METHODIST

COLLEGE OF ENGINEERING & TECHNOLOGY

Estd: 2008

Approved by AICTE New Delhi | Affiliated to Osmania University, Hyderabad

Abids, Hyderabad, Telangana, 500001

DEPARTMENT OF MECHANICAL ENGINEERING

LABORATORY MANUAL

WORKSHOP/ MANUFACTURING PROCESS LABORATORY

BE I & II Semester

For the Students admitted in AICTE Scheme

Name: .....

Roll No: .....

Branch:.....SEM:.....

Academic Year: .....

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VISION

To produce ethical, socially conscious and innovative professionals who would contribute to sustainable technological development of the society.

MISSION

To impart quality engineering education with latest technological developments and interdisciplinary skills to make students succeed in professional practice.

To encourage research culture among faculty and students by establishing state of art laboratories and exposing them to modern industrial and organizational practices.

To inculcate humane qualities like environmental consciousness, leadership, social values, professional ethics and engage in independent and lifelong learning for sustainable contribution to the society.

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DEPARTMENT OF MECHANICAL ENGINEERING

LABORATORY MANUAL

WORKSHOP / MANUFACTURING PROCESS LAB (ES 157 ME)

Prepared by

PART-A

Mr. Venkataratnam Akumarthy Assistant Professor, Mech. Engg.

PART-B

Mrs. Unnati Khanapurkar Assistant Professor, Computer Science & Engg.

DEPARTMENT OF MECHANICAL ENGINEERING

VISION

To be a reputed centre of excellence in the field of mechanical engineering by synergizing innovative technologies and research for the progress of society.

MISSION

- To impart quality education by means of state-of-the-art infrastructure.
- To involve in trainings and activities on leadership qualities and social responsibilities.
- To inculcate the habit of life-long learning, practice professional ethics and service the society.
- To establish industry-institute interaction for stake holder development.

DEPARTMENT OF MECHANICAL ENGINEERING

After 3-5 years of graduation, the graduates will be able to:

PEO1: Excel as engineers with technical skills, and work with complex engineering systems.

PEO2: Capable to be entrepreneurs, work on global issues, and contribute to industry and society through service activities and/or professional organizations.

PEO3: Lead and engage diverse teams with effective communication and managerial skills.

PEO4: Develop commitment to pursue life-long learning in the chosen profession and/or progress towards an advanced degree

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES

Engineering Graduates will be able to:

Po1. Engineering knowledge: Apply the basic knowledge of mathematics, science and engineering fund a mentals along with the specialized knowledge of mechanical engineering to understand complex engineering problems.

PO2. Problem analysis: Identify, formulate, design and analyse complex mechanical engineering problems using knowledge of science and engineering.

Po3. Design/development of solutions: Develop solutions for complex engineering problems, design and develop system components or processes that meet the specified needs with appropriate consideration of the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Formulate engineering problems, conduct investigations and solve using research-based knowledge.

PO5. Modern tool usage: Use the modern engineering skills, techniques and tools that include IT tools necessary for mechanical engineering practice.

Po6. The engineer and society: Apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities during professional practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities to various groups, ability to write effective reports and make effective presentations.

PO11. Project management and finance: Demonstrate and apply the knowledge to understand the management principles and financial aspects in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in Independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

Mechanical Engineering Graduates will be able to:

PSO1: Apply the knowledge of CAD/CAM/CAE tools to analyse, design and develop the products and processes related to Mechanical Engineering.

PSO 2: Solve problems related to mechanical systems by applying the principles of modern manufacturing technologies.

PSO 3: Exhibit the knowledge and skill relevant to HVAC and IC Engines.

CODE OF CONDUCT

1. Students should report to the concerned labs as per the time table schedule.
2. Students who turn up late to the labs will in no case be permitted to perform the experiment scheduled for the day.
3. After completion of the experiment, certification of the concerned staff in-charge in the observation book is necessary.
4. Staff member in-charge shall award marks based on continuous evaluation for each experiment out of maximum 15 marks and should be entered in the evaluation sheet/attendance register.
5. Students should bring a note book of about 100 pages and should enter the readings/observations into the note book while performing the experiment.
6. The record of observations along with the detailed experimental procedure of the experiment performed in the immediate last session should be submitted and certified by the staff member in-charge.
7. Not more than three students in a group are permitted to perform the experiment on a setup for conventional labs and one student in case of computer labs.
8. The components required pertaining to the experiment should be collected from stores in-charge after duly filling in the requisition form.
9. When the experiment is completed, students should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.
10. Any damage of the equipment or burn-out of components will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year.
11. Students should be present in the labs for the total scheduled duration.
12. Students are required to prepare thoroughly to perform the experiment before coming to Laboratory.

DO’S

1. All the students are instructed to wear protective uniforms, shoes & identity cards before entering into the laboratory.
2. Please follow instructions precisely as instructed by your supervisor. If any part of the equipment fails while being used, report it immediately to your supervisor.
3. Take proper guidance before performing any experiment on the machine.
4. Students will not be permitted to attend the laboratory unless they bring the practical record fully completed in all respects pertaining to the experiment conducted in the previous class.
5. Practical records should be neatly maintained.
6. Students should obtain the signature of the staff-in-charge in the observation book after completing each experiment.
7. Theory regarding each experiment should be written in the practical record before procedure in your own words.
8. One student from each batch should put his/her signature during receiving the instrument in the instrument issue register.

DON'TS

1. Don't operate any instrument without getting concerned staff member's prior permission. Handle equipment carefully to avoid breakage.
2. Using the mobile phone in the laboratory is strictly prohibited.
3. Do not touch the work piece after completion of the experiment, because due to friction it gets heated.
4. Do not leave the experiments unattended while in progress.
5. Do not crowd around the equipment & run inside the laboratory.
6. Don’t wear loose torn clothing of any kind.
7. Do not wander around the lab and distract other students
8. Do not use any machine that smokes, sparks, or appears defective.

COURSE OBJECTIVES

The objectives of this course are to:

1.	Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
2.	Provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
3.	To gain a good basic working knowledge required for the production of various engineering products.
4.	To Study different hand operated power tools, uses and their demonstration.
5.	Adopt safety practices while working with various tools

COURSE OUTCOMES

CO No.	Course Outcomes	
CO 1	Explain the usage of different tools and processes in various trades with safety measures.	1, 3, 6, 10
CO 2	Apply the skills developed to execute various experiments in workshop practice as well as everyday life problems.	1, 3, 9,10
CO 3	Demonstrate the various trades such as machining, injection moulding, mould making, casting and basic electronics instruments.	1, 3, 10
CO 4	Illustrate the advanced machining processes like CNC, rapid prototyping,3D printing	1, 3, 5, 10
CO 5	Utilize the basic knowledge of computer to install various operating systems such as windows or Linux.	1, 3, 5,10
CO 6	Apply the basic knowledge of computer to assemble or dissemble various components computer	1, 3, 5,10

COURSE OUTCOMES VS POs MAPPING

S. NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ES157.1	2	-	1	-	-	3	-	-	-	3	-	-	-	2	-
ES157.2	3	-	1	-	-	-	-	-	3	3	-	-	-	2	-
ES157.3	2	-	1	-	-	-	-	-	-	3	-	-	-	2	-
ES157.4	2	-	1	-	1	-	-	-	-	3	-	-	-	3	-
ES157.5	3	-	1	-	1	-	-	-	-	3	-	-	-	-	-
ES157.6	3	-	1	-	1	-	-	-	-	3	-	-	-	-	-
Avg.	2.5	-	1.0	-	1.0	3.0	-	-	3.0	3.0	-	-	-	2.3	-

LIST OF EXPERIMENTS

Note: At least ten experiments should be conducted in the Semester

INDEX

Experiment No	Experiment Name	Date	Page No	Marks				Remarks/ Signature
				P	R	V	T	

Experiment No	Experiment Name	Date	Page No	Marks				Remarks/ Signature
				P	R	V	T	

CARPENTRY

INTRODUCTION

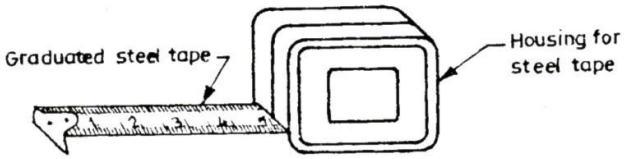
Carpentry may be defined as the process of making wooden components. It starts from a marketable form of wood and end with a finished product. It deals with the building work, furniture, cabinet making etc. Joinery is the preparation of the joints is very important operation in all wood works for making different types of joints to form a finished product.

Marking and Measuring Tools:

1. **Steel Rule**: It is an important tool for linear measurement. It can also be used as a marking tool

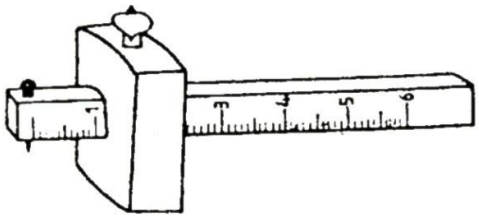
Steel rule

2. **Measuring Steel Tape**: It is used for large measurements, such as marking boards and checking the overall dimensions of the work.



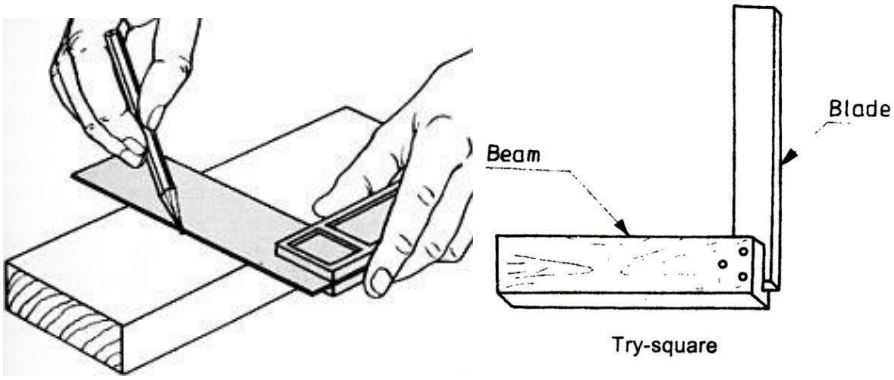
Measuring Steel Tape

3. **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 3mm and the end is sharp enough to make a very fine line .



Marking Gauge

4. **Try-Square**: It is used for making 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

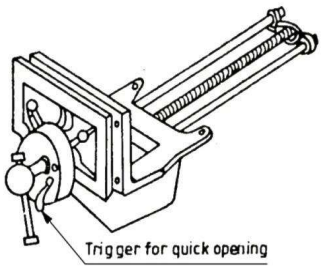


5. **Compass & Divider**: Compass and divider as shown in Fig are used for marking arcs and circles on the planed surfaces of the wood.

6. **Scriber**: It is used for marking on timber. It is made of steel, having one end pointed and other end formed into a sharp cutting edge.

Holding tools

1. **Carpenter's vice:** Fig shows Carpenter's 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 jaws are lined with hard wooden faces.

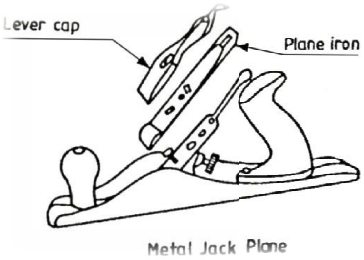


Carpenter's vice

Planing Tools

1. **Jack plane:** It is the most commonly used general purpose plane. It is about 35 cm long. The curing 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.

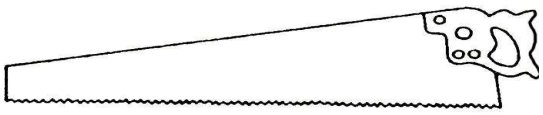
Wood Jack Plane



Metal Jack Plane

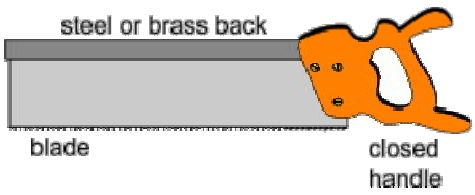
Cutting Tools

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 kerfs will be wider than the blade thickness (Fig). This allows the blade to move freely in the cut without sticking.



Cross cut saw

2. **Compass Saw:** A compass saw is a type of saw used for making curved cuts known as compasses, particularly in confined spaces where a larger saw would not fit.

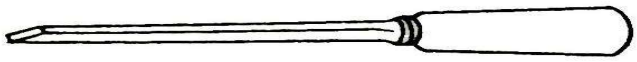


Tenon Saw / Back Saw

Compass Saw

3. **Tenon Saw:** A tenon saw is one kind of backsaw primarily used for cutting furniture joinery pieces with accuracy.

4. **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.

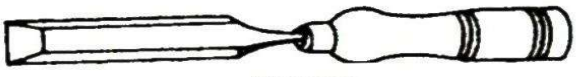


Mortise

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

Firmer Chisel

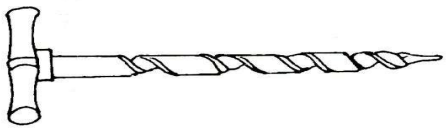
6. **Dovetail Chisel:** It has a tapering cross section and is used to reach difficult to reach corners where sharp corners are required.



Dovetail Chisel

Drilling and Boring Tools

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



Gimlet

Miscellaneous Tools

1. **Wooden 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.

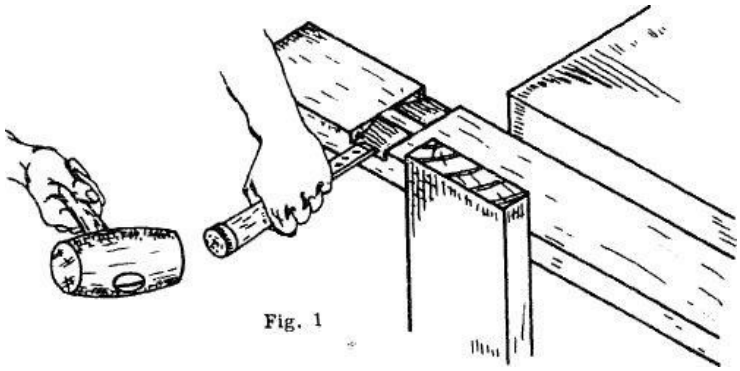
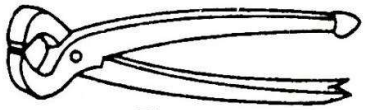


Fig. 1

2. **Pincer**: Figure shows the shape of a pincer. It is made of two forged steel arms with a hinged joint and is used for pulling-out small nails from wood. The inner faces of the pincer jaws are bevelled and the outer faces are plain. The end of one arm has a ball and the other has a claw. The bevelled jaws and the claw are used for pulling out small nails, pins and screws from the wood.



Pincer

3. **Claw hammer**: It has a striking flat face at one end and the claw at the other, as shown in extracting relatively large nails out of wood. It is made of cast steel and weighs from 0.25 kg to 0.75kg.

Claw hammer

4. **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.

Wood Rasp File (Flat)

Wood Rasp File (Half Round)

EXPERIMENT - 01

CARPENTRY: SAWING AND GROOVING

AIM:

To make Sawing and Grooving experiment from the given wood piece.

MATERIAL REQUIRED:

Teak wood piece of size 50 X 30 X 125 mm – 1 piece

TOOLS REQUIRED:

Governor setup, Carpenter's vice, Steel Rule, Jack plane, Try-square, Marking Gauge, Firmer Chisel, Cross-cut Saw, Tenon- Saw, Scriber, Wooden Mallet and Wood rasp File.

PROCEDURE:

1. The given wood piece is checked to confirm size as per sketch given.
2. The wood piece is firmly fixed in the carpenter's vice and any two adjacent faces are planned by jack plane and the two other faces are checked for the squareness using the try-square.
3. Making gauge is set and lines are drawn as per sketch given respectively.
4. Using the cross cut saw the portions to be removed are cut in the wood piece.
5. Followed by chiselling the unwanted wood material can be removed.
6. A fine finishing is given by using wood rasp file.

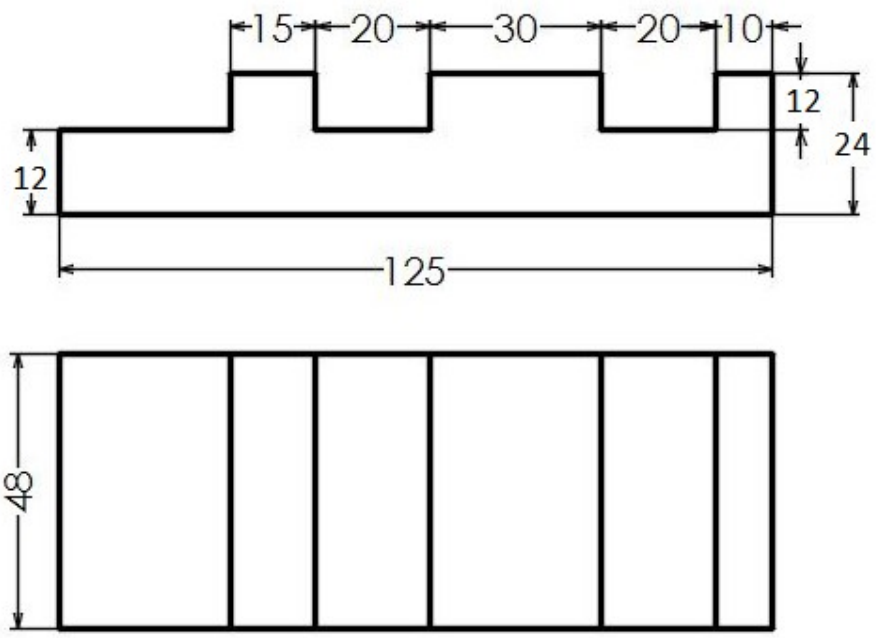
Precautions:

1. Do not use firmer chisel without handle.
2. Do not put finger on cutting edge of chisel and Saw.

RESULT & CONCLUSION:

The T-Lap Joint is thus made by following the above sequence of operations.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What is bench vice?
2. How many types of files?
3. What is chisel? What are the safety precautions are required in carpentry
4. What is carpentry?
5. What are the tools required in carpentry?
6. What are drilling tools?

EXPERIMENT - 02

CARPENTRY: T- LAP JOINT

AIM:

To make a T- LAP JOINT as shown in the figure from the given reaper.

MATERIAL REQUIRED:

Teak wood piece of size 50 X 30 X 125 mm – 2 pieces

TOOLS REQUIRED:

Governor setup, Carpenter's vice, Steel Rule, Jack plane, Try-square, Marking Gauge, Firmer Chisel, Cross-cut Saw, Tenon- Saw, Scriber, Wooden Mallet and Wood rasp File.

PROCEDURE:

7. The given reaper is checked to ensure its correct size.
8. The reaper is firmly clamped in the carpenter's vice and any two adjacent faces are planed by the jack plane and the two faces are checked for squareness with try-square.
9. Marking gauge is set and lines are drawn at 24 and 45mm to mark the thickness and width of the model respectively.
10. The excess material is first chiselled out with firmer chisel an then planned to correct size.
11. The mating dimensions of the parts X and Y are then marked using scale and marking gauge.
12. Using the cross cut saw, the portions to be removed are cut in both the pieces, followed by chiselling.
13. The ends of both the parts are chiselled and filed by wood rasp file to the exact length.
14. A fine finishing is given to the parts, if required so that proper fitting is obtained.
15. The parts are fitted to obtain a straight tight joint.

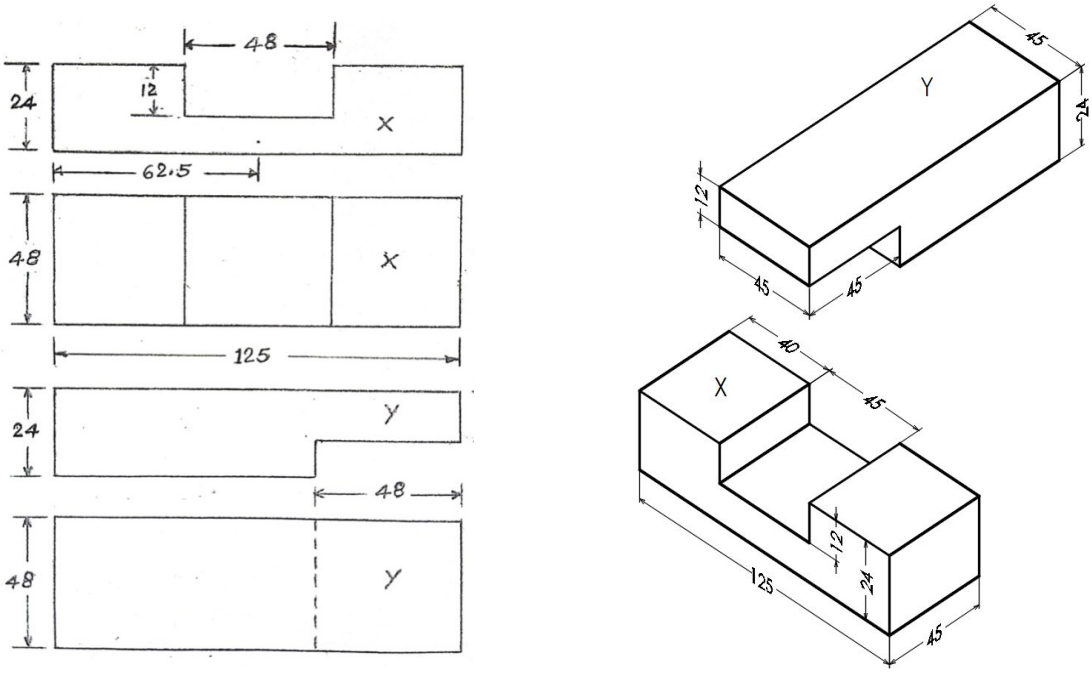
Precautions:

1. Do not use firmer chisel without handle.
2. Do not put finger on cutting edge of chisel and Saw.

RESULT & CONCLUSION:

The T-Lap Joint is thus made by following the above sequence of operations.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What are the safety precautions are required in carpentry?
2. How many types of chisel?
3. What is carpentry?
4. What are the tools required in carpentry?
5. What are drilling tools?

EXPERIMENT - 03
CARPENTRY: DOVETAIL LAP JOINT

AIM:

To make a Dovetail Lap joint experiment from the given wood piece.

MATERIAL REQUIRED:

Teak wood piece of size 50 X 30 X 125 mm – 2 pieces

TOOLS REQUIRED:

Governor setup, Carpenter's vice, Steel Rule, Jack plane, Try-square, Marking Gauge, Firmer Chisel, Cross-cut Saw, Tenon- Saw, Scriber, Wooden Mallet and Wood rasp File.

