FITTING SHOP (8 HOURS)
2. CARPENTRY (6 HOURS)
3. WELDING SHOP (8 HOURS) (ARC WELDING 4 HRS + GAS WELDING 4 HRS)
4. CASTING (8 HOURS) AND SMITHY (6 HOURS)
5. PLASTIC MOULDING & GLASS CUTTING (6 HOURS)
6. 3-D PRINTING OF DIFFERENT MODELS (8 HOURS)

EXAMINATIONS COULD INVOLVE THE ACTUAL FABRICATION OF SIMPLE COMPONENTS, UTILIZING ONE OR MORE OF THE TECHNIQUES COVERED ABOVE.

LABORATORY OUTCOMES

- ❖ UPON COMPLETION OF THIS LABORATORY COURSE, STUDENTS WILL BE ABLE TO FABRICATE COMPONENTS WITH THEIR OWN HANDS.
- ❖ THEY WILL ALSO GET PRACTICAL KNOWLEDGE OF THE DIMENSIONAL ACCURACIES AND DIMENSIONAL TOLERANCES POSSIBLE WITH DIFFERENT MANUFACTURING PROCESSES.
- ❖ BY ASSEMBLING DIFFERENT COMPONENTS, THEY WILL BE ABLE TO PRODUCE SMALL DEVICES OF THEIR INTEREST. BY ASSEMBLING DIFFERENT COMPONENTS, THEY WILL BE ABLE TO PRODUCE SMALL DEVICES OF THEIR INTEREST.

GENERAL INSTRUCTIONS AND SAFETY RULES

- Students should wear the uniform and closed foot wear.
- When you handle chemicals wear eye protection (chemical splash goggles or full face shield).
- When you work with furnaces for heat treatment procedures or other thermally activated equipment you should use special gloves to protect your hands.
- To protect clothing from chemical damage or other dirt, wear a lab apron or lab coat. Long hair should be tied back to keep it from coming into contact with lab chemicals or flames.
- In case of injury (cut, burn, fire etc.) notify the instructor immediately.
- In case of a fire or imminently dangerous situation, notify everyone who may be affected Immediately; be sure the lab instructor is also notified.

- If chemicals splash into someone's eyes act quickly and wash the eye immediately, do not wait for the instructor.
- In case of a serious cut, stop blood flow using direct pressure using a clean towel, notify the lab instructor immediately.
- Eating, drinking and smoking are prohibited in the laboratory at all times.
- Never work in the laboratory without proper supervision by an instructor.
- Never carry out unauthorized experiments. Come to the laboratory prepared. If you are unsure about what to do, please ask the instructor.
- Except the scientific calculator, any other electronic devices are not permitted to use inside the Laboratory.
- Any damage to any of the equipment/instrument/machine caused due to carelessness, the cost will be fully recovered from the individual (or) group of students.

Carpentry

CARPENTRY

INTRODUCTION AND DESCRIPTION OF CARPENTRY COMMON TOOLS.

SAFETY PRECAUTION

What is accidents?

An accidents is an unplanned and uncontrolled event in which the action or reaction of an object, substance, person or radiation result in personal injury or the probability these of.

Percentage of accidents is,

1) NEGLIGENCE 70 %

2) UNKNOWING 20 %

3) SUDDENLY 10 %

100 %

We can avoid 90% accidents by following safety precautions.

CAUSES

1) Carelessness. 2) Ignorance. 3) Disobedience. 4) Over confidence

Carpentry

- Carpentry may be defined as the process of making wooden Components such as table, Chair, floors, partitions, doors and windows & furniture manufacturing etc.
- Carpentry involves cutting, shaping and fastening wood and other materials together to produce a finished product.
- Preparation of joints is one of the important operations in wood work. Joinery denotes connecting the wooden parts using different points such as lap joints, mortise and T- joints, bridle joints, etc.

Carpentry Tools

Carpentry tools are used to produce components to an exact size. The types of carpentry tools are as follows.

1. Marking tools
2. Measuring tools
3. Holding tools
4. Cutting tools
5. Planning tools
6. Boring tools
7. Striking tools
8. Miscellaneous tools

COMMON TOOLS USED IN CARPENTRY

- 1) **METAL JACK PLANE** :- Plane is made of wood or metal. But now a days, a metal jack plane is used in carpentry. This is the quick adjustable plain. It is 14" in length. It's blade's grinding and sharpening angle of 20-25° and 25-30°. It is used for smoothing as well as removing rough surfaces es quickly to bring in required size of sawn wooden piece.



- 2) **TRY-SQUARE** :- Try-square is used for testing the squareness of material and enabling lines to be marked at right angles(90°) to a given surface. It's parts is a) Blade b) Stock c) Rivets.



