SUBJECT: BASIC SCIENCE AND TECHNOLOGY **CLASS: JSS 1**

SCHEME OF WORK **3RD TERM LESSON NOTE**

WEEKS	TOPICS	Learning Objectives: By the end of the lessons, students should be able to:
1	Revision of last term's work / Welcome Test	Revise topics in different areas
2	Wood work (hand tools) continued, driving, holding, care	Identify wood work driving tools and holding devices, sketch the woodwork for both, demonstrate care and maintenance of wood work hand tools
3	Metal work-hand tools, measuring, marking, holding devices	Differentiate the various tools used for metal work , highlight examples of each of the tools
4	Metal work-hand tools – driving, cutting, boring tools and their uses	Mention the uses of the driving tools, cutting and boring tools, identify each of the driving tools, cutting and boring tools
5	Maintenance, and types of maintenance of tools	Explain maintenance, differentiate the types of maintenance, explain the meaning of each maintenance , importance
6	Basic Electricity- Current, Electric circuit, and its components , tools	Explain electricity and current, differentiate the two types of current, electric circuit components, state some basic electrical tools and symbols
7	Mid Term Test	Mid-term break / Open day
8	Electricity measuring instruments, simple electrical calculation	Differentiate the various electricity measuring instruments and device. Explain what each of them does. Do simple calculations on electricity
9	Electricity transmission devices (transformer, stabilizer)	Differentiate the various electricity transmission devices (transformer , stabilizer
10	Simple electrical circuit connection, practical	Demonstrate means of connecting electrical circuit, state process involved, make a simple table lamp holder
11	REVISION	REVISION
12	EXAMINATION	
12-13	EXAMINATION	

REFERENCES

UNIFIED SCHEME OF WORK

MELROSE, Basic Science and Technology Book 1

NERDC, Basic Technology for JSS, Book 1

WEEK ONE- REVISION

1. ___ is a universal language used for communication among technical people (a) Scaling (b) Technical drawing (c) Sketching (d) Oblique.
2. Technical people include the following except (a) engineers (b) technicians (c) builders and draughtsman (d) lawyer
3. Which of the following is not a drawing instrument (a) set squares (b) French curve (c) microscope (d) pencil
4. The following are the ways of caring for a tee square except (a) use it as a toy gun

(b) never use the tee square as a walking stick (c) do not use a pen knife or blade along the edge of the tee square (d) always hang your tee square after use.

5. Set squares are used to draw the following inclined angles except (a) 30^0 (b) 60^0 (c) 45^0 (d) 70^0

6. ___ is a universal language used for communication among technical people (a) Scaling (b) Technical drawing (c) Sketching (d) Oblique.
7. Technical people include the following except (a) engineers (b) technicians(c) builders and draughtsman (d) lawyer

8. Which of the following is not a drawing instrument (a) set squares (b) French curve (c) microscope (d) pencil

9. The following are the ways of caring for a tee square except (a) use it as a toy gun (b) never use the tee square as a walking stick (c) do not use a pen knife or blade along the edge of the tee square (d) always hang your tee square after use.

10. Set squares are used to draw the following inclined angles except (a) 30^0 (b) 60^0 (c) 45^0 (d) 70^0
11. _____ is one of the quickest methods by which the shape of an object can be communicated to others.(a) Technical drawing (b) Freehand sketching (c) Scale drawing (d) Isometric drawing
12. _____ can be defined as the shortest distance between two points.(a) Straight line (b) Curve (c) Circle (d) Square

13. Isometric view is at ____ to horizontal at both sides (a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0
14. Oblique drawing is at ____ to the horizontal at one side (a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0
15. The following are the advantages of free hand sketches except …… (a) A good sketch reduces the task of writing needed to describe the object on the mind of the designer. (b) The ability to make freehand sketching is a valuable asset to practice Engineering work. (c) Laypersons can express themselves by freehand sketches. (d) Materials are wasted by freehand sketches

16. ____ can be defined as the accurate representation of objects in a determined proportion (a) Scale drawing (b) Freehand sketches (c) Technical drawing (d) Isometric drawing.
17. In _____ scale drawing, the object is drawn to the same size with the actual size. e.g. 1:1 (a) enlarged (b) reduced (c) full (d) proportioned
18. In _____ scale drawing the actual size of the object is reduced in proportion to the drawing .It is used when the object is too big , examples include 1:2, 1:5, 1:10, 1:50, 1:100 (a) enlarged (b) reduced (c) full (d) proportioned
19. In the scale expressed below 50 is the ____ of the object 50:1. (a) actual size (b) drawing size (c) proportioned (d) regular

20. ____ scale drawing is used when the object to be drawn is too small to be clearly seen (a) Enlarged (b) Reduced (c) Full (d) Proportioned

WEEK: 2 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Define driving tools, holding tools and care**
2. State their types and uses
3. Care of the tools

KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards
CONTENT: WOOD WORK (HAND TOOLS)

HOLDING DEVICES:

In order to work safely and conveniently on any work piece, it needs firmly secured. The devices used for holding these work piece firmly are called holding vices.