PROCEDURE:

1. The given wood pieces are checked to confirm size as per sketch given.
2. The wood piece is firmly fixed in the carpenter's vice and any two adjacent faces are planned by jack plane and the two other faces are checked for the squareness using the try-square.
3. Making gauge is set and lines are drawn at 24 and 48mm, to mark the thickness and width of the model respectively.
4. The portions to be removed in both male and female pieces can be cut by using the cross cut saw, followed by chiselling.
5. A fine finishing is given by using wood rasp file.
6. The ends of both parts are chiselled and filed by Wood rasp file.
7. A fine finishing is given to the parts, if required so that, proper fitting is obtained.
8. The parts are fitted to obtain a slightly tight joint

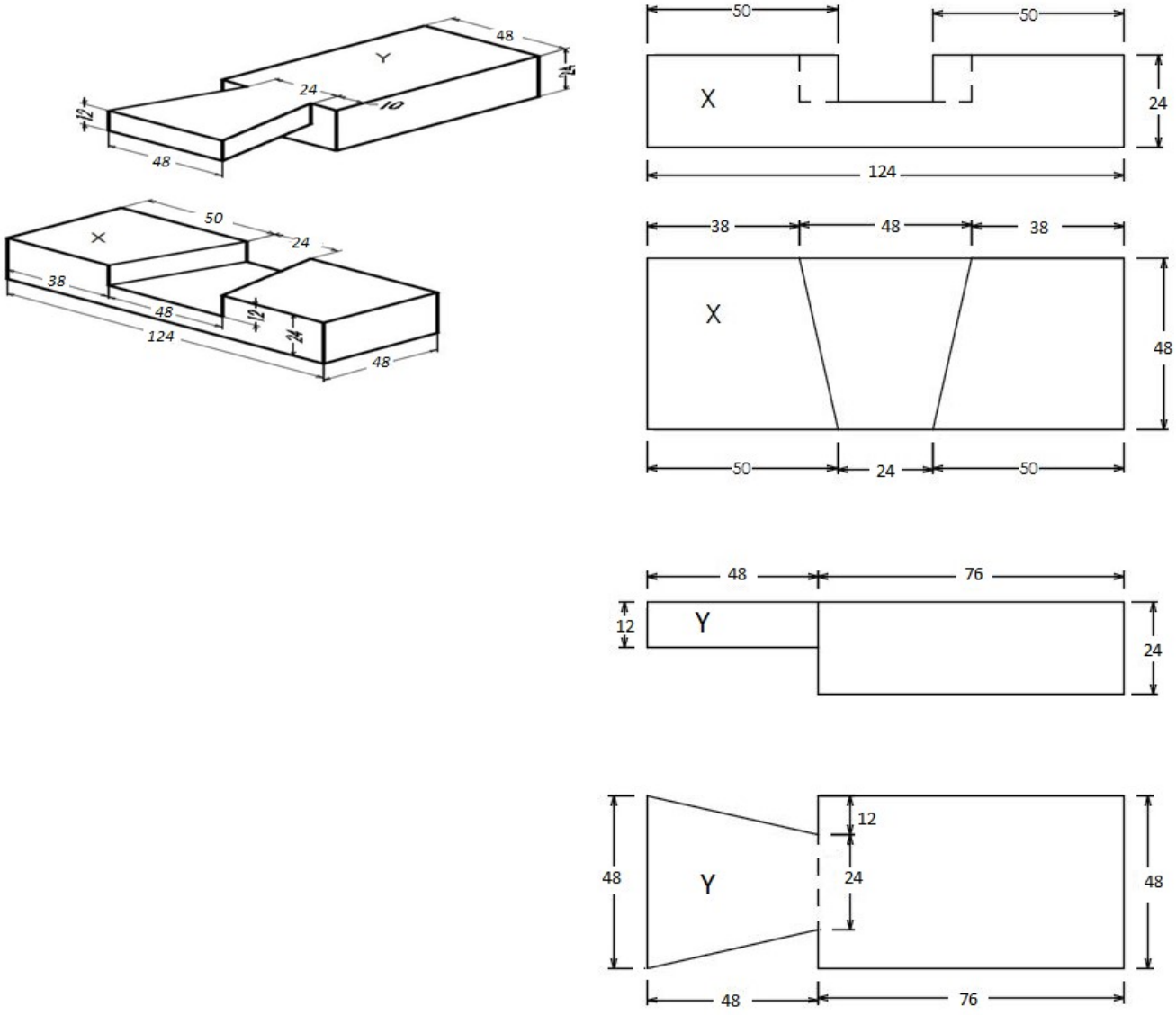
Precautions:

1. Do not use firmer chisel without handle.
2. Do not put finger on cutting edge of chisel and Saw.

RESULT & CONCLUSION:

The T-Lap Joint is thus made by following the above sequence of operations.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What is mortise chisel?
2. What is rough file and smooth file

FITTING

INTRODUCTION

Machine tools are capable of producing work at a faster rate, but there are occasions when components are processed at the bench. The term bench work refers to the production of components by hand on the bench, where as fitting deals with the assembly of mating parts, through the removal of metal to obtain the required fit. Both the bench work and fitting operations consists of filing, chipping, sawing, drilling, tapping etc.,

CLASSIFICATION OF TOOLS:

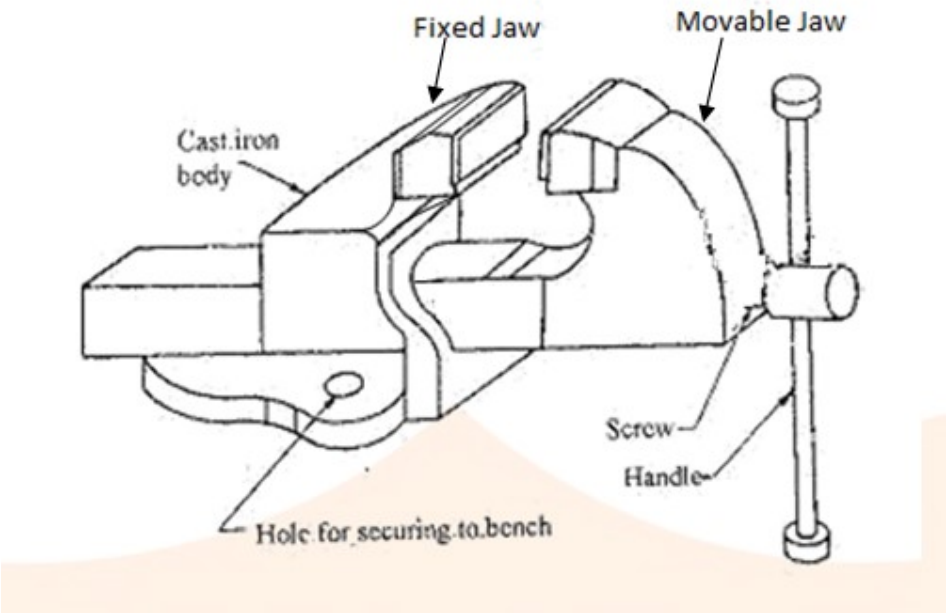
The tools commonly used in fitting may be classified as 1) Holding tools 2) Cutting tools 3) Striking tools 4) Marking & checking tools.

HOLDING TOOLS:

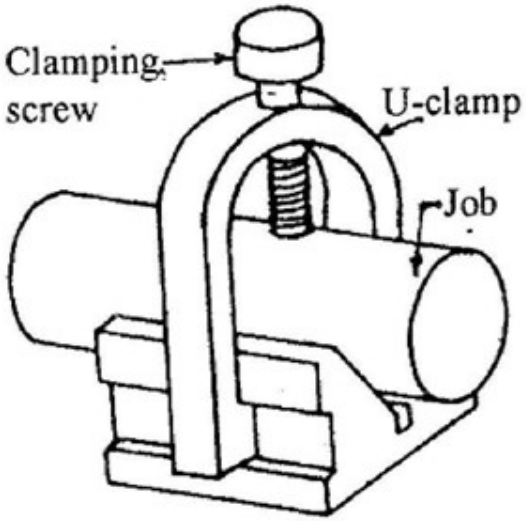
1) Bench vice 2) Pipe vice, 3) Hand vice, 4) Pin vice, Tool makers, 6) Leg vice 7) C- clamp.

BENCH VICE (OR) PARALLEL JAW VICE:

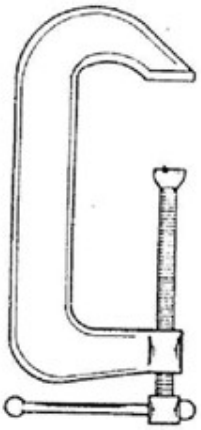
The bench vice is the work holding device. It has two jaws one of which is fixed to the bench and other slides with the aid of square screw and a box nut arrangement. The outer end of the screw carries a handle. The jaws are made with hardened tool and the body is cast iron or cast steel. The working faces of jaws are serrated to give additional grip for holding job. The size of the parallel or bench vice is specified by the jaws width.



BENCH VICE



V-Block



C- Clamp

CUTTING TOOLS:

Hacksaw:

1. Solid Frame Hacksaw
2. Adjustable Frame Hacksaw

The hacksaw is used for cutting metal by hand. It consists of a frame, which holds a thin blade firmly in position. Hacksaw blades have a number of teeth ranging from 5 to 15 per cm. Hacksaw blades are classified as

1. HSS Hacksaw Blade 2. Flexible Bimetal Hacksaw Blade

The teeth of hacksaw blade are staggered or bending alternatively are known as a "set of teeth". These make slots wider than the blade thickness preventing the blade from jamming.

Power Hacksaw: It is similar to hacksaw, but has a large size blade and is driven by motor.

Drills: Drills are cutting tools used for making holes. These are naturally made of high speed steel tools. Drills have two cutting edges and two helical grooves (flutes). The flutes admit coolants and also allow the chips to escape during the drilling. Its cutting angle (lips) is grounded to 118˚. The shank of twist drill may be either straight or taper.

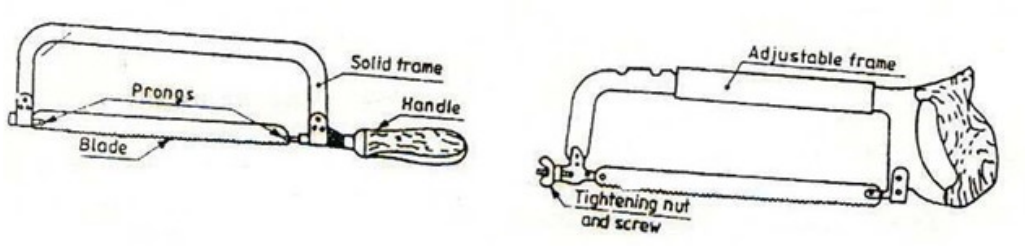
Reamer: A reamer is used for finishing a drilled hole to an accurate size and to produce a good surface finish. It is made of HSS. There are two types of reamers.

1. Hand reamer
2. Machine reamer

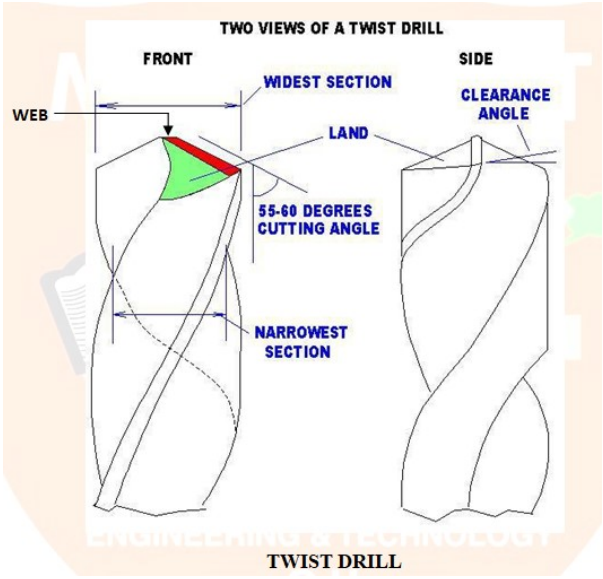
Chisels: Chisels are used for removing excess material from large surfaces and cutting thin sheets. These tools are made from 0.9˚ to 1.0˚ carbon steel of octagonal or hexagonal. The cutting angle for the chisel for general purpose is about 60˚. The recommend angles for cutting different materials at cold state are:

Aluminium	35˚
MildSteel	55˚

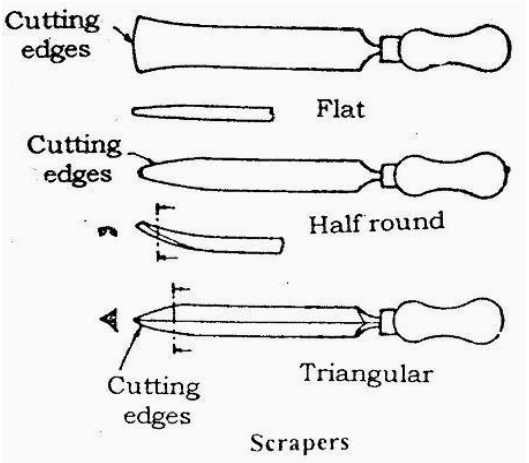
Copper and Brass	40˚ – 45˚
Cast Iron	60˚
Cast Steel	70˚



Hacksaw Frame with Blade



TWIST DRILL



Scrapers

CUTTING TOOLS

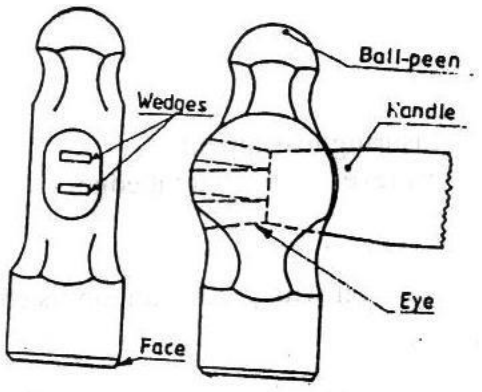
The most commonly used chisels are:

1. Flat chisel
2. Cross cut chisel
3. Half round chisel
4. Diamond point chisel
5. Side chisel

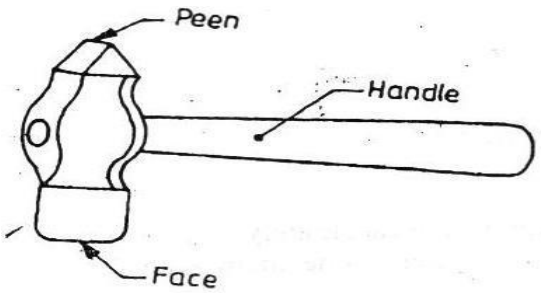
Scrapers: Scrapers are used for producing finished surface. It removes the surface irregularities at selected spots on a surface. The scrapers are made of tool steel. The cutting edge is hardened but not usually tempered. The most commonly used scrapers are:

1. Flat scraper
2. Triangular scraper
3. Half round scraper

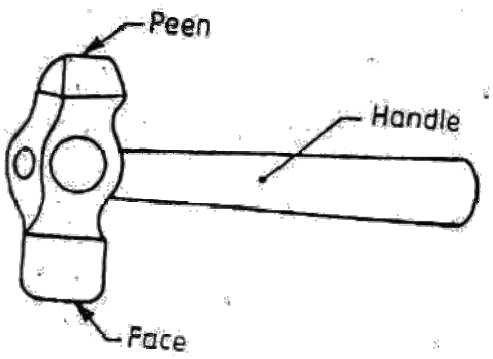
Striking tools: Hand hammers are striking tools. They are made of medium carbon steel. The various types of hand hammers in common use are ball peen hammer, cross pen hammer and straight peen hammer.



Ball Peen Hammer



Cross Peen Hammer



Straight Peen Hammer

STRIKING TOOLS

Marking tools: Marking is a process of layout of sizes on work piece. The following tools are used in marking operations.

1. Scriber
2. Divider
3. Jenny caliper
4. Scribing block
5. Angle plate
6. V-block
7. Punch
8. Try Square
9. Surface plate

Scriber: A scriber is a slender tool used to scribe or mark lines on metal work piece.

Tap and Tap wrenches: A tap is hardened steel tool used for cutting internal threads in a drilled hole. Hand taps are available in sets containing three taps. Taper tap, Second tap, and plug or bottom tap.

Die and Die holders: Dies are cutting tools used for making external threads. They are made of tool steel or high carbon steel.

Punch: It is made of tool steel and the various types of punches are prick punch or dot punch, centre punch, number punch and letter punch.

Prick punch: It is also called as dot punch and used for marking small dots along the layout lines. The point is tempered and grounded to an angle of 60˚.

Centre punch: This is similar to dot punch, except that its point is grounded to angle of 90˚. It is used for marking the location of the holes to be drilled.

V- block: V blocks are made of cast iron or hardened steel. They are provided with V grooves on the top and bottom and rectangle dots on two sides for location of clamps.

Try square: It is used for checking squareness of small works. The size of the try square is specified by the length of the blade.

Surface plate: It is used for providing true surface support to the work during marking. It is made of cast iron, hardened steel or granite and is specified by length× width × height× grade.

Divider: This is used for marking circles, arcs, laying out perpendicular lines, bisecting lines etc.

Jenny caliper: This is also called as odd leg or hermaphrodite caliper. It is used for marking parallel lines from a finished edge and also for locating the centre of round bars.

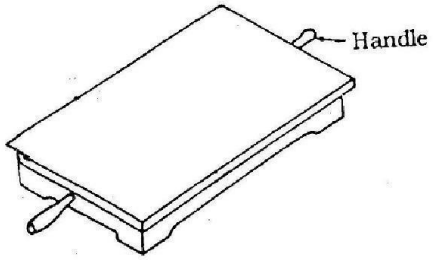
Scribing block: It is also known as universal scribing block. This is used for scribing lines for layout and for checking parallel surfaces.

Angle plate: The angle plate is made of cast iron or hardened steel. They are provided with v-grooves on the top and bottom and rectangular slots on two sides for the location of clamps.

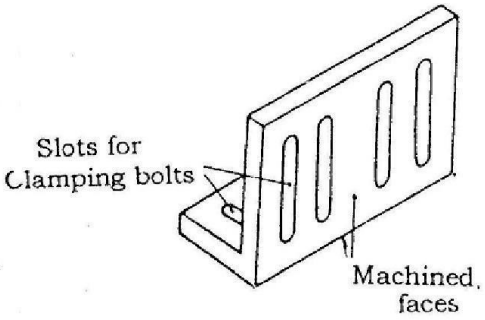
Vernier height gauge: It is clamped with scriber and is used when it is required to take measurements from the surfaces on which gauge is standing. The accuracy and working principles of this gauge is same as vernier caliper.

Outside Micrometer: It is used for measuring external dimensions accurately of 0.01mm.

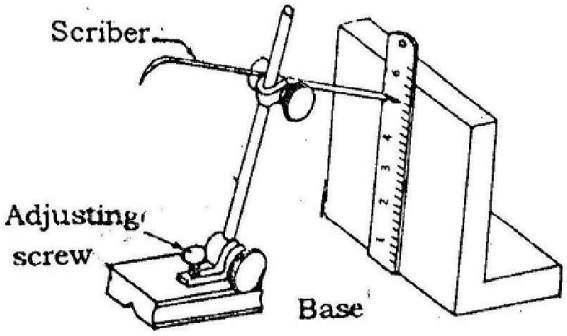
Inside micrometer: This is used to measure inside dimension accurately to 0.01mm. It consists of a measuring unit, a number of interchangeable extension rods and a handle.



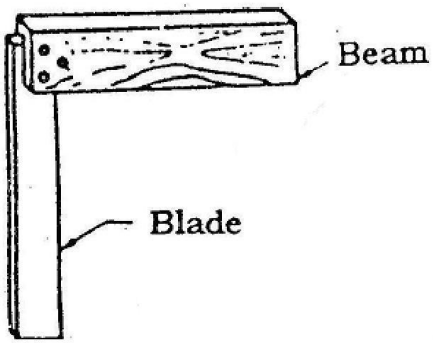
Surface Plate



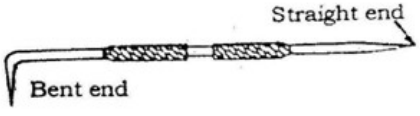
Angle Plate



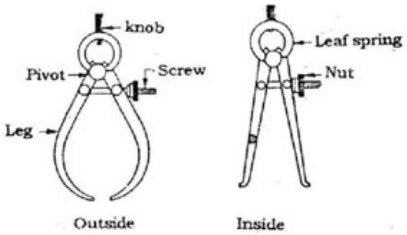
Universal Scribing Block



Try Square

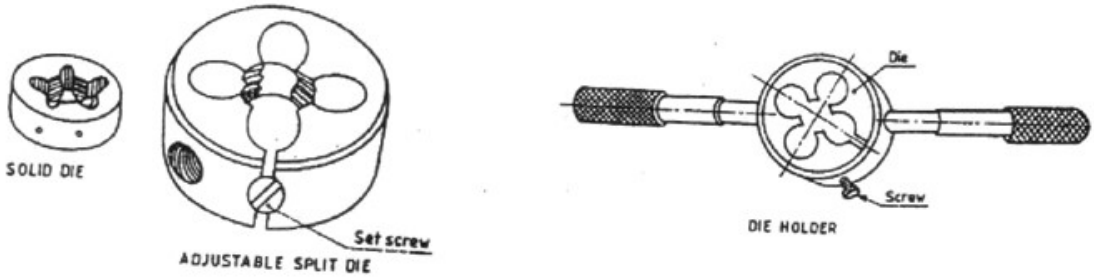


Scriber

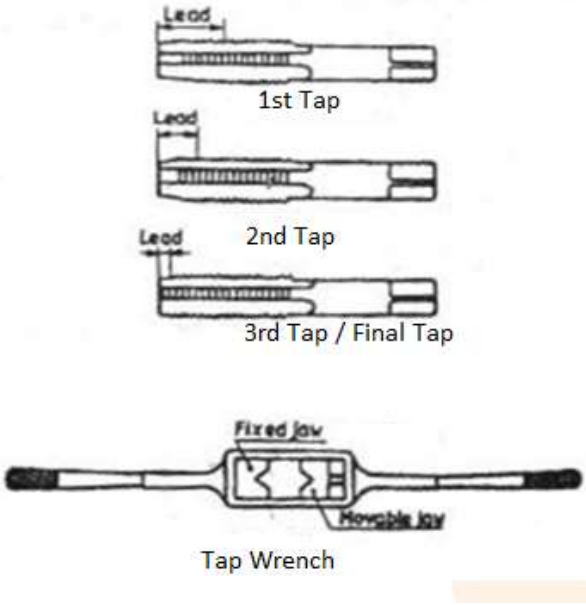


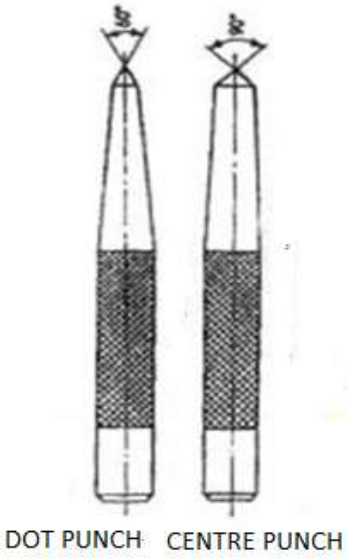
Spring Calipers (Outside & Inside)

DIVIDER



DIES & DIE HANDLE





FILE:

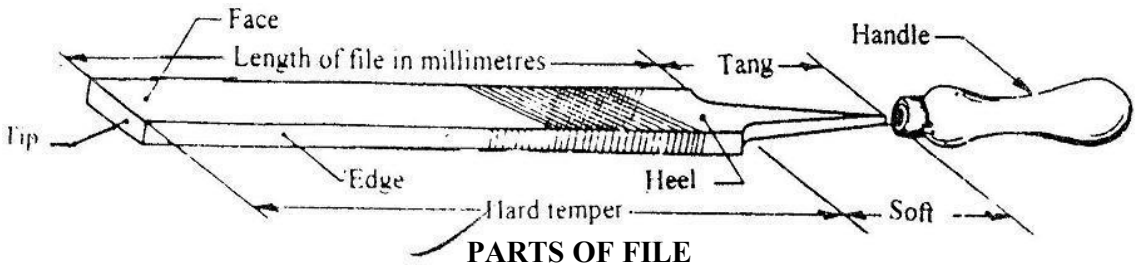
File is a cutting tool. A file is a hardened steel tool having slant parallel rows of cutting edges or teeth on its surface on the faces. The one end of the file is shaped to fit into wooden handle. The hand file is parallel in width and tapering slightly in thickness towards the tip. It is provided with double cut teeth on the faces, single cut on one edge and no teeth on the other edge which is known as "safe edge".

Types of files: Files are classified according to their shape of cutting teeth and pitch grades of teeth.