3) **STEEL RULE** :- It is made of steel. millimeter(mm) & centimeter's (cm) marking marked on one edge and inches(") marking marked on another edge. It is used for taking accurate dimensions on the job. It is getting in the market in length of 6", 12", 24", 1meter & 2meter.

4) **PENCIL** :- Used on drawing lines in the setting out the shapes of parts of the job. Always used when setting out chamfers, levels or slopping edges. etc.

5) **MARKING GAUGE** :- Marking Gauge is used for for marking lines parallel to a face or an edge. It's parts is a) Stock b) Stem c) Thumb screw d) Spur



6) **CUTTING SAWS** :- There are three types of saws,



1) Taper blade saw:- Hand saw is 15" to 18" in length. It is used for cut the wood in cross.

2) Parallel blade saw :- Tenon saw– it is used for fine and accurate cutting in joinery . It is 8" to 12" in length with 12 to 14 teeth per inch with closed handle.

3) Frame saw. Hack-saw-this saws is used for cutting metal,like screws, nails etc,

7) **BENCH VICE** :- It is used to hold the job while performing various operations like planing, sawing, trenching, chiseling, screwing, gluing etc.



8) **CHISELS** :- Mostly Firmer chisel and Mortise chisel are used in carpentry. It's size depend on the width of blade, range in 3,6,9,12,18,21,25mm,.....up to 50mm. Both chisel consist of two main parts a) Blade and b) wooden handle. It's angle of grinding and sharpening is 15 to 20° and 20to25°. Firmer chisel is used for finish laps, mortise socket, pins, etc. And Mortise chisel is used for making rectangular holes in wood called mortise.



9) **MALLET** :- It is used for driving chisel handle as well as assisting in assembling jobs. It is also called as wooden hammer.



10) **CLAW HAMMER** :- It is used for where heavy hammering is necessary to drive large nails. Useful size being 0.45 to 0.57kg. It is also has claws for extracting nails.



11) **SCREW DRIVER** :- It has an alloy blade or bar (flat, round, or square) and wooden handle. Common screw drivers used in carpentry is London pattern and Cabinet making screw drivers for loosing or tightening the screws.

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12) **PINCER** :-It is used for pull out the nails from wood. It is also called as a nail puller. It is used in upholstery work to take out the nails.

13) **HAND DRILL MACHINE** :- It is used for making holes up to 12mm in wood.



14) **OIL STONE** :- It is used for sharpening the tools like chisels and planer blade.

15) **THE WORK BENCH** :- It is used for give support to the job while operations like cutting, chiseling, planing etc. It is 6ft in length, 3ft wide and 33inch in high. It's top's lower portion is called as "Well" to accommodate tools.



RAW MATERIAL :- The raw material of carpentry is wood. It has two types 1) Hard Wood 2) Soft Wood. Specially teak wood is used in carpentry. It is commercial wood and its cost depends on the cubic feet or running feet.

PLYWOOD :- There are two types of plywood A) Marine ply and B) Commercial ply. It is used for making furniture or cabinet works. It is getting in market in the size or 4'x6', 4'x8', 3'x7', 4'x4'. Price is depends upon thickness range in mm 4, 6, 9, 12, 15,18, 21, 25mm.

NAILS :- Nails are made by mild steel ,brass, copper, etc. Some types being supplied with decorative or corrosion resistant coating i e galvanized zinc coating. Its types are :-Diamond head nails, Bullet head nails, Flat head nails, Roofing nails, Panel pins, Takes, Corrugated nails.

TYPES OF NAILS :-

- 1) Diamond head nails
- 2) Bullet head nails
- 3) Flat head nails
- 4) Roofing nails
- 5) Panel pins
- 6) Wire nails
- 7) Tack nails
- 8) Corrugated nails

When Ordering nails:- Nails are sold by mass and priced at much per kilograms

- 1) Quantity:- in Kg
- 2) Metal:- steel, brass etc.
- 3) Type:- Name of nail (head)
- 4) Coating :- galvanized
- 5) Size :- In Length

USES :- Nails are used for fixing two or more wooden pieces together.

SCREWS

Wood screws are mostly made of mild steel, copper or brass. They consists of ,

- 1) Head
- 2) Shank
- 3) Thread
- 4) Point

USES :- For securing pieces of Timber together, strengthening joints and fixing metal fitting such as hinges, catches, locks to wood.

TYPES OF SCREWS :-

- 1) Counter sunk head screws
- 2) Round head screws
- 3) Raised head screws
- 4) Coach screws

When ordering screws:- Screws are sold in packet of 100, 200, or large by Numbers

- 1) Quantity:- numbers of screws or packets
- 2) Material:- steel, brass
- 3) Name or type:- counter sunk or round head
- 4) Size in length (mm) and gauge:- 25/7,35/8.