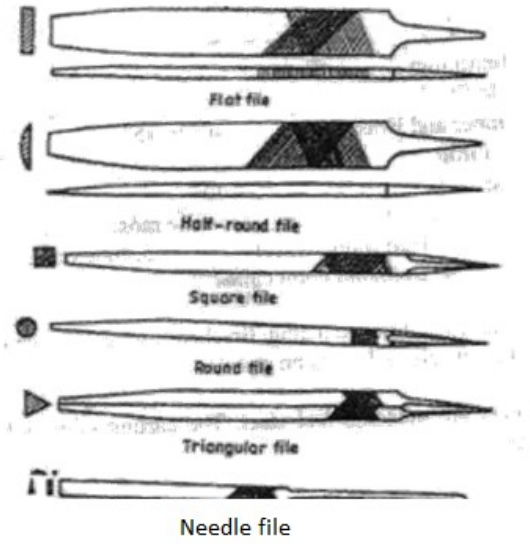
S. No	Type of file	Uses
1	Hand file	It is used for filing a surface, at a right angle to an already finished surface.
2	Flat file	Used for general file
3	Square file	Used for slots and key ways
4	Triangular file	Used for filing internal corners
5	Half round file	Used for filing concave surfaces and internal corners
6	Round file	Used for filing concave surfaces and circular opening
7	Swiss or needle File	Used for filing corners, grooves, slots etc., in intricate work

Based on the coarseness or pitch of the teeth, files are graded as follows:

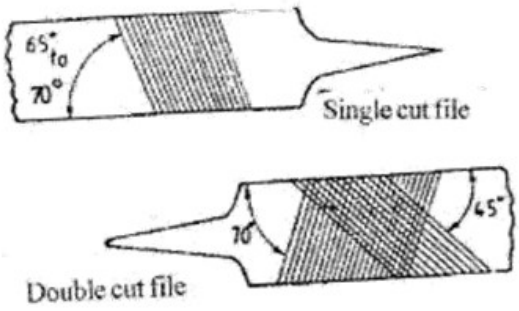
a. Rough: It has 8 teeth per cm and it is used for rough work.
b. Baste red: It has 12 teeth per cm.
c. Second cut: It has 16 teeth per cm
d. Smooth: It has 20 to 24 teeth per cm
e. Dead smooth: It has 40 to 48 teeth per cm



PARTS OF FILE



TYPES OF FILES



CUT OF FILES

MEASURING AND CHECKING INSTRUMENTS:

Measuring tools may be classified as :

1. **Linear measuring instruments**
    a. Steel rule
    b. Caliper
    c. Depth gauge
    d. Vernier caliper
    e. Micrometer
    f. Gauge block
    g. Dial indicator or dial gauge
2. **Angular measuring instruments**
    a. Level protractor

b. Combination set
c. Sine bar

3. **Surface measuring instruments**
   a. Spirit level
   b. Straight edge

Steel rule: It is a strip of steel with graduation on its edges.

Calipers: They are used for transferring the dimensions both external and internal. They are made either with firm joint or spring caliper.

Outside caliper: It is used for measuring outside dimensions of cylindrical shapes.

Inside caliper: It is used for measuring the diameter of holes and width of key ways.

Vernier caliper: It is used for measuring outside as well as inside dimensions accurately. It may also be used as depth gauge.

Least count of vernier = 1 main scale division – 1 vernier scale division

Combination set: It consists of rule, square head, centre head, and a protractor and spirit level. This may be used as a rule, a square, depth gauge for marking meters (45˚) for locating the centre on the end of the round bar and for measuring and marking angles.

Gauges: Gauges are inspection tools used in production work to control the size and shape of the components.

Feeler gauges: These are thin steel blades hardened and grounded to various sizes. These are used to check the clearance between two mating parts. The blade thickness varies from 0.03mm – 1.0mm and the length of the blade is about 100mm.

Screw pitch gauge: It is used to check the pitch of the screw. The pitch of the screw is directly on the gauge.

Wire gauge: The wire gauge is used to check the diameter of the wire from 0.1mm – 10mm.

Plate gauge: Plate gauge (standard wire gauge) is used to measure thickness of sheets of different thickness. Each slot is represented by number (SWG number). As the number increases the thickness size decreases. The most common gauge used in sheet metal has 21 slots with gauge numbers ranging from 4 to 24.

Radius and fillet gauge: These are used to check the radii of curvature of convex and concave surfaces.

Miscellaneous tools:

1. **File card:** It is a metal brush used for cleaning the files to free them from filings logged in between the teeth.
2. **Screw driver:** It is used for tightening and loosening the screws. It is made of steel and its tip is hardened. It is made in a variety of sizes and shapes.
3. **Spanners:** Spanners or wrenches are used for tightening and loosening of nuts and bolts. They are made of forged steel. The size of spanner denotes the size of the bolt on which it can work.

Types of spanners:

1. Single end spanner
2. Double end spanner
3. Ring spanner
4. Box end spanner
5. Adjustable spanner

Allen key: It is used for hallow sunk head bolts and screws.

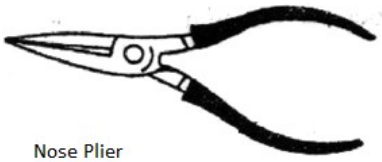
Pliers:

1. Cutting pliers: It is used for holding work and cutting thin soft wires.
2. Nose pliers: It is used for holding and bending thin wires.

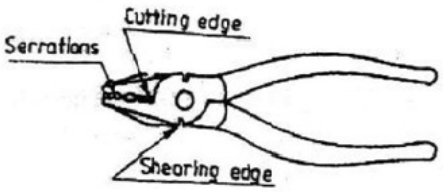
3.Circlip pliers: It is used for locking and removal of Circlip and are available in outside and inside pliers.

Screw Driver

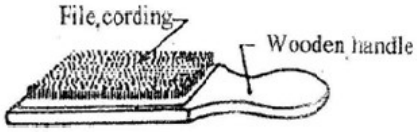
Star Screw Driver



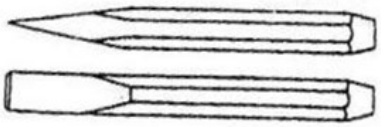
Nose Plier



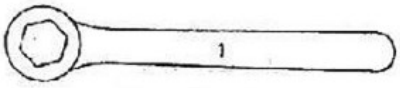
Combination Plier/Cutting Plier



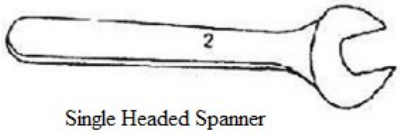
File Card



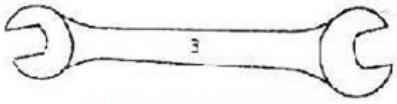
Flat Chisel



Single Headed Box Spanner

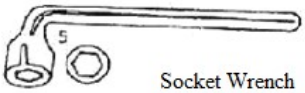


Single Headed Spanner

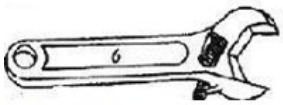


Double Headed Spanner

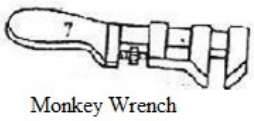
Double Headed Ring Spanner



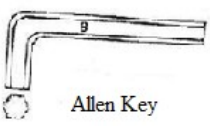
Socket Wrench



Adjustable Spanner



Monkey Wrench



Allen Key

SAFETY PRECAUTIONS:

- Never wear loose clothes, wear the prescribed dresses while in workshop.
- Never enter the workshop without shoes
- Do not run or play in the shop floor
- Keep the floor clear of metal chips, curls, and waste pieces.
- Concentrate on the work and don't talk unnecessarily while operating the machine.
- Do not operate the machine without getting conversant with the machine.
- Do not wear rings, watches etc., that could be caught in moving machinery.
- Do not attempt to oil, clean or adjust or repair any machine when it is running.
- When you switch off the machine, do not leave before it has completely stopped running.
- Keep your body behind the cutting edge of an edged cutting tool.
- Never use a hammer with a loose head.
- Do not clean chips with hands.
- Do not try to stop the machine with your hands or body.
- Keep all the hand tools in proper working condition.
- Slippery floors, poor ventilation, poor lightening, and inadequate space are the potential causes of accidents and hence should be avoided.

EXPERIMENT - 04

FITTING: STEP SAWING AND FILING

AIM:

To make a Step Sawing and Filing from the given M.S. pieces.

MATERIAL REQUIRED:

M.S. Piece of size: 50 X 50 X 5 mm

TOOLS REQUIRED:

Bench Vice, Steel Rule, Try Square, Ball-Peen Hammer, Scriber, Dot Punch, Set of Files, Surface Plate, Jenny Caliper, Hacksaw with Blade and Flat Chisel.

PROCEDURE:

1. The burrs in the pieces are removed and the dimensions are checked with the steel Rule.
2. The pieces are clamped one after the other and the outer mating edges are filed and checked for their flatness, with the help of the try-square.
3. The side edges of the two pieces are filed such that, they are at right angle to each other and widths are exactly 48 mm.
4. Chalk is then applied on the surfaces of the two pieces.
5. The given dimensions of the step fitting are marked, by using the Jenny caliper, steel rule and surface plate.
6. Using the dot punch, dots are punched along the above scribed lines.
7. Using the hack saw, the unwanted portions are removed.
8. Using the flat chisel, the unwanted material in the piece is removed.
9. The cut edges are filed by the Flat file.
10. The corners of the stepped surfaces are filed by using a square or triangular file to get the sharp corners.
11. The piece fitted together the mating is checked for the correctness of the Stepped, defects noticed, are rectified by filing with a smooth file.

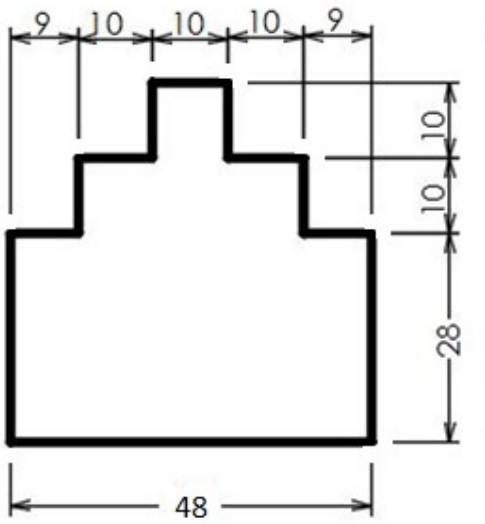
Note:

The single hemmed vertical edges of the tray can either be riveted or soldered to ensure stability of the joints.

RESULT & CONCLUSION:

The required step fitting is thus obtained by following the stages, as described above.

DIAGRAM:



Step Sawing and Filing

All Dimensions are in mm

VIVA QUESTIONS:

1. What is marking gauge?
2. What is full form of M.S?
3. What are the tools required in fitting
4. 4. What is angle plate?

EXPERIMENT - 05

FITTING: DRILLING AND TAPPING

AIM:

To prepare a square flat with a drilled hole and two tapped holes in given MS Piece.

MATERIAL REQUIRED:

M.S. Piece of size: 50 X 50 X 5 mm

TOOLS REQUIRED:

Bench Vice, Steel Rule, Try Square, Ball Peen Hammer, Jenny Caliper, Scriber, Hack Saw, Dot and Centre Punches, Surface Plate, Bet of Files, Drill Bits and Tap Set.

PROCEDURE:

1. The burrs that are present in the piece are removed and the dimensions area checked with the steel rule.
2. Any two adjacent sides of the flat are filed by using rough and smooth files such that they are perpendicular each other.
3. Wet chalk is applied on one side of the flat and dried for marking.
4. Lines are marked at 48 mm from the two edges, using the Jenny caliper and steel rule.
5. Using the dot punch, dots are made along the making lines.
6. The excess material is either filed or cut with the hacksaw and then filed to correct size.
7. By using Jenny caliper and steel rule, lines are marked to locate the centres of the holes.
8. Using the centre punch, dots are made at the centres of the holes.
9. Choosing appropriate sizes of drill bits, holes are made using a bench drill.

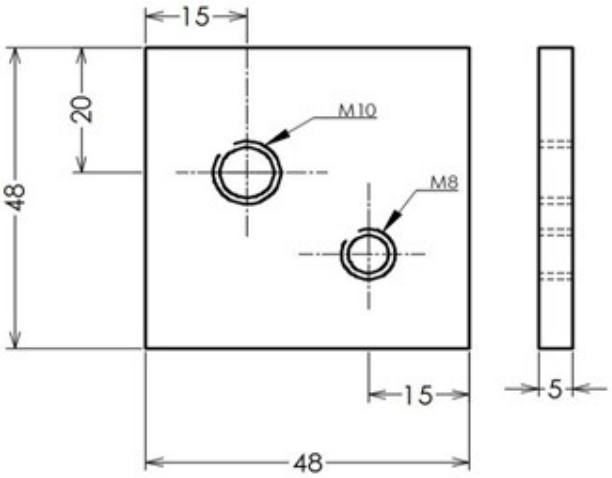
Note:

1. To find the drill diameter for the holes, the following relation is used.
   Drill diameter = 0.84 X Nominal Diameter of the threaded hole.
2. The nearest available smaller drill bit is used for drilling the holes.
3. The corner holes are tapped by using the hand tap set.
4. All the sharp edges around the holes are deburred.

RESULT & CONCLUSION:

The square flat with a drilled hole and two tapped holes are thus made by following the stages as mentioned above.

DIAGRAM:



Tap Size	Drill Size
M 10	Ø 8.5
M 8	Ø 6.75

Material: Mild Steel

All Dimensions are in mm

VIVA QUESTIONS:

1. What is holding tools?
2. What is thickness of metal?
3. What are the safety precautions are required in fitting section?
4. What is centre punch?

EXPERIMENT - 06

FITTING: "V" FITTING

AIM:

To make V-fit from the given two M.S. pieces.

MATERIAL REQUIRED:

M.S. Piece of size: 50 X 50 X 5 mm – 2 Pieces

TOOLS REQUIRED:

Bench Vice, Steel Rule, Try Square, Ball-Peen Hammer, Scriber, Dot Punch, Set of Files, Surface Plate, Jenny Caliper, Hacksaw with Blade and Flat Chisel.

PROCEDURE:

1. The burrs in the pieces are removed and the dimensions are checked with the steel rule.
2. The pieces are clamped one after the other and the outer mating edges are filed and checked for their flatness with the help of the try-square
3. The side edges of the two pieces are filed such that, they are at right angle to each other and widths are exactly 48 mm.
4. Chalk is then applied on the surfaces of the two pieces.
5. The given dimensions of the "V" fitting are marked, by using the Jenny caliper,steel rule and surface plate.
6. Using the dot punch, dots are punched along the above scribed lines.
7. Using the hack saw, the unwanted portions are removed.
8. Using the flat chisel, the unwanted material in the piece Y is removed.
9. The cut edges are filed by the triangular file.
10. The corners of the stepped surfaces are filed by using square or triangular file to get the sharp corners.
11. The pieces (X and Y) are fitted together and the mating is checked for the correctness of the fit. Any defects noticed, are rectified by filing with a smooth file.

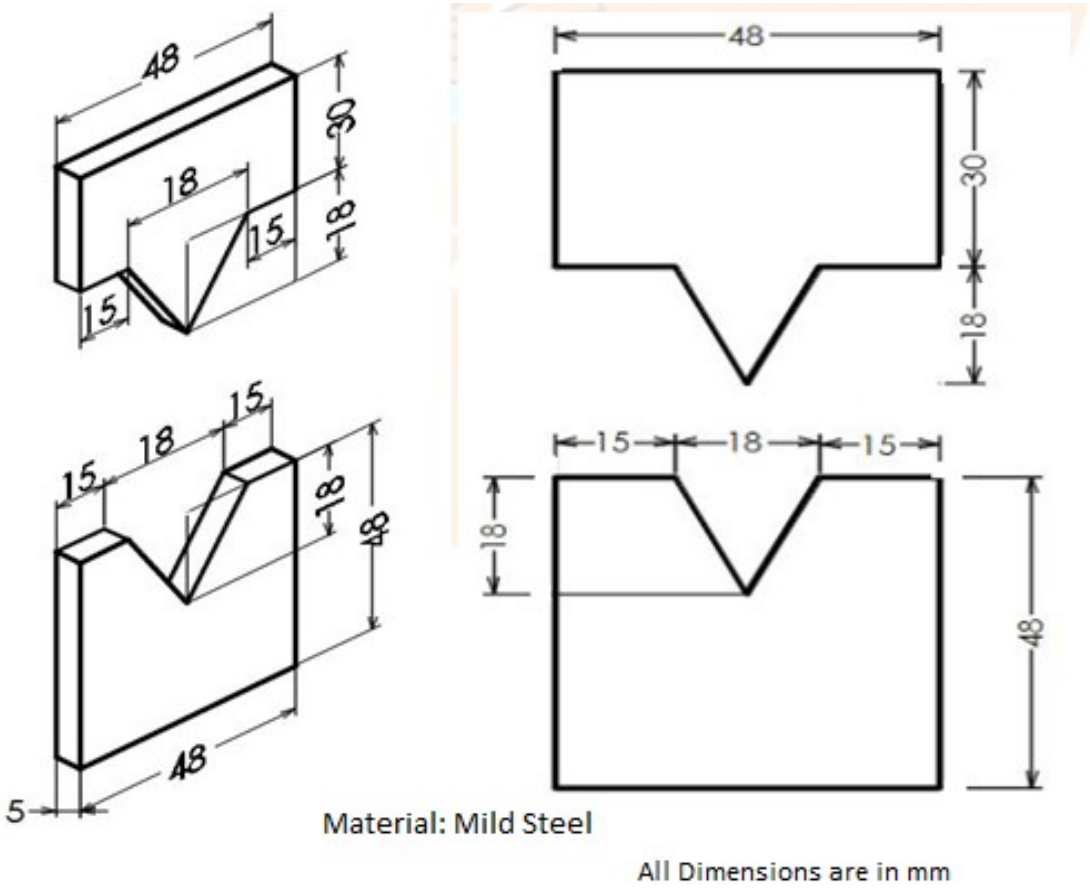
Note:

Care is taken to see that the marking dots are not crossed, which is indicated by the half of the punch dots left on the pieces.

RESULT & CONCLUSION:

The required V-fit is thus obtained by following the stages as described above.

DIAGRAM:



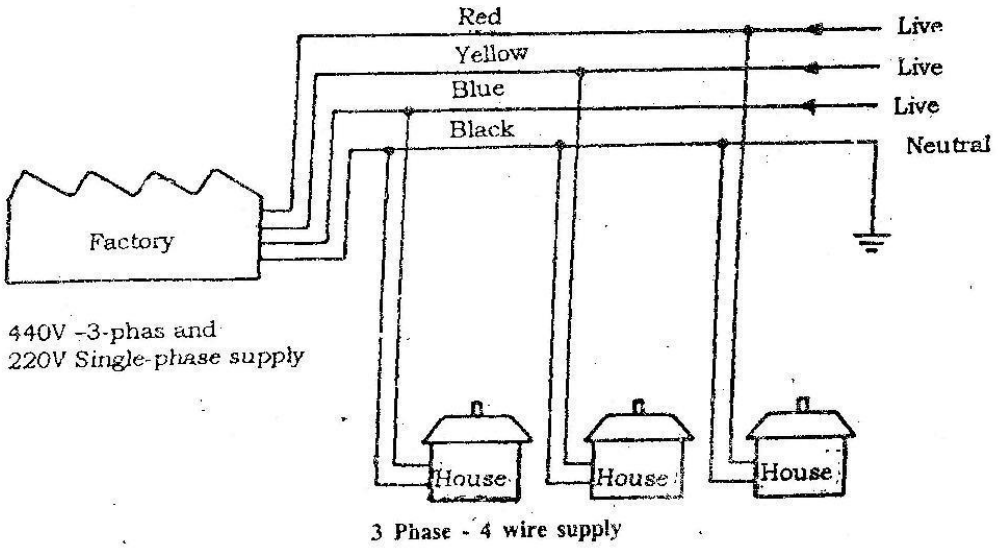
VIVA QUESTIONS:

1. What is dot punch?
2. What is c- clamp?
3. What are the safety precautions are required in fitting section?
4. What is centre punch?

HOUSE WIRING

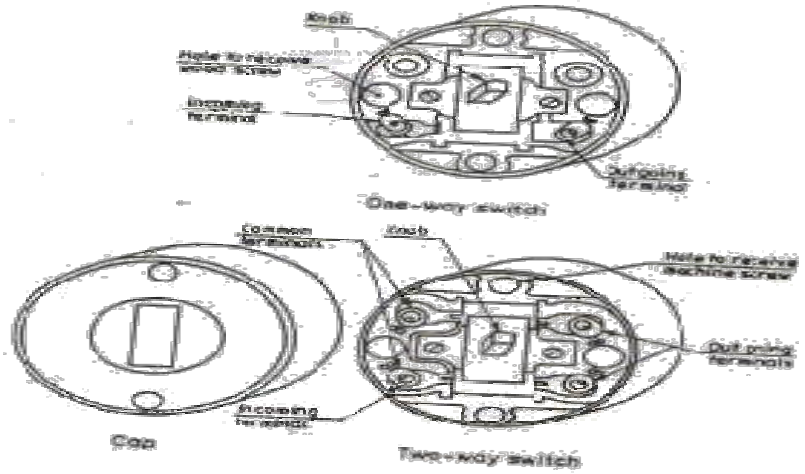
INTRODUCTION

Electrical wiring is defined as a system of electrical conductor, components and apparatus, for conveying electric power from the source to the point of use. Electrical power is supplied to domestic installation through a phase and a neutral forming a single phase A.C. 230V, two wire system. For industrial establishment, power is supplied through 3-phase wire system to give 440v. The figure below shows the power tapping for domestic and industrial purpose. The neutral is earthed at the distribution sub-station of the supply.

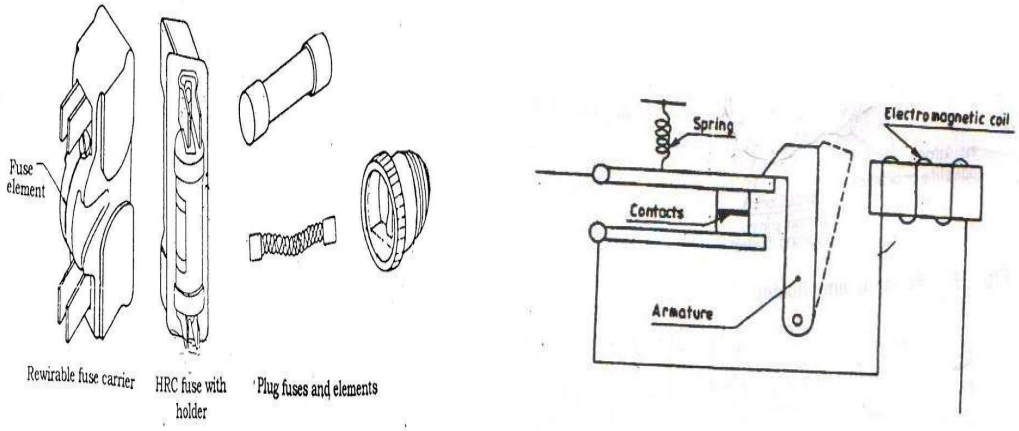


Elements of house wiring:

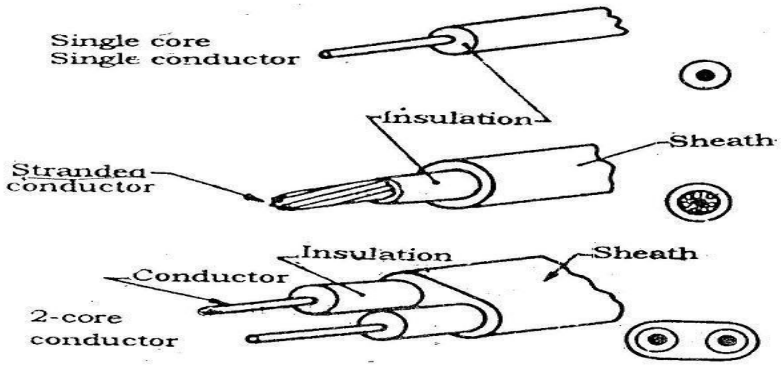
1. **Fuses and Circuit Breakers:** These are devices designed to provide protection to a circuit against excess current.
2. **Electric Switch:** This is a device that makes and breaks or changes the course of electric circuit.
3. **Plug:** It is a device carrying two or more metallic contacts in the form of pins intended for engaging with the corresponding socket contacts.
4. **Socket outlet:** It is a device carrying 2or 3 contacts designed for engagement with corresponding plug pins and arranged for connection to fixed wiring.
5. **Lamp Holder:** It is designed to hold lamps and connect them in the circuit.
6. **Main switch:** This is a switch intended to connect or cut off the supply of electricity to the whole of installation. It contains one or more fuses.



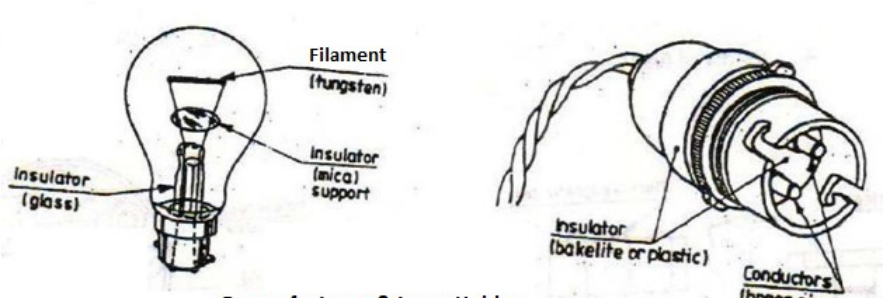
ELECTRICAL SWITCHES



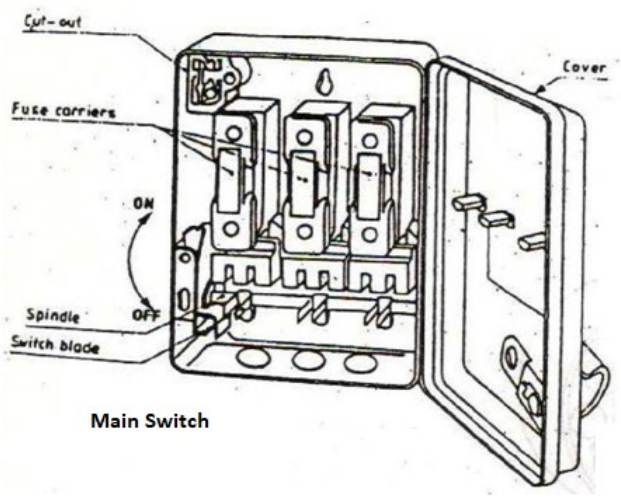
PLUGS AND SOCKETS



WIRES



Parts of a Lamp & Lamp Holder

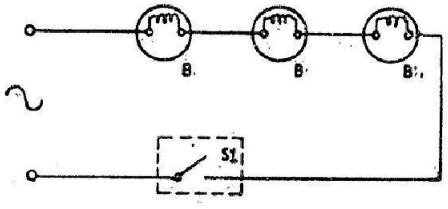


Main Switch

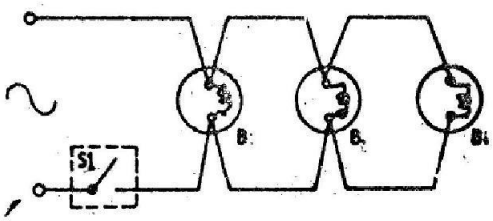
Wiring methods

A circuit is a path along which the electric current flows the negative side of the power source to the positive side. There are three types of electrical circuits that are used for connecting devices or controls to the power source i.e. series circuit, parallel circuit and combination of the two.

The series circuit provides a single, continuous path through which current flows. The devices are connected one after another and the current flows through them until it returns to the power source. In parallel circuit the devices are connected side by side so that, current flows in a number of parallel paths.



Series circuit



Parallel circuit.

Common House wiring connections:

1. One Lamp controlled by one-way switch:

   One lamp controlled by a one-way switch, this is the normal connection one comes across in house wiring.

2. Two Lamps controlled by one-way switch:

   Two Lamps may be connected by one –way switch in parallel for bright glow or in series for dull glow.

3. One Lamp controlled by 2 two-way switches:

   It is sometimes desirable to control a lamp from 2 different places. One may come across this situation with staircase, long corridors or hall containing two entrances etc.

S. No	Description	Symbol		Description	Symbol
29	D.C		43	Choke	
30	A.C		44	Two pin socket	
31	Single phase alternating current	50c/s	45	Three pin socket	
32	Three phase alternating current	3	46	Cell	
33	Neutral	N	47	Battery	
34	Resistor	R	48	D.C volt meter	V
35	Variable resistor	R	49	D.C ampere meter	A
36	Inductor	L	50	D.C/A.C ampere meter	A
37	Capacitor		51	Watt meter	W
38	Variable capacitor		52	Ohm meter	
39	Generator	G	53	Energy meter	kwh
40	Motor	M	54	Oil circuit breaker	
41	Alternator	G	55	Fuse	
42	A.C motor	M	56	Lamp	

EXPERIMENT - 07

HOUSE WIRING: ONE LAMP CONTROLLED BY ONE SWITCH

AIM:

To give connection to one Lamp controlled by one Switch.

MATERIAL REQUIRED:

Aluminum Sheet of (120 X 156 X 0.30 mm)

TOOLS REQUIRED:

Wooden Wiring Board, One Way Switch, Wooden Round Block, Batten Lamp Holder, Connector, Screw Driver, Wires, Wire Clips, Nails, Wood Screws, Poker and Bulb.

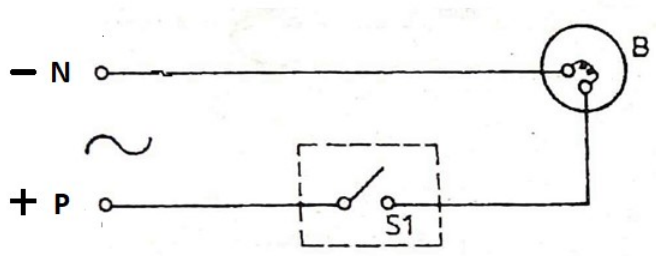
PROCEDURE:

1. The outline of the wiring diagram is marked on the wooden wiring board.
2. Clips are nailed to the board, following the wiring diagram
3. Wires are stretched and clamped with the clips
4. Round block is screwed onto the board, as per the diagram.
5. Wires are connected to the holder and switch which are then screwed onto the round blocks.
6. Bulb is fitted to the holder.
7. The wiring connections are then tested, by giving power supply

RESULT & CONCLUSION:

By following above sequence of operation one light controlled by one switch is thus made.

DIAGRAM:



VIVA QUESTIONS:

1. What are the tools are required in house wiring ?
2. What is screw driver ?
3. What is tester ?
4. What is lamp holder?
5. What Is difference between one way switch and two way switch ?
6. What are safety precautions required in house wiring section

EXPERIMENT - 08

HOUSE WIRING: TWO LAMPS CONTROLLED BY ONE SWITCH IN PARALLEL OR IN SERIES CONNECTION

AIM:

To give connection to one Lamp controlled by one Switch.

MATERIAL REQUIRED:

Aluminum Sheet of (120 X 156 X 0.30 mm)

TOOLS REQUIRED:

Wooden wiring board, one way switch, wooden round blocks, batten lamp holders, connector, screw driver, wires, wire clips, nails, wood screws, poker and bulbs.

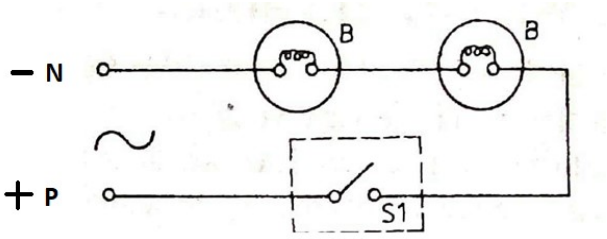
PROCEDURE:

1. The outline of the wiring diagram is marked on the wooden wiring board.
2. Clips are nailed to the board, following the wiring diagram
3. Wires are stretched and clamped with the clips
4. Round blocks (3 No's) are screwed onto the board, as per the diagram.
5. Wires are connected to the holders and switch which are then screwed onto the round blocks.
6. Bulbs are fitted to the holders
7. The wiring connections are then tested, by giving power supply.

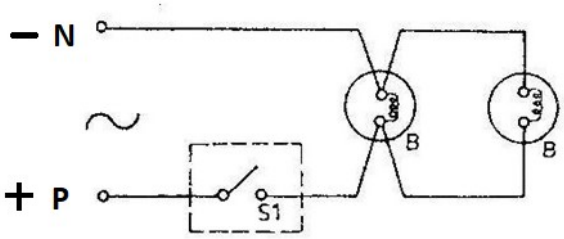
RESULT & CONCLUSION:

The electrical circuit, for two lights controlled by one switch in series is thus made.

DIAGRAM:



Two Lamps controlled by one switch in Series connection



Two Lamps controlled by one switch in Parallel connection

VIVA QUESTIONS:

1. What are safety precautions required in house wiring section
2. What is house wiring ?
3. What is plug
4. What is earthing
5. What is socket outlet ?

EXPERIMENT - 09

HOUSE WIRING: ONE LAMP CONTROLLED BY 2 TWO-WAY SWITCHES

AIM:

To give connection to one Lamp controlled by one Switch.

MATERIAL REQUIRED:

Aluminum Sheet of (120 X 156 X 0.30 mm)

TOOLS REQUIRED:

Wooden wiring board, two way switches (2 No's), wooden round blocks, batten lamp holders, connector, screw driver, wires, wire clips, nails, wood screws, poker and Bulb.

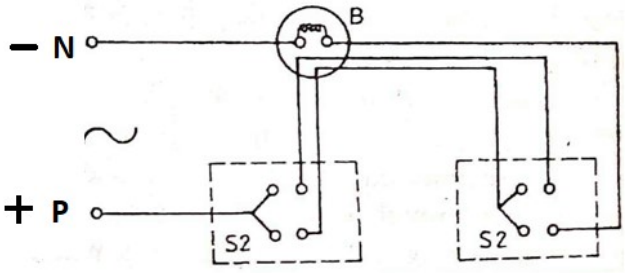
PROCEDURE:

1. The outline of the wiring diagram is marked on the wooden wiring board.
2. Clips are nailed to the board, following the wiring diagram.
3. Wires are stretched and clamped with the clips.
4. Round blocks (3 No's) are screwed onto the board, as per the diagram
5. Wires connected to the holders and switches which are then screwed onto the round blocks.
6. Bulb is fitted to the holder.
7. The wiring connections are then tested, by giving power supply.

RESULT & CONCLUSION:

The electrical circuit, for one light controlled by two way switches is thus made.

DIAGRAM:



One Lamp controlled by two way switches

VIVA QUESTIONS:

1. What are safety precautions required in house wiring section
2. What is house wiring ?
3. What Is difference between one way switch and two way switch ?
4. What are safety precautions required in house wiring section?

SHEET METAL WORKING

INTRODUCTION

The metal plank having less than 2mm thick is called sheet metal. Sheet metal work deals with the production of components in wide variety of shapes and sizes with the aid of tools or machines.

Some of the important metals used in sheet metal work are described below.

Galvanized Iron: It is a sheet of soft steel, which is coated with zinc. Zinc resists corrosion and improves the appearance of the metal galvanized iron in one of the least expensive metals and is used for making pans, buckets, ducts, gutters, tanks, boxes, etc.

Black Iron: It is an uncoated sheet of metal with bluish- back appearance. It corrodes rapidly is not expensively due to difficulties of soldering the block iron sheet are used for parts that are to be painted.

Tin plate: Tin plate is an iron or steel coated with pure iron. It has very bright silver appearance and is used for food containers, cans, pans.

Stainless steels: It is an alloy steel possessing corrosion resistance. General type stainless steel contains 18 percent chromium and 8 percent nickel. This steel is commonly known as 18-8 stainless steel. These are available various sizes and thickness. It is widely used for food containers, dairy equipment.

Copper: It has reddish color and possesses good malleability, ductility and resistance to atmospheric corrosion.

Aluminum: Sheet aluminum is never pure aluminum and it is always allowed with small quantities of copper silicon, magnesium, and iron.

Tools and Equipment used in Sheet Metal

The common hand tools used in sheet metal work are steel rule, wire gauge, dot punch, trammels, scriber, ball peen hammer, straight –peen hammer, cross peen hammer, Nylon Mallets Hammer, Snips and Soldering Iron etc.

Snips: Hand shear or snips are used to cut sheet metal. Although there are many types, the sheet metal works generally use straight snips and curved snips.

Straight Snips: Straight snips have straight blades and are used for cutting along the straight lines and for trimming edges.
Curved Snips / Bent Snip: Curved snips has a curved blade and used for cutting circles and irregular shapes.

Bench shears: Bench shear is used for cutting thick sheets. The lower fixed blade is firmly secured by bracket at bottom. The movable blade is pivoted at the rear end; the hand operating lever is attached to the front end of movable blade link mechanism.

Stakes: Stakes are made of steel and forged in a variety of shapes and sizes. Its working face is machined and polished to facilitate various operations such as bending, seaming or forming.

The following types of stakes are mostly used.

a. **Double seaming:** These stakes has two horns and it is used to make double seam for vessels.
b. **Blow horn:** These stakes have two horn tapering norms and it is used to forming or seaming funnels.
c. **Break horn:** These stakes have a square tapered horn on one side and a round tapered horn on opposite side. It is used for shaping round and square surfaces, bending edges, and making corners.
d. **Conductor stake:** These stakes has two cylindrical horns having different diameters. It is used for forming pipes and cylindrical pieces.
e. **Funnel stake:** It is used for forming conical shapes and for making wire rings.
f. **Hatchet stake:** It has a horizontal sharp straight edge and can be used for making straight sharp bends and for folding and bending edges.
g. **Square Stake**: It has a square straight edge and can be used for folding and bending of the sheet edges and for making right angle bends.
h. **Wire gauge:** The thickness of sheet metal is referred in number known as standard wire gauge. The gaps in the circumference of the gauge are used to check the gauge number as shown in figure.

i. **Sheet Metal Joints:** Various types of joints are used in sheet metal work to suit the varying requirements. Some commonly used sheet metal joints and folded edges are shown below. These are self secured joints, formed by joining together 2 pieces of sheet metal and using the metal itself to form the joint.

j. **Hand Hammers and Mallets:** The sheet metal worker uses a wide variety of hammers and mallet by forming shapes by different operations. The most commonly used hammers are follows.

k. **Straight-Peen Hammer:** It has a peen end similar to its bottom size round shape and its top side is straight point. Square, slightly curved face and its peen is tapered, it is used for riveting.

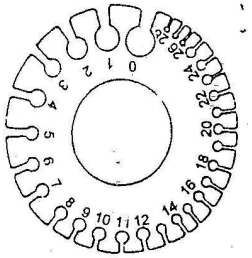
l. **Cross Peen Hammer:** It has a square flat face and it is tapered on one side. It is used for setting down the edges for making a double seam.

m. **Mallet:** Mallet is generally made of wood and Nylon. It is used whenever slight blows are required. Wooden and Nylon mallets don't damage the surface.

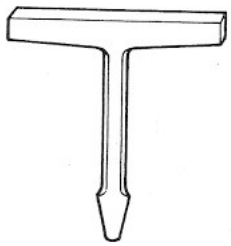
Wooden Mallet

Nylon Mallet

Trammel

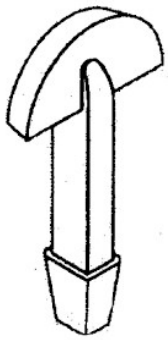


Standard Wire Gauge



Square Stake

Hatchet Stake



Half Moon Stake

Funnel Stake

Bench Shear Machine

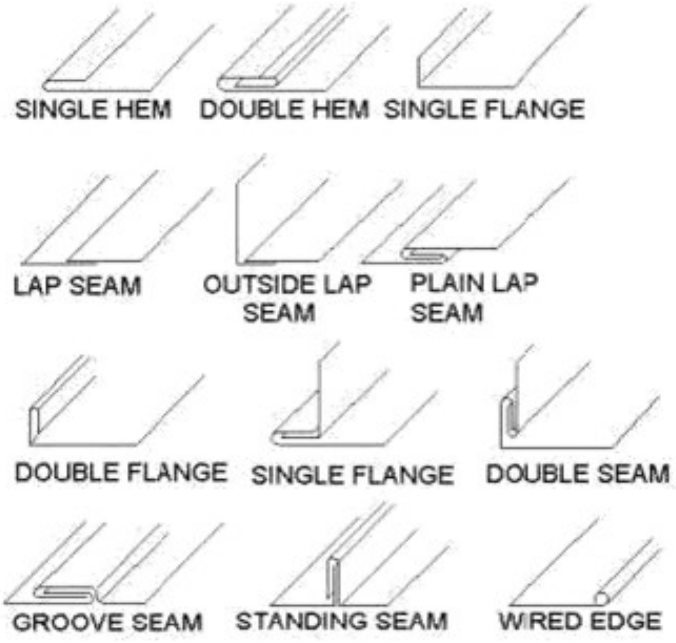
Straight Snip

Bent Snip

Bent Scriber

Straight Scriber

TYPES OF SEEMS AND FOLDED EDGES



SAFETY PRECAUTIONS:

- Never carry tools in pockets.
- Do not try to hold the sheets with bare hands.
- Do not remove any guards on squaring shears.
- Care should be exercised when working on squaring shears.
- Be sure that the fingers are away from the shearing blade.
- Never use a soldering iron a loose handle.
- Never touch a soldering Iron to see its hotness.
- The melting of solder indicates the correct temperature.
- Be careful when cutting out a pattern. Remove scrap metal to avoid injuries.

EXPERIMENT - 10
SHEET METALWORKING : OPEN SCOOP

AIM:

To prepare an Open Scoop using the given Sheet Metal

MATERIAL REQUIRED:

Aluminium Sheet, Size: 80 X 90 X 0.32 mm or 32 Gauge

TOOLS REQUIRED:

Strait Snip, Steel Rule, Scriber, Square Stake, Hatchet Stake, Wooden Mallet or Nylon Hammer and Try Square.

PROCEDURE:

1. Measurements confirm to drawing dimensions.
2. With the help of Steel rule, Scriber mark on the Sheet as per the Sketch.
3. Using the Straight Snip cut along marking whichever is not required.
4. Using the Nylon Hammer, Square Stake, Hatchet Stake, bending and forming of the sheet to form Open Scoop.
5. Using Straight Snip If any sharp edges on the final Open Scoop, cut and remove.

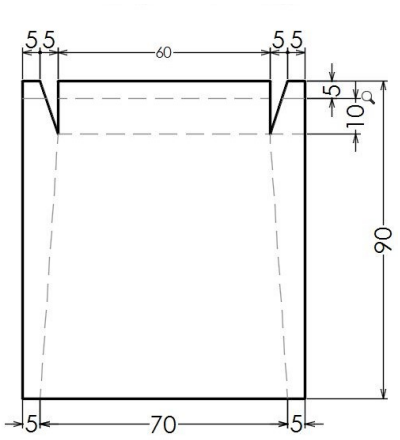
Precautions:

1. Wear Apron and Shoes whenever you are in the Lab.
2. Take care while handling the sheet metal piece, not to get injury by sharp edges.

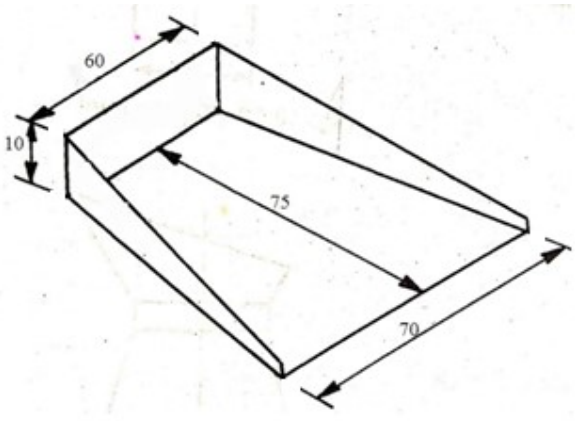
RESULT & CONCLUSION:

The Open Scoop is thus made by following the above sequence of operations.

DIAGRAM:



Open Scoop Development Drawing



Open Scoop

All dimensions are in mm

VIVA QUESTIONS:

1. What is scriber ?
2. What is thickness of G.I sheet ?
3. What is full form of G.I ?
4. What are the uses of soldering ?
5. What are the tools are required in sheet metal ?

EXPERIMENT - 11

SHEET METALWORKING: FUNNEL

AIM:

To prepare a FUNNEL using the given Aluminum Sheet

MATERIAL REQUIRED:

Aluminium Sheet, Size: 65 X 120 X 0.32 mm – 1 no., 40 X 60 X 0.32 mm -1 no.

TOOLS REQUIRED:

Straight Snip, Bent Snip, Steel Rule, Scriber, Circular Stake, Wooden Mallet or Nylon Hammer, Try Square, Divider, Protractor, Nose Plier.

PROCEDURE:

1. With the help of Steel rule check the dimensions of the given Sheet.
2. Mark the development of funnel by using steel rule, protractor, divider and scriber as per sketch on the given sheet.
3. Using the Straight Snip and Bent Snip cut along marking whichever is not required.
4. The development of the funnel after bending X & Y joint together for making funnel.
5. Cut and remove if any sharp edges on the final FUNNEL by using Straight Snip.
6. The joint is then soldered if required.

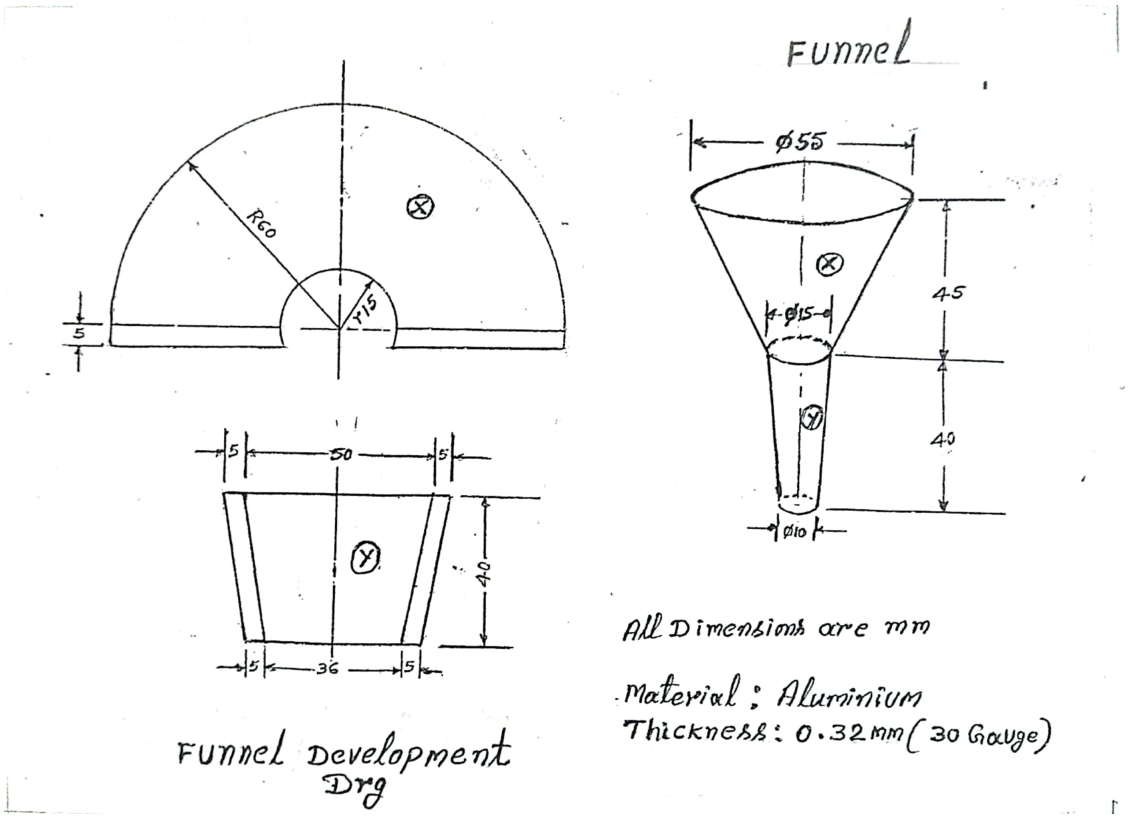
Precautions:

1. Wear Apron and Shoes whenever you are in the Lab.
2. Take care while handling the sheet metal piece, not to get injury by sharp edges.