GLUE:- Now a days mostly ready made glue is used in carpentry work like FEVICOL. It is known as a synthetic resin. It is used for stick two or more wooden pieces together.

Application of Fevicol:- Clean the both joint pieces. Pest equal quantity glue on both side. Hold the both pieces together by G clamps or vice. Remove surplus glue with cloth and give the cramping time to dry.

JOINTS:- Two or more wooden pieces joint together is called joint.

USES:- Joints are used for making furniture, cabinet building construction and make different shapes. Carpentry joints are classified into three main groups:-

1)Angular, Box or Framing joints

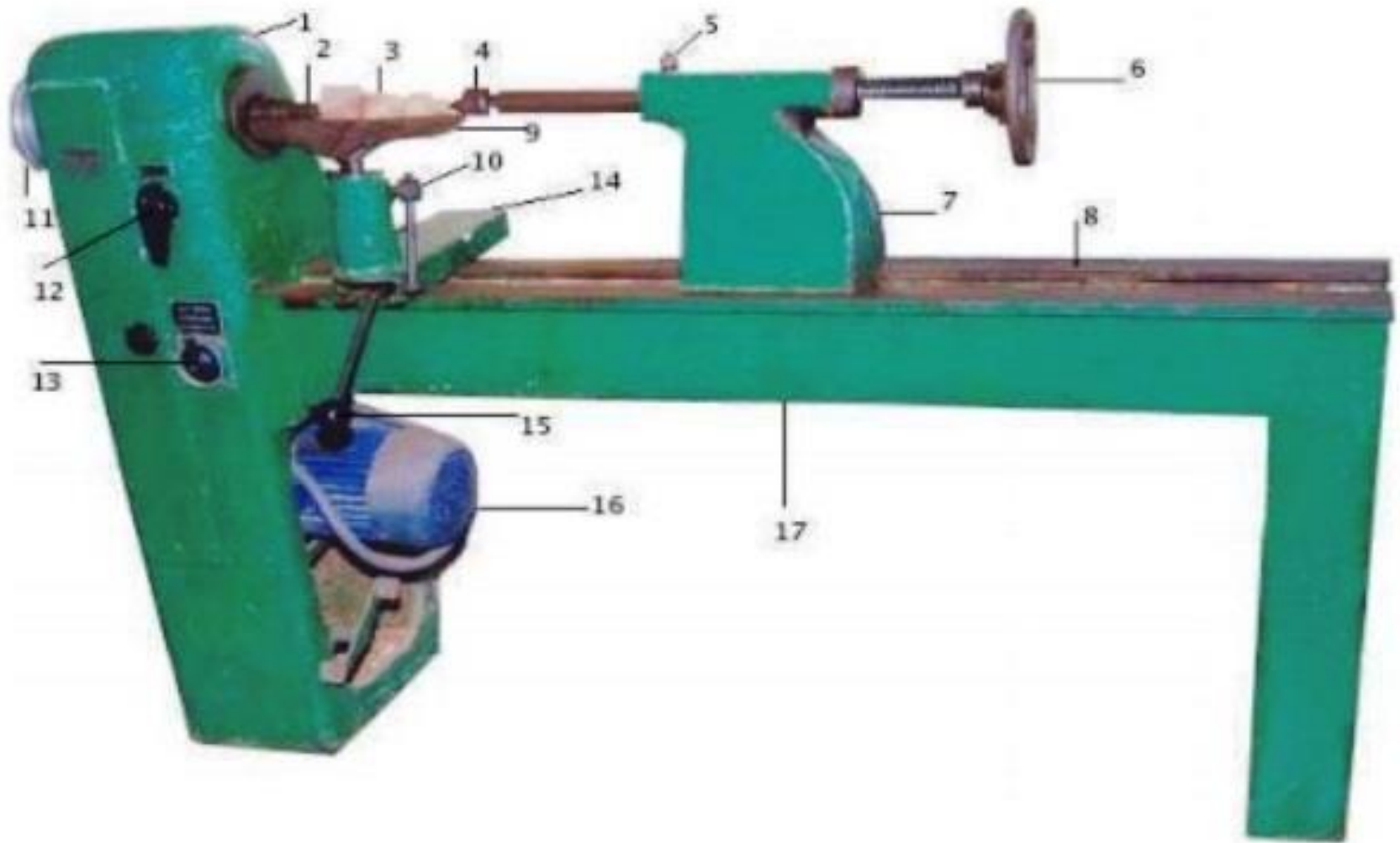
(e. g. cross lap joint, tenon & mortise joint, etc.)

2)Widening or Broadening Joints

(e. g. simple butt joint, dowel joint, rebate joint. etc.)

3)Longitudinal or Lengthening Joints

(e. g. table scarf joint, bevel scarf joint. etc.)