RESULT & CONCLUSION:

The Funnel is thus made by following the above sequence of operations.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What are the tools are required in sheet metal ?
2. What is try square ?
3. What is wood mallet ?
4. What is thickness of G.I sheet ?
5. What is full form of G.I ?
6. What are the safety precautions are required in sheet metal section ?

EXPERIMENT - 12

SHEET METAL WORKING: RECTANGULAR TRAY

AIM:

To make a rectangular tray using the given sheet.

MATERIAL REQUIRED:

Aluminum Sheet of (120 X 156 X 0.30 mm)

TOOLS REQUIRED:

Steel Rule, Try Square, Divider, Scriber, Straight Snip, Mallet or Nylon Hammer, Square Stake, Hatchet Stake.

PROCEDURE:

1. The size of given sheet is checked with the steel rule.
2. The developed drawing of the tray is marked on the given sheet.
3. The unwanted material of the tray is cut by using the straight snip as shown in development.
4. Single hemming is made on the four sides of the tray by using stakes and nylon hammer.
5. The four sides of the tray are bent to 90°.

Precautions:

1. Do not try to hold the sheets with bare hands.
2. Be sure that the fingers are away from the shearing bend.
3. Markings should be done carefully.
4. Cutting should be done carefully to avoid cross cutting.

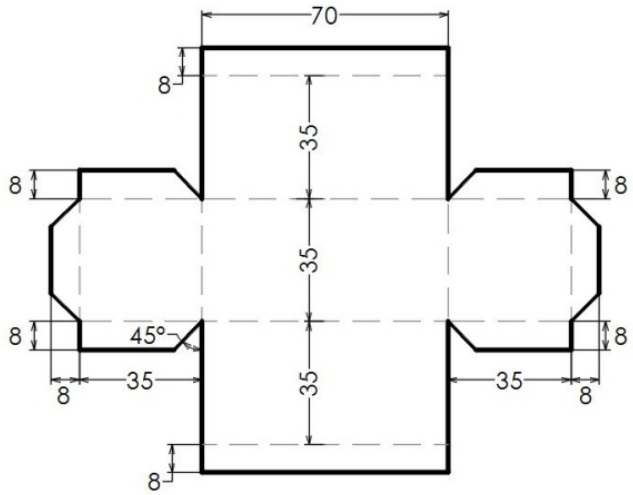
Note:

The single hemmed vertical edges of the tray can either be riveted or soldered to ensure stability of the joints.

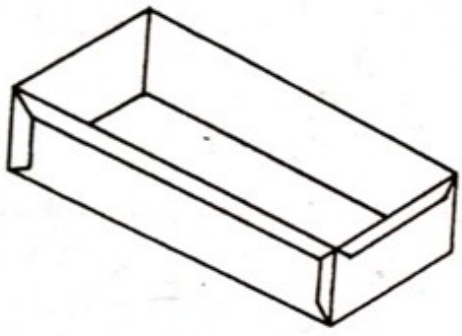
RESULT & CONCLUSION:

The rectangular tray is thus made, from the given sheet metal.

DIAGRAM:



Rectangular Tray Development drg.



Rectangula Tray

All dimensions are in mm

VIVA QUESTIONS:

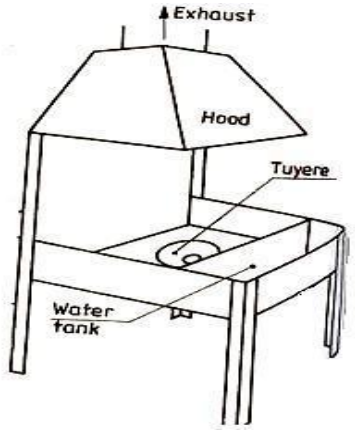
1. What are the tools are required in sheet metal ?
2. What is try square ?
3. What is wood mallet ?
4. What is thickness of G.I sheet ?
5. What is full form of G.I ?
6. What are the safety precautions are required in sheet metal section ?

SMITHY

INTRODUCTION

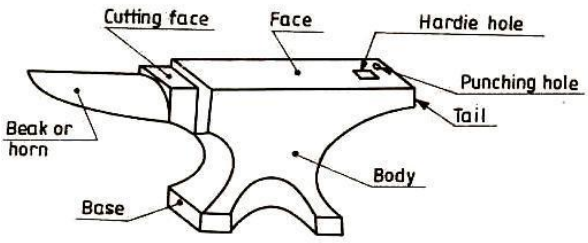
Smithy is one of the oldest metal working processes. It is defined as the shaping of a heated metal by hammering and pressing .In forging; metals are made plastic by heating them and deformed by hammering, while they are hot. This process is usually carried at above the recrystallisation temperature. Therefore it is regarded as hot working. It is also called as Black Smithy.

Forge or Hearth: - The forge or hearth is needed for heating metals. In this forges, metals are heated to plastic state for hammering them into desired shape.

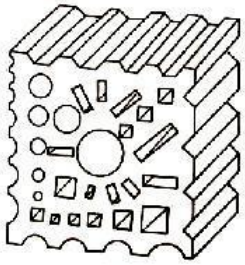


Smithy Forge

Anvil: The anvil is used for supporting the work while hammering they are made in different forms to provide the means for other forging operations. The usual form of anvil used in hand forging weighs up to 25 to 250 kgs. It has a round hole for bending rods and a square hole for holding square shanks of various tools such as swages, fullers etc. The body is made of mild steel and a strip of high carbon steel about20 mm thick is welded to its to provide hard face. Beak is used for bending metal to round shapes.



Swage block: -The swage block is generally made of cast iron or cast steel. It has grooves on faces and holes in the body. It is used as a support while forming different shapes and punching holes. It can also be used for finishing round, square and hexagonal forms.



Swage block

Sledgehammer

Sledgehammer: - The sledgehammers are heavy hammers used by smith helper. The various forms of sledgehammers weigh 3 to 8 kgs. The sledgehammer is specified by its weight.

Chisel: -The chisel are used for cutting steels and for nicking prior to breaking.

Hot chisel: - The hot chisel is used for cutting the metal when hot. The angle of cutting edges is about 30.

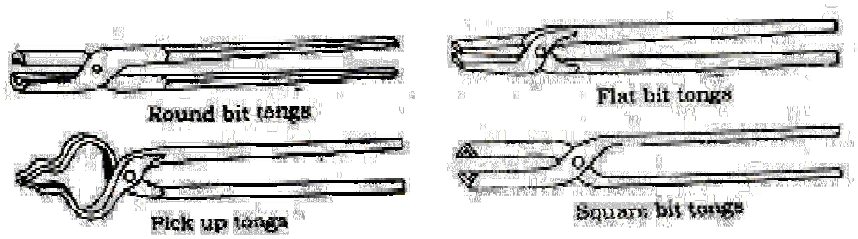
Cold chisel:-The cold chisel is used for cutting cold material .The angle of cutting edge is about 60.

Swages:-Swages are used for reducing and finishing the round square or hexagonal shapes. The top swage is provided with handle and the bottom swage with square shank, which is held in hardie hole.

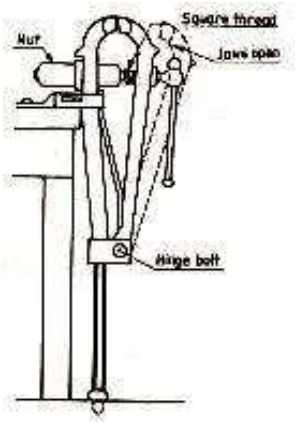
Fuller: -Fullers are used in pairs for necking or growing operations. These are made in various shape and sizes. The bottom fuller has square shank to fit in the hardie hole and top one is provided with handle

Flatters: -Flatters are used to obtain and smooth and finished flat surfaces. These are made of tool steel with flat faces

Tongs:-The metal to be forged must be held securely, while it is being shaped. A pair of tongs of suitable size and shape must be used for the purpose. They are made of mild steel and sizes vary from 40cmto 60cm in length and 6mm to 55mm opening.



Leg vice: - It is a heavy duty vice. It is mainly used for light forging and bending work..



Forging temperature of metals:

Type Material	**Forging Temperature**
Mild steel	750-1300° C
Wrought Iron	900-1300° C
Medium carbon steel	750-1250° C
High carbon &alloy steel	800-1150° C

Forging operations:-

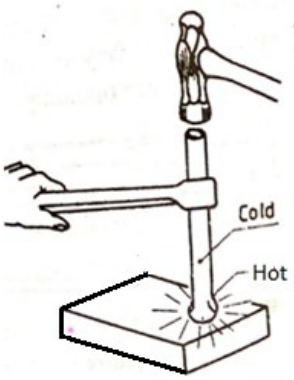
Drawing: -Drawing is the process of stretching the stock while reducing its cross section.

Upsetting:-It is the process of increasing the area of cross section

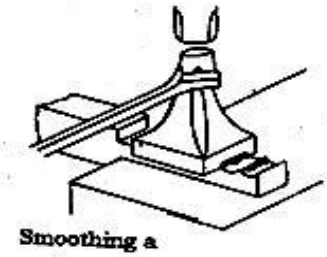
Fullering: -Fullers are used for necking down a piece of work.

Flattening: These are used for finishing flat surfaces.

Swaging : These are used to reduce and finish to round or hexagonal form.

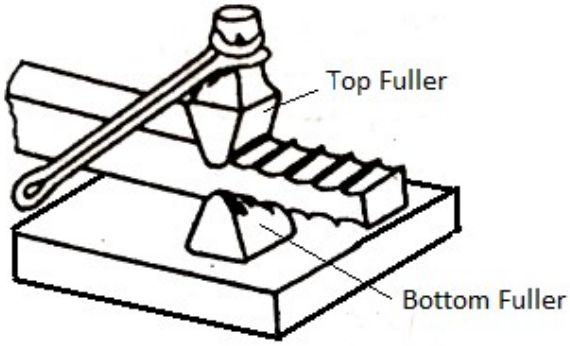


Up Setting



Smoothing a rough surface

Flattering



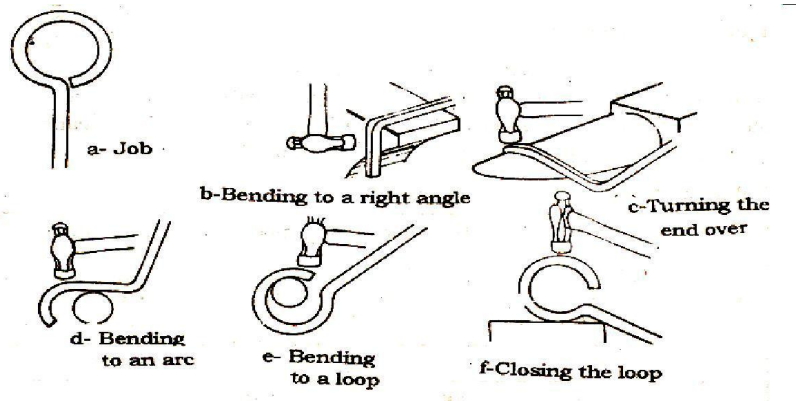
Fullering

Top and bottom swages

Swaging

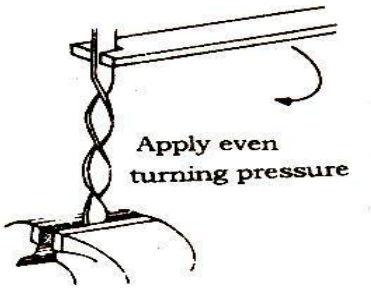
Bending:

Bending of bars, flats etc., is done to produce different types of bent shapes such as angles, circles and ovals etc.

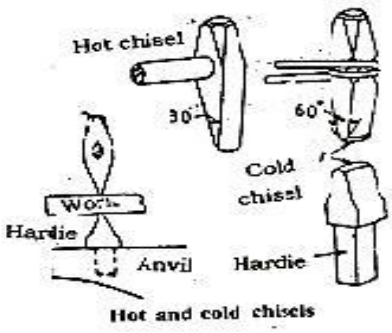


Bending

Twisting: It is also one of form of bending. It is done to increasing the rigidity of the work piece.



Twisting



Hot and cold chisels

Cutting: Chisels are used to cut metals, either in hot or cold state.

SAFETY PRACTICES

1) Use correct size and type of tongs when forging short work, otherwise the job will fly, causing injuries.
2) Hold the hot work, downwards close to the ground, while transferring from the forge to anvil, to minimise danger of burns, resulting from accidental collision with others.
3) Keep stray forgings off the floor.
4) Wear face shield when hammering hot metal.
5) Wear gloves when handling hot metal.
6) Protect the eyes from infrared rays from the hot object.
7) All hammers should be fitted with tight and wedged handles.

EXPERIMENT - 13

SMITHY: UP SETTING

AIM:

To perform UP SETTING operation on a given round rod by following hand forging operation.

MATERIAL REQUIRED:

M.S. Rod Ø10 x 100 mm long.

TOOLS REQUIRED:

Smith's Forge, Anvil, 1.5 kg Ball-Peen Hammer, Swage Block, Round Bit Tongs, Pick-Up Tongs and 5 kg Sledge Hammer.

PROCEDURE:

1. Half of the given mild steel rod is heated to a red hot condition in the smith forge.
2. Holding the rod with round bit tong and the rod is placed vertically on the anvil face.
3. By using the suitable sledge hammer, hammer on the other end so that the bottom end will get required flat by increasing in cross section of the rod at the end.

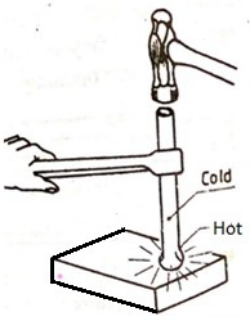
Precautions:

1. Always use suitable tongs to handle hot jobs. While carrying hot jobs by using tongs at ground level only.

RESULT & CONCLUSION:

By following above sequence of operations we performed UP SETTING experiment.

DIAGRAM:



Up Setting

VIVA QUESTIONS:

1. What is the name of fuel used in the smithy shop?
2. What is the purpose of drift in the smithy shop?
3. What is the difference between cold set and hot set (chisel)?
4. What is the purpose of fullers?
5. What is the purpose of flatter?
6. What is meant by black smithy?
7. What are the parts of a forge?

EXPERIMENT - 14

SMITHY: FULLERING

AIM:

To make a Fullering formation from a given M.S. Square Rod

MATERIAL REQUIRED:

Mild Steel Square Rod of 10 X 10 X 100 mm long

TOOLS REQUIRED:

Smith's Forge, Anvil, 5kg Sledge Hammer, Square Bit Tongs, Bottom Fuller, Top Fuller and Swage Block.

PROCEDURE:

1. Collect one Rod of given MS Sq. Rod and Heat it at one end in a Furnace.
2. Insert the bottom fuller in the hardie hole of the anvil.
3. Few minutes later the rod becomes reddish, then take out the square rod from furnace by using Square Bit Tong.
4. Locate the flat face of square rod on a bottom Fuller which is placed in the hardie hole.
5. Take top Fuller and keep on the other flat side of the square Rod, which is already located on a bottom fuller.
6. One should hold the fuller and other one collect the sledge hammer.
7. Use hammering as shown in fig to form fullering formation.

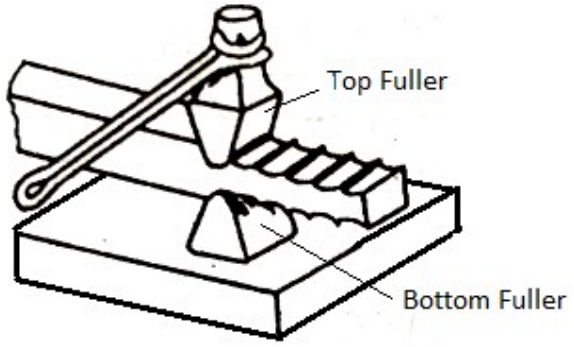
Precautions:

1. Always use suitable tongs to handle hot jobs. While carrying hot jobs by using tongs at ground level only.

RESULT & CONCLUSION:

By following above sequence of operations, Fullering Formation on a M.S Rod of Square Shape is performed.

DIAGRAM:



Fullering

VIVA QUESTIONS:

1. What is the name of fuel used in the smithy shop?
2. What is the purpose of drift in the smithy shop?
3. What is the difference between cold set and hot set (chisel)?
4. What is the range of forging temperature for mild steel?
5. Can you tell the names of at least 4 types of tongs
6. What is the name of supporting tool used in the smithy shop?

EXPERIMENT - 15

SMITHY: S-HOOK

AIM:

To make a S-hook from a given round rod, by following hand forging operation.

MATERIAL REQUIRED:

Mild Steel Rod Ø10 X 160 mm long

TOOLS REQUIRED:

Smith's Forge, Anvil, 1.5kg Ball-Peen Hammer, Flatters, Swage Block, Half-Round Tongs, Pick-Up Tongs and 5kg Sledge Hammer.

PROCEDURE:

1. One end of the bar is heated to red hot condition in the smith's forge for the required.
2. Using the pick-up tongs; the rod is taken from the forge, and holding it with the half round tongs, the heated end is forged into a tapered pointed end.
3. The length of the rod required for S-hook is estimated and the excess portion is cut off, using a cold chisel.
4. One half of the rod towards the pointed end is heated in the forge to red hot condition and then bent into circular shape as shown.
5. The other end of the rod is then heated and forged into a tapered pointed end.
6. The straight portion of the rod is finally heated and bent into circular shape as required.
7. Using the flatter, the S-hook made as above, is kept on the anvil and flattened so that the shape of the hook is proper.

Precautions:

1. Always use suitable tongs to handle hot jobs, while carrying hot jobs by using tongs at ground level only.

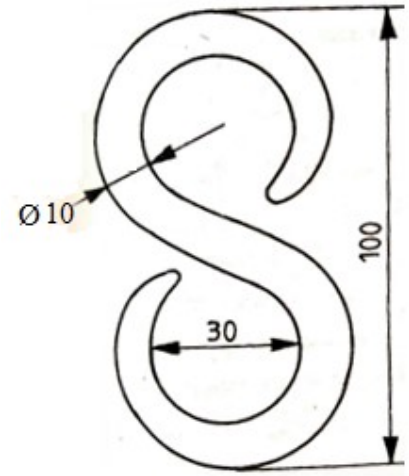
Note:

1. In-between the above stages, the bar is heated in the smith's forge to facilitate forging operations.

RESULT & CONCLUSION:

The S-hook is thus made from the given round rod; by following the stages mentioned above.

DIAGRAM:



S - Hook

VIVA QUESTIONS:

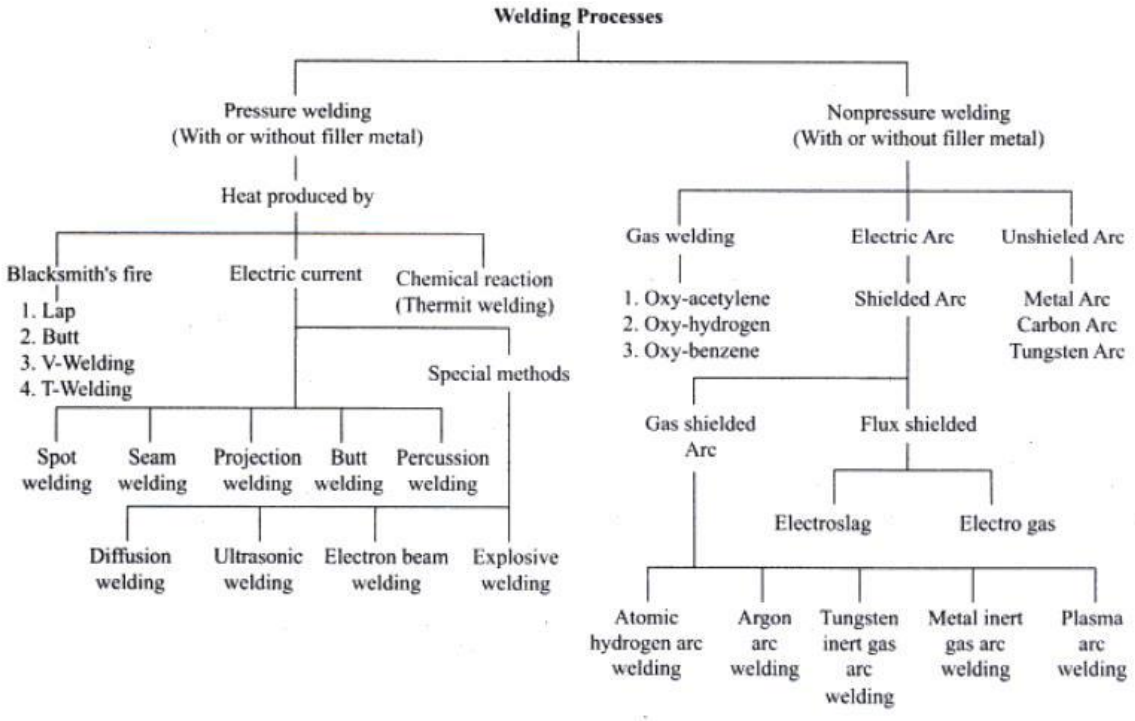
1. What is meant by black smithy?
2. What are the parts of a forge?
3. What is the range of forging temperature for mild steel?
4. Can you tell the names of at least 4 types of tongs
5. What is the name of supporting tool used in the smithy shop?

WELDING

INTRODUCTION

Welding is a process for joining two similar or dissimilar metals by fusion. It joins different metals/alloys, with or without the application of pressure and with or without the use of filler metal. The fusion of metal takes place by means of heat. The heat may be generated either from combustion of gases, electric arc, electric resistance or by chemical reaction.

Welding provides a permanent joint but it normally affects the metallurgy of the components. It is therefore usually accompanied by post weld heat treatment for most of the critical components. The welding is widely used as a fabrication and repairing process in industries. Some of the typical applications of welding include the fabrication of ships, pressure vessels, automobile bodies, off-shore platform, bridges, welded pipes, sealing of nuclear fuel and explosives, etc.



Most of the metals and alloys can be welded by one type of welding process or the other. However, some are easier to weld than others. To compare this ease in welding term 'weldability' is often used. The weldability may be defined as property of a metal which indicates the ease with which it can be welded with other similar or dissimilar metals.

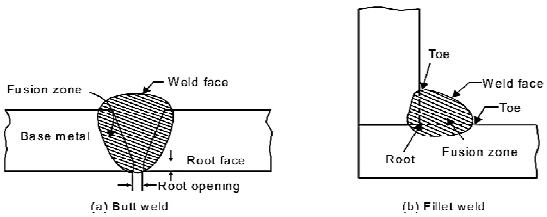


Fig. 17.1 Terminological elements of welding process

Edge preparations

For welding the edges of joining surfaces of metals are prepared first. Different edge reparations may be used for welding butt joints, which are given in Figure.

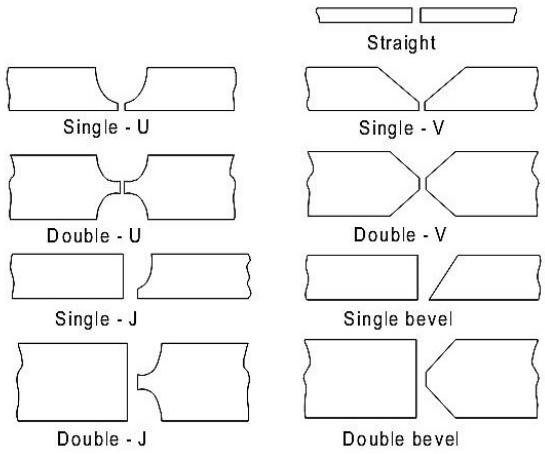
Welding joints

Some common welding joints are shown in Figure. Welding joints are of generally of two major kinds namely lap joint and butt joint. The main types are described as under

1. Lap Weld Joint

Single-Lap Joint

This joint, made by overlapping the edges of the plate, is not recommended for most work. The single lap has very little resistance to bending. It can be used satisfactorily for joining two cylinders that fit inside one another.



Double-Lap Joint

This is stronger than the single-lap joint but has the disadvantage that it requires twice as much welding.

Tee Fillet Weld

This type of joint, although widely used, should not be employed if an alternative design is possible.

2. Butt weld joint:

Single V- Butt Weld:

It is used for plates up to 15.8 mm thick. The angle of the vee depends upon the technique being used, the plates being spaced approximately 3.2 mm.

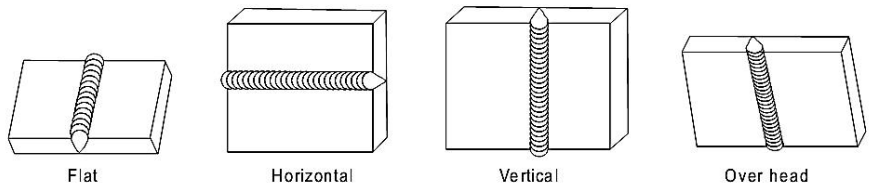
Double V- Butt Weld:

It is used for plates over 13 mm thick when the welding can be performed on both sides of the plate. The top vee angle is either 60° or 80°, while the bottom angle is 80°, depending on the technique being used.

Welding Positions

As shown in the below Fig., there are four types of welding positions, which are given as:

a. Flat or down hand position
b. Horizontal position
c. Vertical position
d. Overhead position



Flat or Down-hand Welding Position

The flat position or down hand position is one in which the welding is performed from the upper side of the joint and the face of the weld is approximately horizontal.

Horizontal Welding Position

In horizontal position, the plane of the workpiece is vertical and the deposited weld head is horizontal. This position of welding is most commonly used in welding vessels and reservoirs.

Vertical Welding Position

In vertical position, the plane of the work-piece is vertical and the weld is deposited upon a vertical surface. It is difficult to produce satisfactory welds in this position due to the effect of the force of gravity on the molten metal.

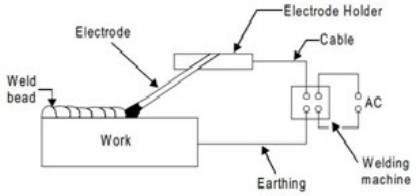
Overhead Welding Position

The overhead position is probably even more difficult to weld than the vertical position. Here the pull of gravity against the molten metal is much greater.

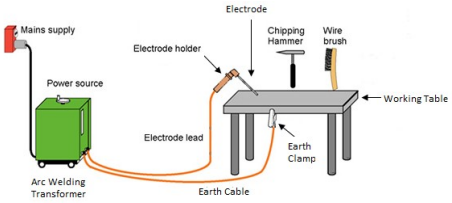
ARC WELDING PROCESSES

The process, in which an electric arc between an electrode and a work-piece or between two electrodes is utilized to weld base metals, is called an arc welding process. The basic principle of arc welding is shown in Figure. However the basic elements involved in arc welding process are shown in the figure.

Most of these processes use some shielding gas while others employ coatings or fluxes to prevent the weld pool from the surrounding atmosphere.



Basic Principle of Arc Welding



Arc Welding Equipment

Arc welding equipment, setup and related tools and accessories are shown in Figure. However some common tools of arc welding are shown separately through Figure. Few of the important components of arc welding setup are described as under.

1. Arc welding power source

Both direct current (DC) and alternating current (AC) are used for electric arc welding, each having its particular applications. DC welding supply is usually obtained from generators driven by electric motor or if no electricity is available by internal combustion engines. For AC welding supply, transformers are predominantly used for almost all Arc-welding where

mains electricity supply is available. They have to step down the usual supply voltage (200-400 volts) to the normal open circuit welding voltage (50-90 volts). The following factors influence the selection of a power source:

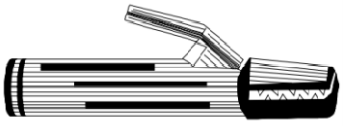
a. Type of electrodes to be used and metals to be welded
b. Available power source (AC or DC)
c. Required output
d. Duty cycle
e. Efficiency
f. Initial costs and running costs
g. Available floor space
h. Versatility of equipment

2. Welding cables

Welding cables are required for conduction of current from the power source through the electrode holder, the arc, the work piece and back to the welding power source. These are insulated copper or Aluminum cables.

3. Electrode holder

Electrode holder is used for holding the electrode manually and conducting current to it. These are usually matched to the size of the lead, which in turn matched to the amperage output of the arc welder. Electrode holders are available in sizes that range from 150 to 500 Amps.



4. Welding Electrodes

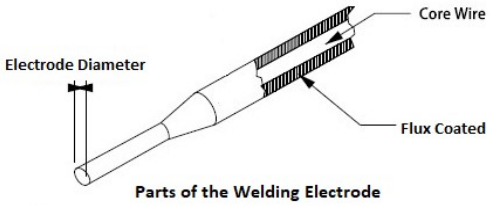
An electrode is a piece of wire or a rod of a metal or alloy, with or without coatings. An arc is set up between electrode and workpiece. Welding electrodes are classified into following types.

Consumable Electrode

1. Bare Electrode
2. Coated Electrode

Non-Consumable Electrode

1. Carbon or Graphite Electrodes
2. Tungsten Electrode



Parts of the Welding Electrode

Consumable electrode is made of different metals and their alloys. The end of this electrode starts melting when arc is struck between the electrode and work piece. Thus consumable electrode itself acts as a filler metal. Bare electrodes consist of a metal or alloy wire without any flux coating on them. Coated electrodes have flux coating which starts melting as soon as an electric arc is struck. This coating on melting performs many functions like prevention of joint from atmospheric contamination, arc stabilizers etc.

Non-consumable electrodes are made up of high melting point materials like carbon, pure tungsten or alloy tungsten etc. These electrodes do not melt away during welding. But practically, the electrode length goes on decreasing with the passage of time, because of oxidation and vaporization of the electrode material during welding. The materials of non-consumable electrodes are usually copper coated carbon or graphite, pure tungsten, thoriated or zirconiated tungsten.

5. Hand Screen

Hand screen used for protection of eyes and supervision of weld bead.

6. Chipping hammer

Chipping Hammer is used to remove the slag by striking.

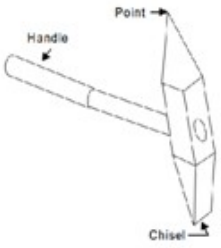
7. Wire brush

Wire brush is used to clean the surface to be weld.

8. Protective Clothing

Operator wears the protective clothing such as apron to keep away the exposure of direct heat to the body.

Earth Clamp



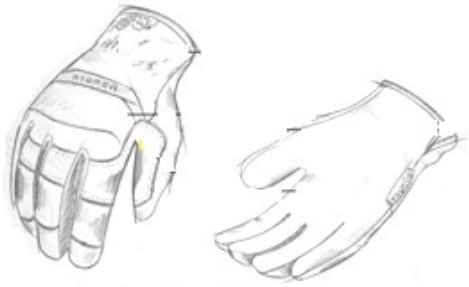
Chipping Hammer

Steel Wire Brush

Welding Face Shield /
Hand Shield

Welding Helmet / Head Shield

Iron Tong



Leather Hand Gloves

Safety Recommendations for ARC Welding

The beginner in the field of arc welding must go through and become familiar with these general safety recommendations which are given as under.

1. The body or the frame of the welding machine shall be efficiently earthed. Pipe lines containing gases or inflammable liquids or conduits carrying electrical conductors shall not be used for a ground return circuit All earth connections shall be mechanically strong and electrically adequate for the required current.
2. Welding arc in addition to being very is a source of infra-red and ultra-violet light also; consequently the operator must use either helmet or a hand-shield fitted with a special filter glass to protect eyes
3. Excess ultra-violet light can cause an effect similar to sunburn on the skin of the welder
4. The welder's body and clothing are protected from radiation and burns caused by sparks and flying globules of molten metal with the help of the following:
5. Gloves protect the hands of a welder.
6. Leather or asbestos apron is very useful to protect welder's clothes and his trunk and thighs while seated he is doing welding.
7. For overhead welding, some form of protection for the head is required
8. Leather skull cap or peaked cap will do the needful.
9. Leather jackets and 1ather leggings are also available as clothes for body protection.
10. Welding equipment shall be inspected periodically and maintained in safe working order at all times.
11. Arc welding machines should be of suitable quality.
12. All parts of welding set shall be suitably enclosed and protected to meet the usual service conditions.

EXPERIMENT - 16

WELDING: SINGLE V BUTT JOINT

AIM:

To make a Single ' V ' Butt Joint using the given two Mild Steel pieces by Arc Welding.

MATERIAL REQUIRED:

Mild Steel Pieces 50 X 50 X 5 mm – 2 no's

EQUIPMENTS & TOOLS REQUIRED:

Arc Welding Transformer (AC), MS Electrodes Ø 3.15mm,Electrode Holder, Ground Clamp, Hand Shield, Tongs, Leather Apron, Leather Gloves, Chipping Hammer, Steel Wire Brush, Steel Rule, Try Square, Work Bench and Rough File.

PROCEDURE:

1. The given MS pieces are thoroughly cleaned of rust and scale
2. One edge of each piece beveled, to an angle of 300, leaving nearly ¼ of the flat thickness, at one end.
3. The two pieces are positioned on the welding table such that they are separated slightly for better penetration of the weld.
4. The electrode is fitted in the electrode holder and the welding current is set to a proper value. (for MS Ø3.15mm Electrode - 120 Amps current)
5. The ground clamp is fastened to the welding table.
6. Wearing leather apron and using the face shield the arc is struck and holding the two pieces together tack welding is done on the two ends
7. Holding the electrode at an angle 450 to 700 to the surface to be welded, welding is done.
8. With uniform speed maintaining medium arc length, ensure that the weld material is deposited in the gap in between the work pieces in convex shape.
9. The slag formation on the weld is removed by using chipping hammer.
10. Brushing is done to clean the surface of the work piece by a Steel wire brush.

Precautions:

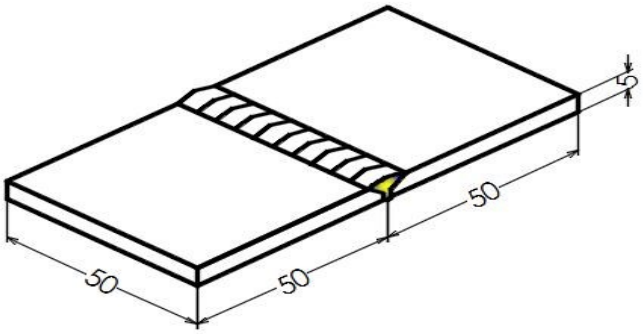
1. Inflammable and Combustible material are removed from welding area.
2. Ensure good electrical contact before starting the operation .

3. To hold the work pieces after welding use Iron Tong.
4. While welding hold the Hand Shield to protect Eyes and Face from the ''UV'' rays.

RESULT & CONCLUSION:

The Single V Butt Joint is thus made using the Tools and Equipment as mentioned above.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What is meant by welding?
2. What is the name of item coated over a welding rod?
3. What is the name of tool to remove the slag from welded portion?
4. What is meant by Butt welding?
5. What is the advantage of 'v' Butt joint?
6. What is the difference between welding and soldering?

EXPERIMENT - 17

WELDING: LAP JOINT

AIM:

To make a Lap Joint using the given two M.S. pieces by Arc Welding.

MATERIAL REQUIRED:

Mild Steel Pieces 50 X 50 X 5 mm – 2 no's

EQUIPMENTS & TOOLS REQUIRED:

Arc Welding Transformer (AC), Mild Steel Welding Electrodes Ø 3.15mm, Electrode Holder, Ground Clamp, Hand Shield, Iron Tongs, Leather Apron, Leather Hand Gloves, Chipping Hammer, Steel Wire Brush, Steel Rule, Try Square, Work Bench and Flat File.

PROCEDURE:

1. The given M.S. pieces are thoroughly cleaned of rust and scale.
2. The work pieces are positioned on the welding table to form a Lap Joint with required over lapping.
3. The electrode is fitted in an electrode holder and the welding current is set to a proper value. (for Ø3.15mm M.S. electrode - 120 amps current).
4. The ground clamp is fastened to the welding table.
5. Wearing the leather apron, using the face shield and holding the over lapped pieces, the arc is struck and the work pieces are tack welded at the ends of both the sides.
6. Welding is carried out throughout the length of the Lap joint, on both the sides.
7. The slag formation on the welds is removed by using the chipping hammer.
8. Brushing is done to clean the surfaces of the work pieces by steel wire brush.

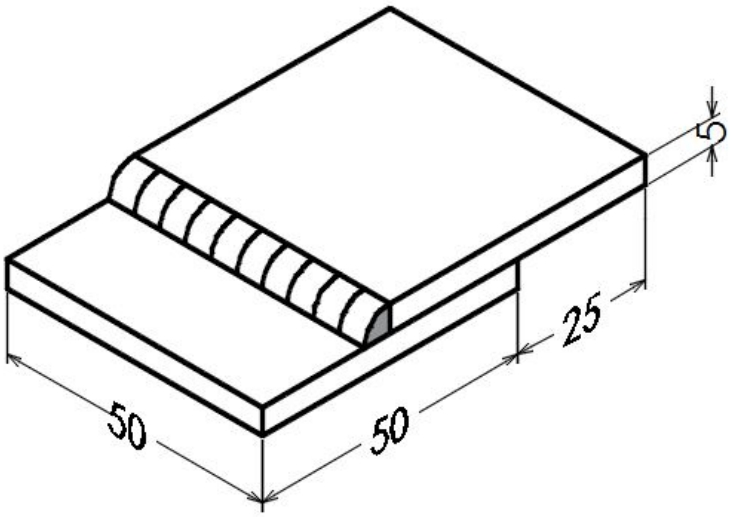
Precautions:

1. Inflammable and Combustible material are removed from welding area.
2. Ensure good electrical contact before starting the operation.
3. To hold the work pieces after welding use Iron Tong.
4. While welding hold the Hand Shield to protect Eyes and Face from the ''UV'' rays.

RESULT & CONCLUSION:

The Lap Joint is thus made using the Tools and Equipment as mentioned above.

DIAGRAM:



All dimensions are in mm

VIVA QUESTIONS:

1. What is meant by welding?
2. What is the name of item coated over a welding rod?
3. What is the difference between welding and soldering?
4. What are the accessories used in the welding shop?
5. Name the main tools used in the welding shop?
6. What type of transformer is used in welding shop?
7. What are the safety precautions to be followed in welding shop?

EXPERIMENT - 18

WELDING: CORNER JOINT

AIM:

To make a Corner Joint using the given two M.S. pieces by Arc Welding.

MATERIAL REQUIRED:

Mild Steel Pieces 50 X 50 X 6 mm – 2 no's

EQUIPMENTS & TOOLS REQUIRED:

Arc Welding Transformer (AC), Mild Steel Welding Electrodes Ø 3.15mm, Electrode Holder, Ground Clamp, Hand Shield, Iron Tongs, Leather Apron, Leather Hand Gloves, Chipping Hammer, Steel Wire Brush, Steel Rule, Try Square, Work Bench and Flat File.

PROCEDURE:

1. The given M.S. pieces are thoroughly cleaned of rust and scale.
2. The work pieces are positioned on the welding table such that, the L-shape (90˚) is formed.
3. The electrode is fitted in an electrode holder and the welding current is set to a proper value. (for Ø3.15mm M.S. electrode-120 amps current)
4. The ground clamp is fastened to the welding table.
5. Wearing the leather apron, using the face shield, the arc is struck and the work pieces are tack welded at both the ends and at the center of the joint.
6. The alignment of the corner joint is checked with try square and tack welded pieces are reset if required.
7. Welding is carried out throughout the length of the Corner joint.
8. The slag formation on the welds is removed by using the chipping hammer.
9. Brushing is done to clean the surfaces of the work pieces by steel wire brush.

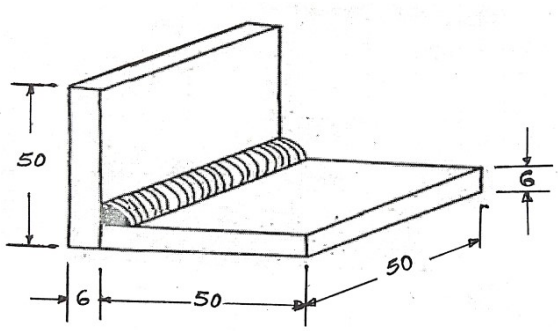
Precautions:

1. Inflammable and Combustible material are removed from welding area.
2. Ensure good electrical contact before starting the operation.
3. To hold the work pieces after welding use Iron Tong.
4. While welding hold the Hand Shield to protect Eyes and Face from the ''UV'' rays.

RESULT & CONCLUSION:

The Corner Joint is thus made using the Tools and Equipment as mentioned above.

DIAGRAM:



Corner Joint

All dimensions are in mm

VIVA QUESTIONS:

1. What is meant by welding?
2. What is the name of item coated over a welding rod?
3. What is the name of tool to remove the slag from welded portion?
4. What is meant by Butt welding?
5. What is the advantage of 'v' Butt joint?
6. Name the main tools used in the welding shop?
7. What type of transformer is used in welding shop?
8. What are the safety precautions to be followed in welding shop?

PLUMBING

INTRODUCTION

Plumbing is a skilled trade of working with pipes or tubes and plumbing fixtures. The process is mainly used for the supply of drinking water and the drainage of waste water, sometimes mixed with waste floating materials in a living or working place. A plumber is someone who installs or repairs piping systems, plumbing fixtures and equipment such as valves, washbasins, water heaters, water closests, etc. Thus it usually refers to a system of pipes and fixtures installed in a building for the distribution of water and the removal of waterborne wastes.

The latin word plumbum, means metal lead pipe, is the origin for developing the term plumbing. Plumbing process was originated during the ancient civilizations such as the greek, Roman, Persian, Indian and Chinese civilizations as they developed public baths and needed to provide potable water, and drainage of wastes carried by water.

PIPES AND THEIR JOINTS:

Pipes are manufactured by using different types of materials like Steel, Cast Iron, Galvanized Iron, Brass, Copper, Aluminum, Lead, Plastic, Concrete, Asbestos, etc. They are usually classified according to the material. They are also grouped as cast, welded, seamless, extruded, etc. For conveying large quantity of water, cast iron, steel or concrete pipes having large diameter are usually used. Galvanized Iron pipes (GI pipes) are popular for medium and low pressure water supply lines.

Plastic pipes are preferred for household uses at low pressure. Pipes are generally specified by their inner diameter (Nominal diameter specified in inches). Hence, the pipe fitting size is also based on this dimension. But for plastic pipes, this rule is not strictly followed because threading is not usually required for them. For engineering uses, along with the nominal diameter, the pipe thickness is also specified as light, medium or heavy.

TYPES OF PIPE JOINTS:

According to the pipe material, size and application, different methods are used to join pipes. The most common types of pipe joints are:

1. Screwed pipe joint – For GI Pipes
2. Welded pipe joint – for Steel, Copper, Aluminum and Lead pipes
3. Flanged pipe joint – for Cast Iron and Steel pipes
4. Soldered pipe joint – for Brass and Copper tubes
5. Glued or Cemented pipe joint – for PVC pipes

Pipes made of iron (GI Pipes) and brass of small and medium diameters (10 mm to 100 mm) are usually joined by screwing the pipe specials with internal or external threads. Welding is used to make permanent joint of medium and large diameter steel pipes. Flanged pipe joints are common in medium and large diameter pipes of cast iron and steel, along with rubber/CAF (Compressed asbestos fibre) gaskets. The flanged are screwed to the pipe for smaller diameter but made integral for large diameters. Pipes of copper and brass are usually joined by soldering.

PVC (poly Vinyl Chloride) pipe is the most popular choice in plastic group. It is rigid and uses thread and solvent weld (glue) connections. It also can be heat fused. PVC pipes are available in various pressure ratings for water supply, and is a very choice for landscape irrigation. The reasons for the popularity are the economy, no corrosion and easiness to work. CPVC is a different type of plastic, which has an extra chlorine atom in the compound, can be used for the hot water supply, and in industry.

To join plastic pipes, gluing or cementing method is used. Solvent cement is the gluing material and it partially melts the surface of the plastic pipe to make the joint. As the glue evaporates within two minutes, a strong joint is obtained. Screwed pipe fittings, (pipe specials) are removable or temporary pipe connections which permit necessary dismantling or reassembly for the purpose of installation, maintenance, cleaning, repair, etc. The functions of pipe fittings can be broadly classified as:

1. To join two or more pipe lines together
2. To effect change in diameter or direction
3. To close the end of a pipe line

The most common types of screwed pipe fittings used in galvanized iron (GI) pipe lines and plastic (PVC) pipe lines are shown in Figure. A brief description of these fittings is given below

1. **Coupler (coupling)**: Two pipe lines of equal diameter and in axial alignment can be joined by a coupler (coupling). It is a short sleeve with internal thread.
2. **Reducer coupler (Reducer coupling):** This is a coupler to join two pipe lines of different diameters in axial alignment.
3. **900 Elbow**: This is a pipe special used or effecting abrupt change in direction through 90°. Internal threads are provided on both ends. An elbow brings twice the head loss than a bend.
4. **900 Reducer Elbow**: This is an elbow with outlet diameter less than that of inlet diameter It is used to join two pipe lines having different diameters and meeting at right angle.
5. **Bend:** This is a pipe special used to effect gradual change in direction (usually 90°).The two ends of the bend are externally threaded.
6. **Return hand:** This bend is used to return the direction of pipe line through 180°.The ends are internally threaded for fitting the pipe lines.
7. **Tee:** This pipe special is used to make a branch connection of same diameter to the main pipe line at right angle. A Tee is internally threaded and it connects three ends of pipes.
8. **Reducer Tee:** This is a pipe special similar to Tee used to take a branch connection of reduced diameter from the main pipe line.
9. **Cross:** This pipe special is used to take two branch connections at right angles to the main pipe line. The threads are provided internally.
10. **Close nipple:** A nipple is a short straight piece of pipe with external thread on both ends. A close nipple is the shortest one of this category with external thread for the full length. They are used to join two internally threaded pipe specials and valves.
11. **Short nipple:** A short nipple has the same shape and function of a close nipple, but it has a short unthreaded portion at the middle of its length for gripping.
12. **Short nipple with hexagonal grip:** This nipple has an additional hexagonal nut shape at the middle portion for easy screwing with spanner. It is similar to an ordinary short nipple, except that difference.
13. **Hose nipple:** A hose nipple is used to connect a hose (flexible pipe-usually plastic or rubber) to a pipe line. One end of the hose-nipple has a stepped taper to fit the hose, while other end has thread. A hexagonal nut shape is given to the middle portion for gripping with a spanner.

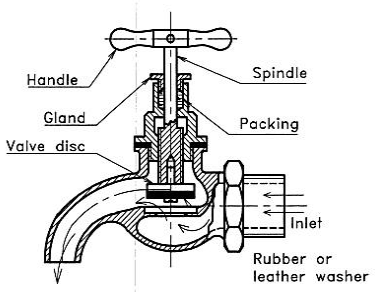
14. **Male Plug:** A male plug is used to close an internally threaded end of a pipe line or pipe special. It has external thread and a grip of square shape at the end.
15. **Female Plug (Cap):** A female plug is used to close an externally thread end of a pipe or pipe special. It has internal thread and a grip of square shape at the end.
16. **Screwed Union:** II consists of three pieces as shown in the drawing. The two end pieces have internal threads at their ends which are connected to the pipe ends. The central hexagonal (or octagonal) piece (union nut) has internal thread at one end and a collar at the other end. After the end pieces are screwed on to the pipes, the central piece (union nut) is tightened to draw the end pieces together to get a water tight joint.
17. **Flange:** This is a disc type pipe special having threaded hole at the centre for screwing to the externally threaded end of a pipe line. It will have holes around the central hole at equal angular spacing (3, 4, 6f or 8 Nos.) for joining to another similar flange or flat surface using bolt or stud. Example for the use of various pipe fittings in pipe line is given in Figure below.