WOOD WORKING LATHE MACHINE

Experiment: wooden job making

DOVETAIL LAP JOINT

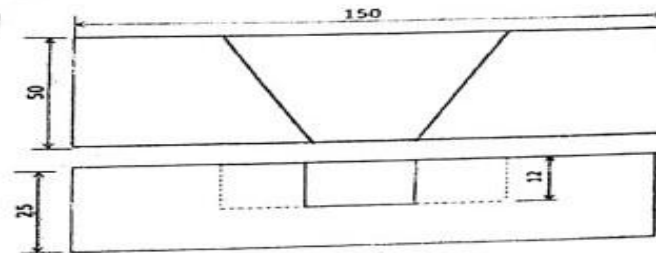
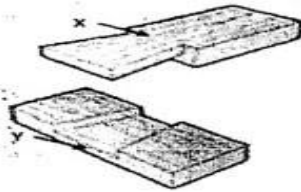
AIM: to make a dovetail lap joint.

MATERIALS REQUIRED: Teak wood (30mm*150mm*50mm)

TOOLS AND EQUIPMENT

USED:

1. Steel rule
2. Try square
3. Marking guage
4. Rip saw
5. Tenon saw
6. Mortise chisel
7. Mallet
8. Jack plane
9. Wood rasp file



OPERATIONS TO BE CARRIED OUT:

1. Planning
2. Marking
3. Sawing
4. Chiseling
5. Finishing

PROCEDURE:

1. The wooden pieces are made into two halves and are checked for dimensions.
2. One side of pieces is planned with jack plane and for straightness.
3. An adjacent side is planned and checked for squareness with a try square.
4. Marking guage is set and lines are marked at 40-50 mm to make the thickness and width according to given figure.
5. The excess material is planned to correct size.
6. Using tenon saw, the portions to be removed are cut in both the pieces.
7. The excess material in X is chiseled with mortise chisel.
8. The excess material in Y is chiseled to suit X.
9. The end of both the pieces is chiseled to exact lengths.

PRECAUTIONS:

1. Wood should be free from moisture
2. Marking is done with out parallax error
3. Care should be taken while chiseling
4. Matching of X and Y pieces should be tight.

RESULT:

The dovetail lap joint is made success fully.

CROSS HALF LAP JOINT

AIM: to make a cross half lap joint.

MATERIALS REQUIRED: Teak wood (30mm*150mm*50mm)

TOOLS AND EQUIPMENT

USED:

1. Steel rule
2. Try square
3. Marking guage
4. Rip saw
5. Tenon saw
6. Mortise chisel
7. Mallet
8. Jack plane
9. Wood rasp file

OPERATIONS TO BE CARRIED OUT:

1. Planning
2. Marking
3. Sawing
4. Chiseling
5. Finishing

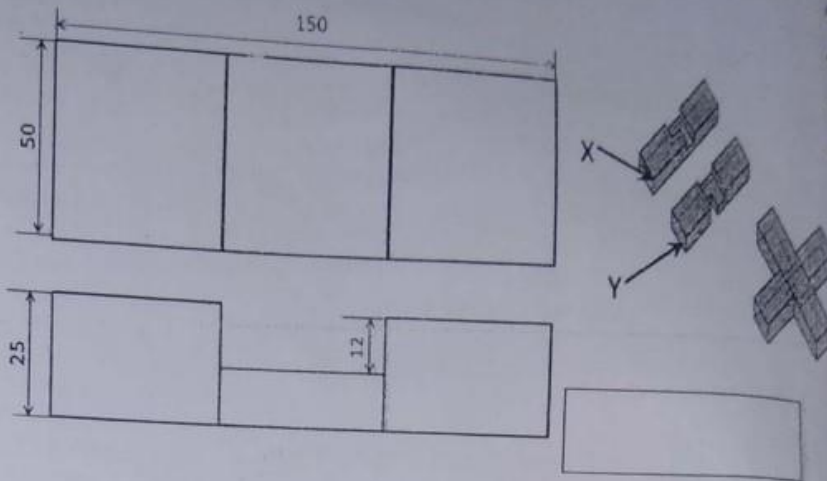
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3. Care should be taken while chiseling
4. Matching of x and y pieces should be tight.

RESULT: The cross half lap joint is made success fully.



- **References:**
- **Workshop Technology by Hazara Prasad & BS Raghuvasi**
- **‘Manufacturing Technology by P.N. Rao, Tata McGraw Hill, New Delhi**
- **‘Production Technology’ by R K Jain, Laxmi Publisher**
- **Ghosh A. and Mallik A. K., Manufacturing Science, EWP Pvt. Ltd**
- **<http://nptel.ac.in/courses>**
- **For Images:**
<https://www.google.co.in/imghp?hl=en&tab=ri&ogbl>