VALVES AND METERS

Valves are used in piping systems to control or stop the flow of liquid or gas. The most common types of valves used in low pressure water pipe line are:

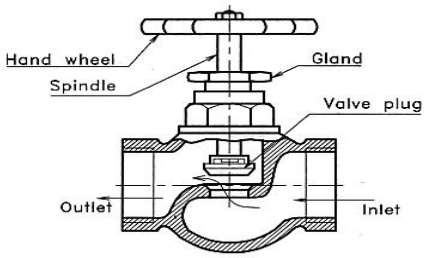
1. Water tap
2. Water cock
3. Globe valve
4. Gate valve
5. Ball valve
6. Non-return valve
7. Foot valve

WATER TAP



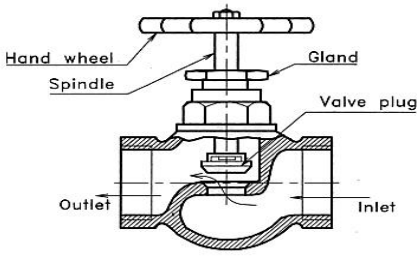
To collect water from low pressure pipe line, water tap (screw-down valve) is commonly used. Figure gives the cross section of the tap. Its leather or rubber faced valve disc is lifted or lowered by rotating the spindle. Brass or gun-metal is the material used for the valve body and the size is specified by the pipe to which it is fitted, usually ranging from 10 mm to 25 mm.

WATER COCK



This is the simplest and smallest form of a valve in which a conical plug called cock is inserted into a conical hole having a matching taper. A rectangular hole is provided at the centre across the conical potion so that, in one position it permits flow of water as shown in Figure. A half turn of the handle will bring the solid portion of the cock to the water ways preventing the flow. Cocks are used for low rate of water flow' or for tapping pressure line.

GLOBE VALVE



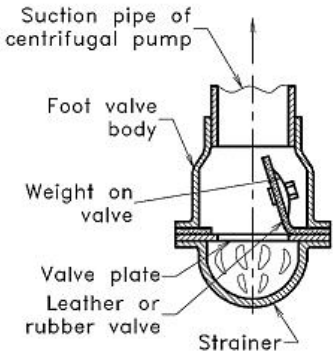
Globe valves are used as control valves in fluid (gas and liquid) pipe lines. Figure shows the simplest and smallest type of globe valve used in water pipe lines. Basically, the valve is a variable opening flow device. The design of a globe valve also creates a slight retardation to the flow because the fluid is forced to make a double turn and passes through the opening at 90° to the axis of the pipe. The valve plug is raised or lowered to stop or regulate the flow through a circular opening. A globe valve can be identified by the spherical body and the arrow mark for the direction of flow. These valves are used in water pipe lines from 12 mm to 100 mm or even larger diameter for the flow control purpose.

GATE VALVE:

A Gate valve is on-off type valve. It allows a straight-line movement of fluid and offer very little resistance to the flow in fully opened position. The central disc moves completely out of the passage and leaves a full opening. Figure shows a simple type of gate valve partially opened in position. These valves are very widely used in water pipe lines of diameter ranging from 12 mm to higher values. A gate valve can be identified by its slim body. It is to be noted that there will be no arrow mark or the body of valve because it can be used in both ways.

FOOT VALVE:

Foot valve is a kind of non-return valve used in centrifugal pumps. It is fitted at the bottom most end of the suction pipe (Foot) to stop flow in the downward direction for priming purpose. The strainer restricts the entry of floating materials to the pipe line. Figure gives the details of the foot valve. The material used may be cast iron, brass, or PVC.



EXPERIMENT - 19

PLUMBING: EXTERNAL PIPE THREADING

AIM:

To cut the threads at the end of a given pipe.

MATERIAL REQUIRED:

1/2″ GI Pipe, 1/2″ GI socket.

TOOLS REQUIRED:

Pipe Vice, Pipe Threading Die with Die Stock, Cutting Oil, Hack Saw, Spanners, Pipe and Wrenches.

PROCEDURE:

1. The given pipe is securely clamped in the pipe vice.
2. Proper size of the die is selected and inserted into the Die stock.
3. The die is positioned at the end of the pipe and pressure is applied, die is slowly turned.
4. Once the threading is started, the cutting oil is applied and continued to turn the die into the pipe till one thread projects through the die.
5. While threading, the stock is turned back and forth frequently, to loosen the chips.
6. After threading the check with 1/2” Socket.

RESULT & CONCLUSION:

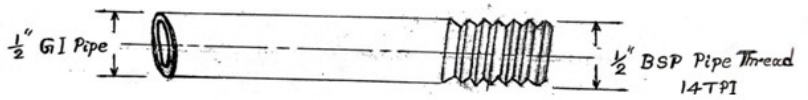
Threads are cut at the end of the given pipe, by following the above sequence of operations.

Size of the Pipe: 1/2” GI Pipe

Size of the Threading: 1/2” BSP, 14 TPI

(GI: Galvanized Iron; BSP: British Standard Pipe Threading; TPI: Thread per Inch).

DIAGRAM:



External Pipe Threading

VIVA QUESTIONS:

1. What are tools are required in plumbing section ?
2. What is pipe vice?
3. What is coupling ?
4. What is bush ?
5. What is elbow ?
6. What is pipe wrench ?
7. What are safety precautions required in plumbing section ?

EXPERIMENT - 20

PLUMBING: SHOWER CONNECTION

AIM:

To make shower connection.

MATERIAL REQUIRED:

1/2" GI Pipe, 1" GI Pipe, 1/2" GI Elbow, 1/2" GI coupling, 1/2" Tee, 1/2" Union, 1/2" Ball valve, 1/2" shower and reducer 1/2" by 1".

TOOLS REQUIRED:

Pipe Vice, Pipe Threading Die with Die Stock, Cutting Oil, Hack Saw, Spanners, Pipe and Wrenches.

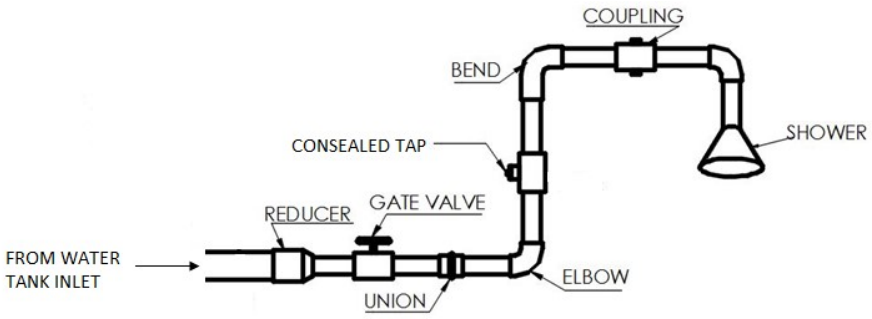
PROCEDURE:

1. The given 1/2" GI Pipe and 1" GI pipes are cut to the required length using the hacksaw and make threads on the pipes both the sides with die stock.
2. The die set is withdrawn from the pipe by rotating the threading die in counter and clockwise direction.
3. The quality of the threads is checked by 1/2" and 1" GI sockets.
4. After completing of threading all the pipes are tightened in to the sockets , reducer and shower by using Pipe Vice and Pipe Wrenches.(for joining of pipes use Taflon Tape to avoid leakage).

RESULT & CONCLUSION:

The Shower Connection is made as per the above procedure.

DIAGRAM:



VIVA QUESTIONS:

1. What are tools are required in plumbing section ?
2. What is pipe vice?
3. What is coupling ?
4. What is bush ?
5. What is union and nipple ?
6. What is gate valve?
7. What is tee ?
8. What is elbow ?

EXPERIMENT - 21

PLUMBING: TAP CONNECTION

AIM:

To make Tap connection.

MATERIAL REQUIRED:

1/2" GI Pipe, 1" GI Pipe, 1/2" GI Elbow, 1/2" GI coupling, 1/2" Tee, 1/2" Union, 1/2" Ball valve, 1/2" shower and reducer 1/2" by 1".

TOOLS REQUIRED:

Pipe Vice, Pipe Threading Die with Die Stock, Cutting Oil, Hack Saw, Spanners, Pipe and Wrenches.

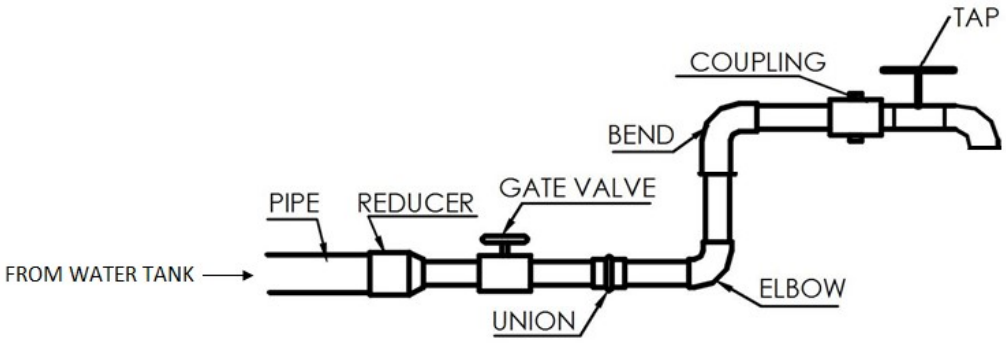
PROCEDURE:

1. The given 1/2" GI Pipe and 1" GI pipes are cut to the required length using the hacksaw and make threads on the pipes both the sides with die stock.
2. The die set is withdrawn from the pipe by rotating the threading die in counter and clockwise direction.
3. The quality of threads is checked by 1/2" and 1" GI sockets.
4. After completing of threading all the pipes are tightened in to the sockets, reducer and Tap by using Pipe Vice and Pipe Wrenches. (for joining of pipes use Taflon Tape to avoid leakage).

RESULT & CONCLUSION:

The Tap Connection is made as per the above procedure.

DIAGRAM:



VIVA QUESTIONS:

1. What are tools are required in plumbing section ?
2. What is pipe vice?
3. What is coupling ?
4. What is bush ?
5. What is union and nipple ?
6. What is gate valve?
7. What is tee ?
8. What is elbow ?
9. What is pipe wrench ?
10. What are safety precautions required in plumbing section ?

(PART-B)

IT WORKSHOP

INTRODUCTION

AIM: Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition. (To identify the peripherals of a computer, assemble and disassemble the system).

Software Requirement: No Software Required.

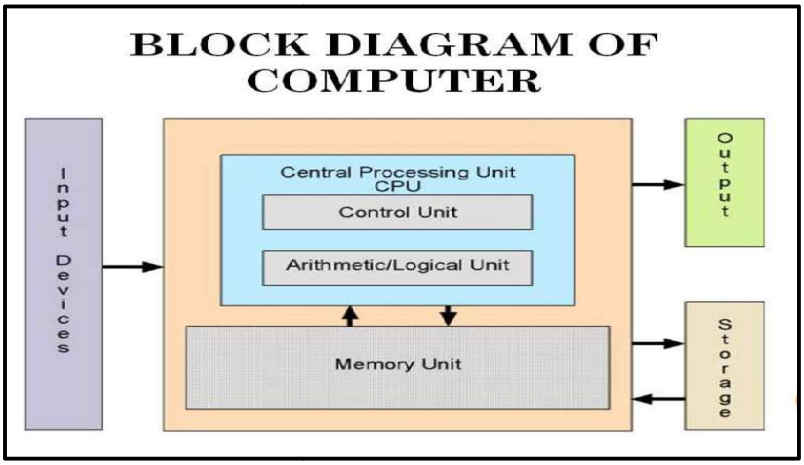
Hardware Requirement: Desired Configuration for the above task is

1. System unit
2. CPU
3. Mother Board
4. FDD
5. CD ROM Drive
6. HDD
7. Ethernet Card
8. Monitor, Keyboard, Mouse & Speakers

Safety Precautions:

1. Beware of electrostatic discharge (ESO)
2. Build computer on a hard surface, away from concepts.
3. Wear shoes and the short sleeved cotton wear.
4. Use Phillips, head screw driver.
5. Keep the components away from moisture.
6. Avoid using pressure while installing.

BLOCK DIAGRAM OF COMPUTER



PERIPHERALS OF A COMPUTER:

1. Cabinet:

It is used to install all hardware devices like (mother board, SMPS,HDD, CD Rom, FDD). It has Start, Restart Button, Led's, Audio and USB Connecters are available at front side.

2. Monitor:

Monitor of a computer is like a television screen.

It displays text characters and graphics in colors or in shades of grey.

The monitor is also called as screen or display or CRT (cathode ray tube). In the monitor the screen will be displayed in pixels format

i. 800 by 600 pixels

ii. 1024 by 768 pixels

3. Key Board:

Key board is like a type writer, which contains keys to feed the data or information into the computer.

Keyboards are available in two modules. These are

- Standard key board with 83-88 keys
- Enhanced key board with 104 keys or above

4. Mouse:

Every mouse has one primary button (left button) and one secondary button (right button). The primary button is used to carry out most tasks, where as secondary button is used in special cases you can select commands and options.

5. Printer:

A device that prints images (numbers, alphabets, graphs, etc…) on paper is known as Printer. We have different types of printers to take printouts. These are as follows:

i. Dot matrix printer

ii. Inkjet printer

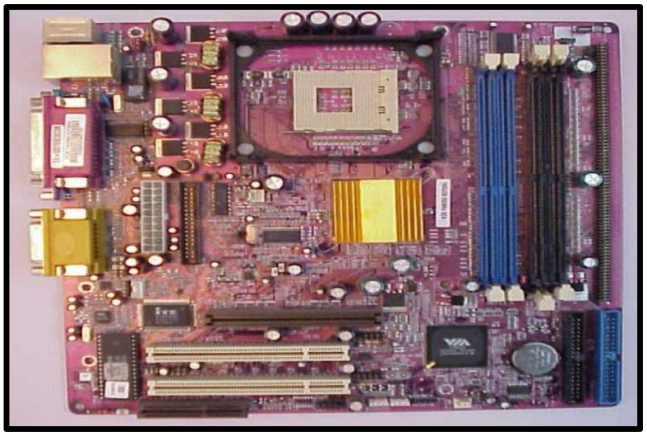
6. Speakers:

Speakers make your system much more delightful to use entertain you while you are working on computer

7. Scanner: Scanner used to scan images and text.

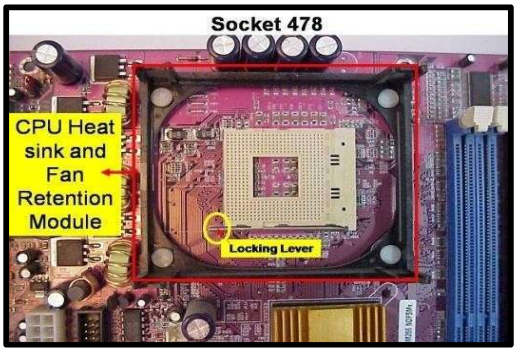
8. System board/Motherboard

- This is the major part of the PC hardware
- It manages all transactions of data between CPU peripherals.
- which holds the Processor, Random Access Memory and other parts, & has slots for expansion cards
- It is rectangle shape



9. Socket 478:

- It use 478 – PIN MICROPGA package it is used installing CPU It is square type design.

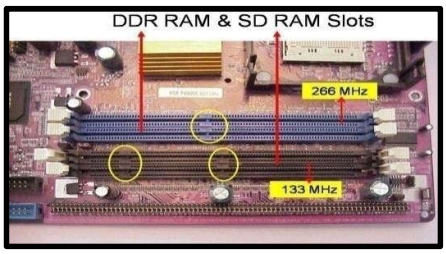


10. CPU

- The central processing unit contains the heart of any computer, the processor. The processor is fitted on to a Mother Board. The Mother Board contains various components, which support the functioning of a PC.
- It is brain of the computer
- It is square shape

11. Ram Slots:

- Ram slots are used to install the rams
- It is large rectangle shape and each ending has small clips.
- There two type ram slots
- SD Ram ----------Two Gaps (synchronous DRAM) is a generic name for various kinds of dynamic random access memory (DRAM) that are synchronized with the clock speed that the microprocessor is optimized for. This tends to increase the number of instructions that the processor can perform in a given time.
- DDR Ram----------One Gap (Double Data Rate Synchronous DRAM: A clock is used to read data from a DRAM. DDR memory reads data on both the rising and falling edge of the clock, achieving a faster data rate.)



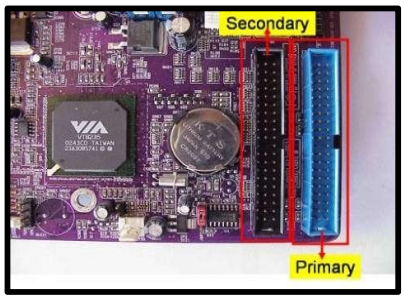
12. North Bridge:

- It is also called as controller
- It is nearby socket 478
- It placed middle of the mother board
- It converts electronic signals to binary values and binary values to electronic signals

13. CMOS Battery:

- Computer is using a coin shape battery
- It generates the clock signal and it manage system continues time.

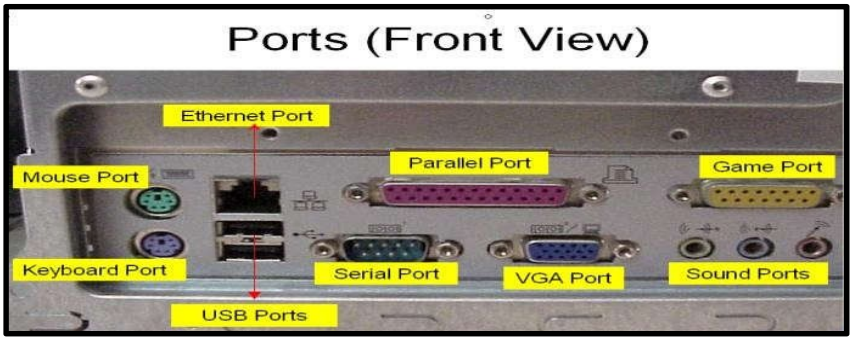
14. Primary & Secondary (IDE-1 & IDE-2):



- It is also called as IDE-1, IDE-2.
- It used to connecting Hard Disk Drive, CD ROM, DVD ROM.

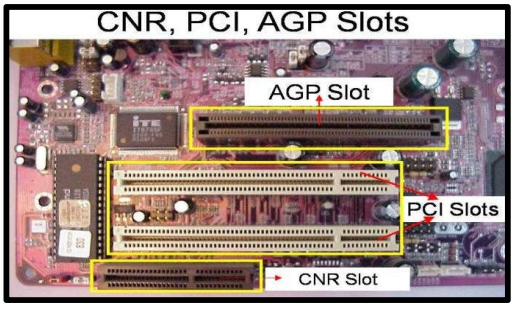
15. Input & Output ports:

- IO ports are used to connecting IO device such as key boards, mouse, monitor, printer, scanner, speakers etc...



16. AGP Slot & AGP Card:

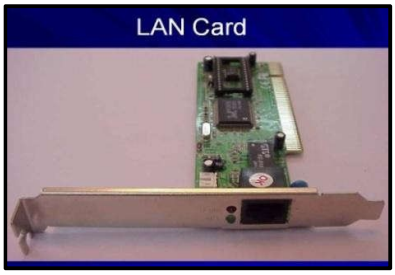
- AGP Slot is used install the AGP card.
- AGP back view same as VGA port (15-female pins) and used to connecting the monitor's c. This slot is above PCI slots and its color is Black or Brown



17. CI Slots &PCI (Expansion) Cards:

- PCI slots are used to install the PCI cards such as

i. LAN (Ethernet) Card---Back view Ethernet port



ii. Sound Card- Back view Audio pin connectors)

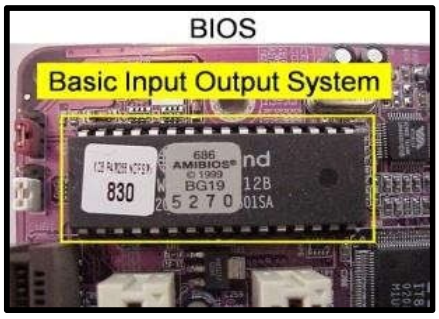
iii. TV Tuner (Internal) Card - Dish Pin connecter

iv. PCI Slots are white or yellow color

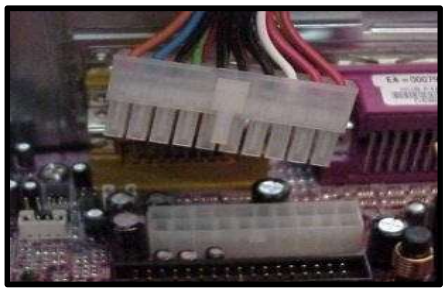
v. PCI Card has Single gap only

18. BIOS Chip:

- BIOS controls how the operating system and hardware wok together
- BIOS identification is BIOS name is available on chip or mother board

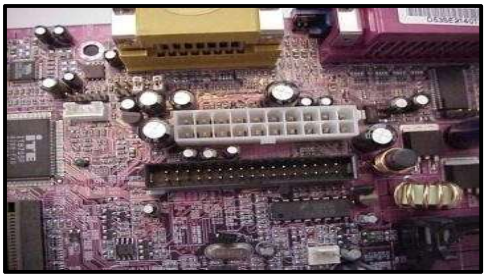


19. ATX Power connecter:



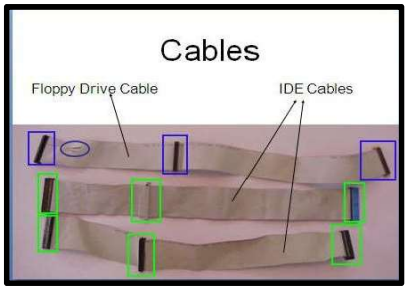
- ATX power connecter is used to connect ATX power plug (This is from SMPS)
- It is white color and it has ATX Name is available on Mother Board
- ATX Power connecter has 20/24 pins available.
- Typical ATX 1.3 power supply. From left to right, the connectors are 20-pin motherboard, 4-pin "P4connector", fan RPM monitor (note the lack of a power wire), SATA power connector (black), "Molex connector" and floppy connector.

20. Floppy connecter:



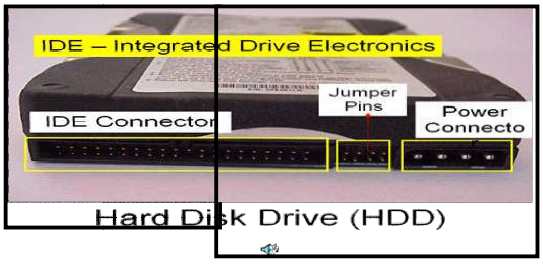
- Floppy connecter is used to connect Floppy Disk Drive.
- This is beside of ATX power connecter and Name FDD is available on the mother board.

21. Bus Cables or Data cables:



22. Hard Disk Drive:

- The hard disk drive is the main, and usually largest, data storage device in a computer
- The operating system, software titles and most other files are stored in the hard disk drive
- Identifications is the panel name is Hard Disk dive



23. CD ROM Drive & CD-Writer:

- CD-Rom (Compact Disk Read only Memory) Drive is a device that reads the information from Compact Disks (CD).
- CD-Writer is used to write the data into Compact Disks.
- Identification is the panel name is CD Writer

24. Floppy Disk Drive:

- The floppy disk drive is used to read the information stored in floppy disks.
- Floppy disks also called as a diskette.
- Identification is smaller than CD Writer.

25. SMPS:

- SMPS is used to supply the power to Mother Board HDD,CD ROM, FDD
- In SMPS holds a transformer, voltage control and fan
- Identification is the rectangular box shape and panel name is switching mode power supply.

EXPERIMENT - 22

IT WORK SHOP - I

AIM: **Assembling & Disassembling the System Hardware components of the Personal Computer**

1. **Setting the Cabinet ready**
   - Check how to open the cabinet and determine where to fix the components.
   - Determine if the case has the appropriate risers installed.
2. **Fitting the Mother board.**
   - Line up the patch on the motherboard (ps/l, USB, etc) with the appropriate holes in the block panel I/O shield of the case.
   - Check the points where you and to install
   - Install them and make the mother board sit on them and fix screws if required.
3. **Installing the CPU**
   - Raise the small lever at the side of the socket.
   - Notice that there is a pin missing at one corner, determine the direction to fit in the processor.
   - You should not force the CPU. When inserting it. All pins should slide smoothly into the socket.
   - Lock the lever back down.
4. **Installing CPU fan**
   - Install the heat sink over it (Different type for each processor).
   - Heat sink /CPU fan.
5. **Fitting the RAM:**
   - The RAM must be suitable for motherboard.
   - There are currently 3 types of RAM available.

a. SD RAM.

b. DDR SD RAM.

c. RD RAM.

- The mother board‘s chipset determines which type of RAM may be used.

6. Installing SMPS

7. Installing the ATX Power Connector ATX Connectors:

- PS, Mouse.
- Key board.
- USB.
- Parallel (Prints)
- Serial COM1.
- Serial COM 2.
- Joystick.
- Sound.

8. Installing the HDD and Floppy disk:

- Place the floppy and hard disks in their slots.
- Leave some space above HDD to prevent heat building.
- Check the jumper configuration.
- Fix the screws.

9. CD ROM Drive :

- CD-ROM drive is similar to installing a hard disk.
- 1st check that the jumper configuration is correct.
- Fix the screw.

10. LAN Card

11. Connecting the ribbon Cables and Front panel connections

- Attach the long end of the cable to the IDEU connector on the motherboard first. The red stripe on the IDE cable should be facing the CD Power.

12. Final Check:

- Mother board jumper configurations are the settings for the processor operator.
- Drive jumper settings, master/ slave correct?
- Is the processor, RAM modules and plug in cards finally seated in their sockets?
- Did you plug all the cables in? Do they all fit really?
- Have you frightened all the screws in plug- in cards or fitted the clips?
- Are the drive secure?
- Have u connected the power cables to all driver?

Powering up for the first time:

1. Ensure that no wires are touching the CPU heat sink fan.
2. Plug your monitor, mouse and keyboard.
3. Plug in power card and switch the power supply.
4. If everything is connected as it should be
    - All systems, fans should start spinning
    - U should hear a single beep and after about 5-10 sec
    - Amber light on monitor should go green
    - You will see computer start to boot with a memory check
    - Now check front LED‘S to see if u plugged them in correctly
    - Check all other buttons
    - Power afford change any wrong settings

Why should one learn about hardware?

1. Troubleshoot you and save time.
2. Knowing about system internals and components.
3. Very easy installation for modern hardware.
4. Install extra memory.
5. Removing components.

TEST DATA : No Test Data for This Experiment

ERROR : No Errors for this Experiment

RESULT : Assembling and disassembling the system is completed

VIVA Q & A :

1. Define hardware?
2. Define software?
3. What are the functional units of a computer?
4. IDE Stands for
5. What are the other names for LAN card
6. What is the use of LAN card?

EXPERIMENT - 23

IT WORK SHOP - II

Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

AIM: **A) To install Windows XP**

SOFTWARE REQUIREMENT: Windows XP Compact Disc Hardware

EQUIPMENT REQUIRED: Personal computer

PROCEDURE:

1. Keep on press the delete button and go to advanced BIOS feature [BIOS- Basic Input Output System]
2. And go to boot sequence. Select first boot drivers. CD ROM and press F10 to save the bios feature. Yes and then enter. Press any key to boot from CD. Press enter to setup windows XP.
3. F8 = To agree the license.
4. Press ESC to don‘t repair the windows XP setup.
5. Press _p‘to delete the previous partitions. Then press enter.
6. Press _L‘to delete the partition.
7. Press _C‘to create the partition in the UN partition space.
8. Press enter to setup windows XP on the selected items.

BASIC FILE SYSTEMS:

FAT : File Allocation Table.

NTFS : New Technology File system.

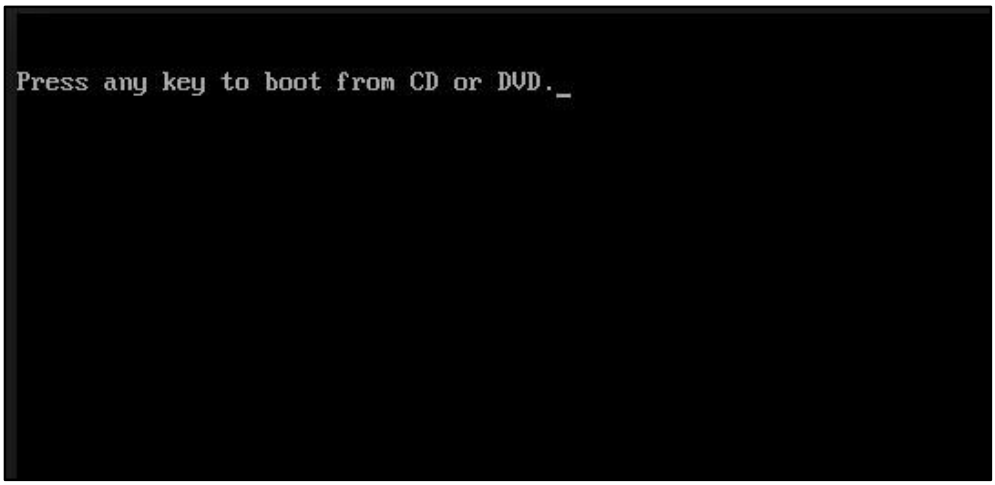
Format the create using NTFS partition.

BASIC STEPS IN INSTALLATION:-

1. Collecting information.
2. Dynamic update
3. Preparing installation
4. Installing windows.
5. Tracking installation

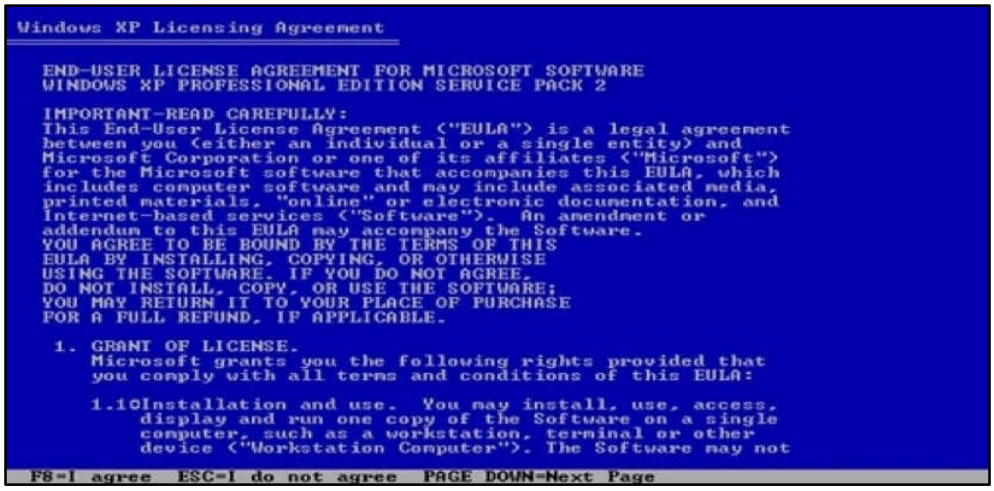
SCREEN SHOTS OF WINDOWS XP INSTALLATION

1. Insert the Windows XP CD into your computer and restart your computer. If prompted to start from the CD, press SPACEBAR. If you miss the prompt (it only appears for a few seconds), restart your computer to try again.

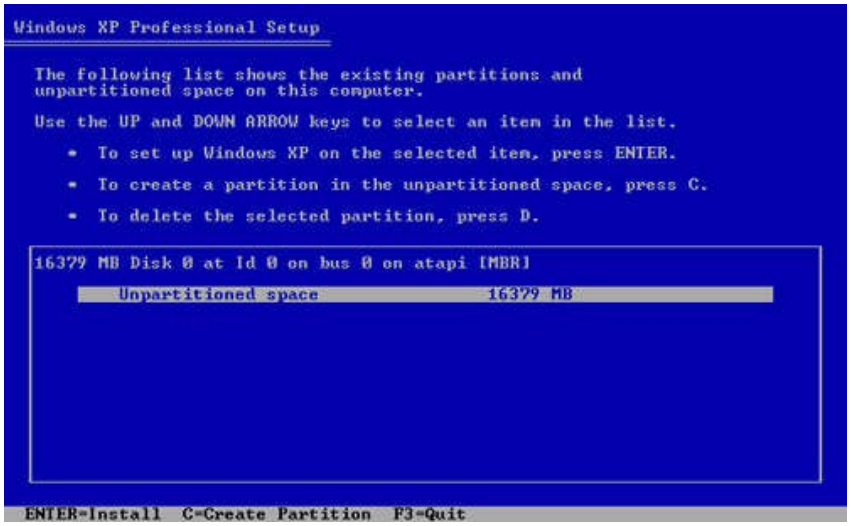


2. Windows XP Setup begins. During this portion of setup, your mouse will not work, so you must use the keyboard. On the Welcome to Setup page, press ENTER.

3. On the Windows XP Licensing Agreement page, read the licensing agreement. Press the PAGEDOWN key to scroll to the bottom of the agreement. Then press F8.

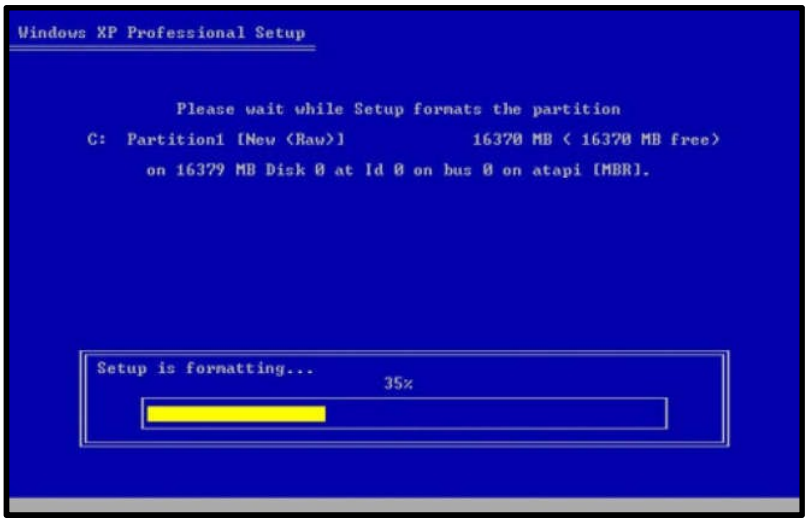


4. This page enables you to select the hard disk drive on which Windows XP will be installed. Once you complete this step, all data on your hard disk drive will be removed and cannot be recovered. It is extremely important that you have a recent backup copy of your files before continuing. When you have a backup copy, press D, and then press L when prompted. This deletes your existing data. Press ENTER to select Un partitioned space, which appears by default.



5. Press ENTER again to select Format the partition using the NTFS file system, which appears by default.

6. Windows XP erases your hard disk drive using a process called formatting and then copies the setup files. You can leave your computer and return in 20 to 30 minutes.

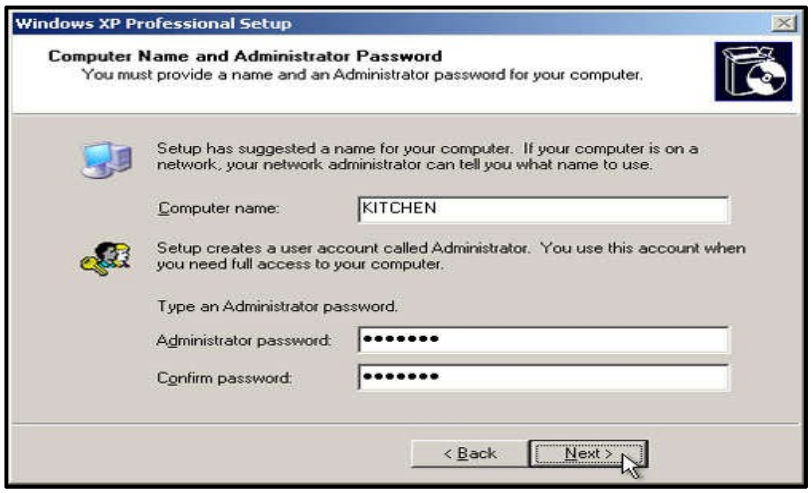


7. Windows XP restarts and then continues with the installation process. From this point forward, you can use your mouse. Eventually, the Regional and Language Options page appears. Click next to accept the default settings. If you are multilingual or prefer a language other than English, you can change language settings after setup is complete.

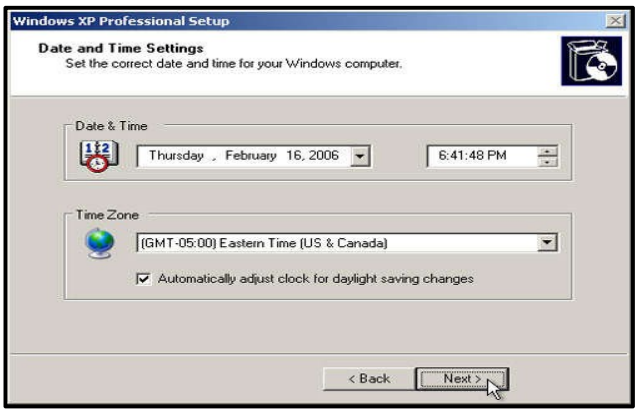
8. On the Personalize Your Software page, type your name and your organization name. Some programs use this information to automatically fill in your name when required. Then, click Next.

9. On the Your Product Key page, type your product key as it appears on your Windows XP CD case. The product key is unique for every Windows XP installation. Then, click Next.

10. On the Computer Name and Administrator Password page, in the Computer name box, type a name that uniquely identifies your computer in your house, such as FAMILYROOM or TOMS. You cannot use spaces or punctuation. If you connect your computer to a network, you will use this computer name to find shared files and printers. Type a strong password that you can remember in the Administrator password box, and then retype it in the Confirm password box. Write the password down and store it in a secure place. Click Next.

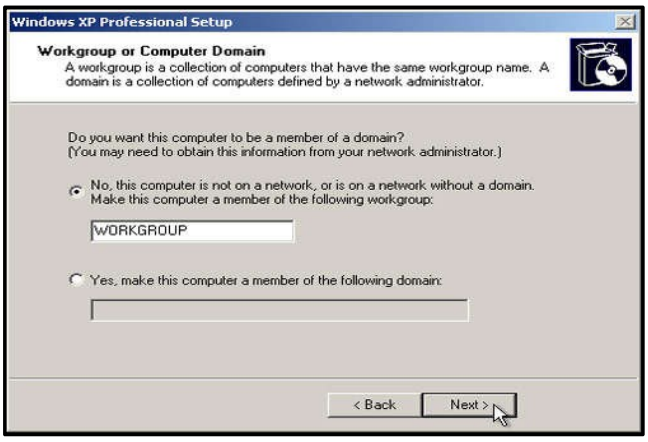


11. On the Date and Time Settings page, set your computer‘s clock. Then, click the Time Zone down arrow, and select your time zone. Click Next.

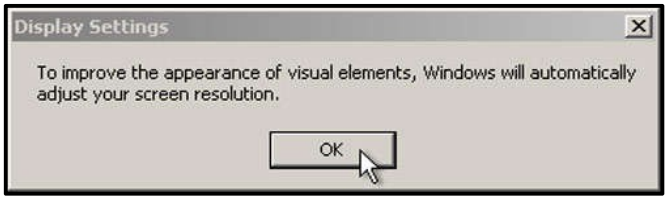


12. Windows XP will spend about a minute configuring your computer. On the Networking Settings page, click Next.

13. On the Workgroup or Computer Domain page, click Next.



14. Windows XP will spend 20 or 30 minutes configuring your computer and willautomatically restart when finished. When the Display Settings dialog appears, click OK

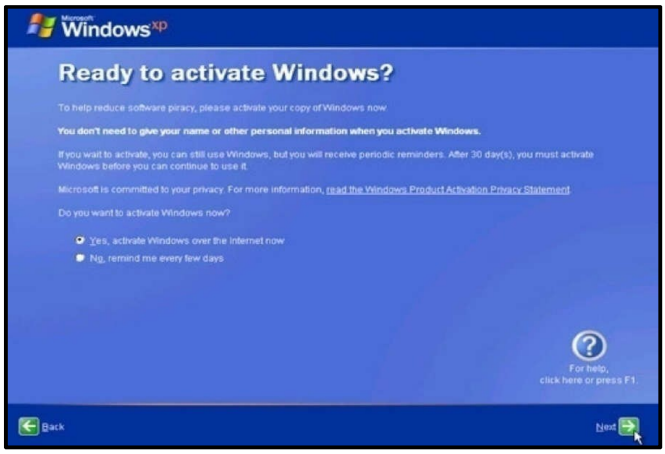


15. When the Monitor Settings dialog box appears, click OK.

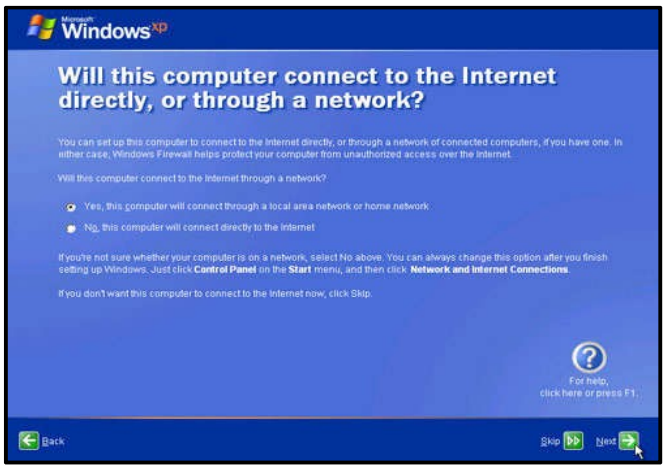
16. The final stage of setup begins. On the Welcome to Microsoft Windows page, click Next.

17. On the **Help protect your PC** page, click **Help protect my PC by turning on Automatic Updates now**. Then, click

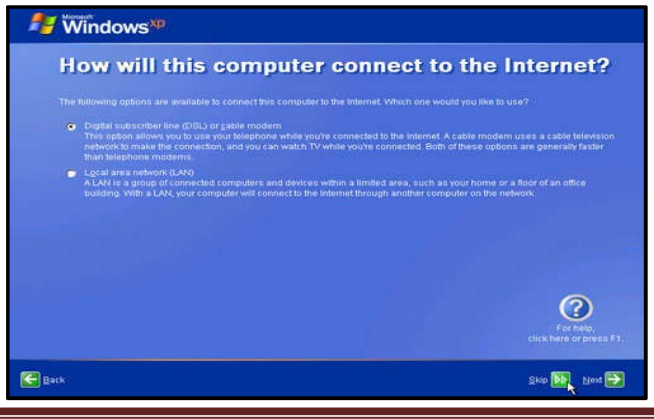
18. Windows XP will then check if you are connected to the Internet: If you are connected to the Internet, select the choice that describes your network connection on the **Will this computer connect to the Internet directly, or through a network ?**



If you‘re not sure, accept the default selection, and click **Next**



19. If you use dial-up Internet access, or if Windows XP cannot connect to the Internet, you can connect to the Internet after setup is complete. On the How will this computer connect to the Internet? Page, click Skip.



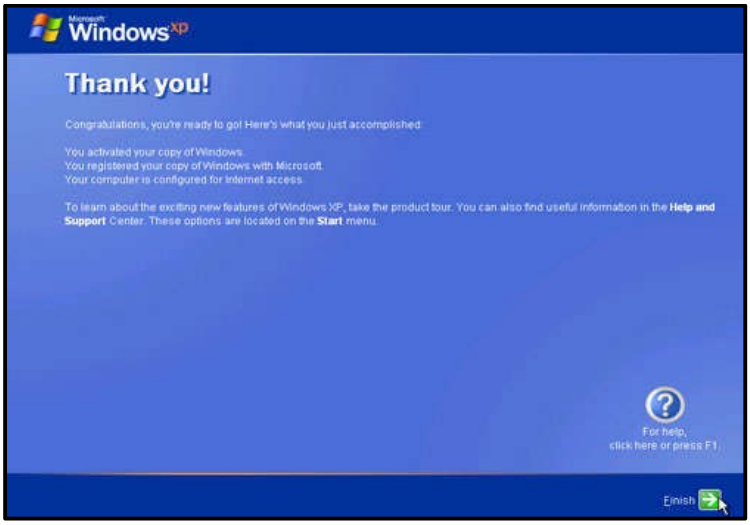
20. Windows XP Setup displays the Ready to activate Windows? Page. If you are connected to the Internet, click Yes, and then click Next. If you are not yet connected to the Internet, click No, click Next, and then skip to step 24. After setup is complete, Windows XP will automatically remind you to activate and register your copy of Windows XP

    On the **Ready to register with Microsoft?** Page, click **Yes**, and then click **Next**.

21. On the **collecting registration information page**, complete the form. Then, click Next.

22. On the **Who will use this computer**? page, type the name of each person who will use the computer. You can use first names only, nicknames, or full names. Then click Next. To add users after setup is complete or to specify a password to keep your account private, read Create and customize user accounts.

23. On the **Thank you**! Page, click **Finish**.



Congratulations! Windows XP setup is complete.

TEST DATA: No Test data for this Experiment

ERROR: No Errors for this Experiment

RESULT: Installation of Windows XP is completed..

AIM: **B) To install Linux in system**

SOFT WARE REQUIREMENT: Linux Compact Discs

HARDWARE REQUIREMENT: Personal computer

PROCEDURE:

1. **Language Selection**
   - Using your mouse select the language you would prefer to use for the installation
   - Click next to continue.
2. **Key Board Configuration**:
   - Using your mouse select the correct layout type for the keyboard you would prefer to use for the installation and as the system default.
   - Once you have made the selection click next to continue.
3. **Mouse Configuration:**
   - If you have a PS/2, USB or Bus mouse you do not need to pick a port and device. If you have a serial mouse, you should choose the correct port and device that your serial mouse is on.
   - The Emulate 3 buttons checkbox allows you to use a two-button mouse as if it had three buttons. If you select this check box you can emulate a third ―middle‖ button by pressing both mouse buttons simultaneously.
4. **Installation Type**:
   - Choose the type of installation you would like to perform.
   - Your options are Personal desktop, Workstation, Server, Custom and upgrade
5. **Disk partition Setup:**
   - You can chose automatic partitioning or manual partitioning using Disk Druid of fdisk.
   - Automatic partitioning allows you to perform an installation without having to partition your drives yourself.
   - Automatic partitioning allows you to have some control concerning what data is removed from your system.
   - Your options are:
     - Remove all Linux partitions on this system.

- Remove all partitions on this system
- Keep all partitions and use existing free space.
- To partition manually choose either Disk druid or fdisk partitioning tool.
- Lick next once you have made your selections.

6. **Partitioning your system:**
   - If you chose automatic partitioning and did not select Review skip ahead
   - If you choose automatic partitioning and selected review you can either accept the current partition settings (click next) or modify the setup using Disk Druid, the manual partition tool.
   - If you choose manual partition with disk skip ahead.
   - At this point you must tell the installation program where to install Linux. This is done by defining mount points for one or more disk partitions in which Linux will be installed.
7. **Adding Partitions:**
   - To add a new partition select new button, a dialogue box appears. Select the options and click ok
8. **Boot Loader Configuration:**
   - Boot loader is the first software program that runs when a computer starts. The installation program provides two boot loaders GRUB (GR and Unified Boot Loader) which is the default and LILO
   - If you do not want GRUB as your boot loader click Change Boot Loader.

You can then choose to install LILO or choose not to install boot loader at all by clicking **Do not install boot loader** on the **change boot loader** button.

Network devices are automatically detected and displayed in **Network Devices** list, Select a network device and click **Edit**

Here you can configure IP address and net mask of the device.

9. **Firewall configuration:**
   - Offers firewall protection for enhanced protection.
   - A properly configured firewall can greatly increase the security of the system.

10. Time zone configuration:

You can set your time zone by selecting your computers physical location or by specifying your time zones offset from Universal Time.

11. Account Configuration:

Allows to set Root password or user accounts

Root count is similar to the administrator password that you set up in Win NT.

Click **add** button to add a new non-rot user.

Enter the details and click **OK**.

12. Packing group selection:

You can select package groups which groups components together or individual packages or a combination of the two.

TEST DATA: No Test data for this Experiment

ERROR: No Errors for this Experiment

RESULT: Installing the OS of Linux is completed

VIVA Q&A:

1) Give the advantages of Linux over other OS?
2) Who wrote Linux?
3) What are the Flavors of Linux

Estd: 2008

METHODIST

COLLEGE OF ENGINEERING & TECHNOLOGY

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