Holding devices include the following:

1. Vices
2. Clamps
3. Pliers

VICES

Vices are used for holding objects rigidly in position, so that desired operations can be carried out. Vices are of various sizes, shapes and types.

Bench Vice:

The bench vice is used for all types of heavy work, like filing, chipping and sawing. It is fastened to the bench, near its edge, with bolts and nuts. It has two separate jaws that ensure a firm grip on a work piece.

Machine Vice

The machine vice is commonly used on drilling, milling and shaping machines. The jaws are left unseparated, so as not to leave any work an already finished surface.

Hand Vice

The hand vice is used for holding small work piece that cannot be handled conveniently by the bench vice because of their small size.

Leg Vice

Blacksmiths use the leg vice. It is used for holding work piece that require heavy blows to bend. The vice is therefore made from wrought iron that has the capacity to absorb heavy blows without being damaged. 8

Clamps

Clamps are also holding devices, used for holding work pieces for various jobs. Clamps are mainly of three types.

1. **Toolmaker's clamp:** The toolmaker's clamp is used for holding metal in drilling operations, as well as for securing jobs on angle plates for marking out. It has two long screws one for tightening, and the other for locking.
2. **G-Clamp:** The "G" Clamp is used by metalworkers for securing long work pieces to the table of a drilling machine, for drilling operations. It is used in conjunction with an angle plate to secure big jobs when marking out.

Pliers

Pliers are useful general purpose holding tool.

TYPES OF PLIERS

(a) **Long nose pliers**
(b) **Flat nose pliers**
(c) **Round nose pliers**

Evaluation

1. Outline the procedure for using clamps
2. Mention 4 types of pliers

GENERAL CARE OF HANDTOOLS

Metal work hand tools need careful handling during and after use. They should also be kept or stored properly to remain accurate, and to serve in the future. The following guidelines will help you to care for the workshop tools:

1. Use the right tool for the right operation. Using the wrong can damage the tool and the work. It can also cause injury.
2. After use, clean the tool before it is stored away.
3. Store tools in an orderly manner. There are racks for drills, chisels and spanners. Tool s should be arranged in proper order, as this will make it easy to pick them up for use.

4. Store tools away from pathways, so that they do not cause obstruction to free movement.
5. Avoid keeping them in a damp place, as keeping them in damp place will them to rust and get damaged.

GENERAL EVALUATION

1. State 5 general care of hand-tools.
2. State 3 types of holding device.
3. State and explain 4 types of vice.
4. State 3 types of pliers and their uses.

WEEKEND ASSIGNMENT

1 The devices used to keep jobs in the workshop firm to the work bench are called___ (a) cutting tools (b) driving tools (c) holding tools (d) marking out tools

2 The following are examples of holding devices except___ (a) vices (b) clamps (c) pliers (d) odd leg caliper

3 The type of vice, which is commonly used on drilling, milling and shaping machines is called_____ (a) bench (b) machine (c) leg (d) hand

4 Which of the following is not a type of clamp? (a) Drill (b) Pliers (c) Toolmaker's (d) G-Clamp

5 Which of the following is used for holding metal in drilling operations, as well as for securing jobs on angle plates for marking out (a) Drill (b) Pliers (c) Toolmaker's (d) G-Clamp

THEORY

1. State the general care of hand tools.
2. State 3 types of work holding devices and their uses

DRIVING TOOLS

Driving tools are tools used for moving objects into metals through hammering, punching, or screw driving. Driving tools are tools include the following:

1. Hammers
2. Punches
3. Screwdrivers

HAMMERS

Hammers are the most commonly used of all tools. They consist of a metal head and a wooden handle.

Types of hammer

1. **Ball Pein Hammer**: Used for riveting conical end rivets, while the other flat end is for striking.
2. **Cross Pein Hammer**: Used for riveting in awkward places and flat end used for striking
3. **Straight Pein Hammer:** Used for riveting in Vee-grooves.
4. **Special Hammers (Mallets):** Used when steel head may be too strong for the job. They are made of lead, copper, rawhide, wood, plastic or rubber. They are called Mallet

PUNCHES

Punches are driving tools. They are used for punching holes in steel metal, driving out rivets, tapered pins or dowels from holes.

1. **Pin Punches:** They are used for driving dowel pins, and holding shafts and lubs together.
2. **Round Punches:** They are useful when a round sleeve or shaft has to be removed from a hole

3. **Square Punches:** They are useful where a square bar sleeve has to be removed from a hole in which it is. It must be noted that all punches are aided by hammer strikes to achieve their goal.

SCREWDRIVERS

Screwdrivers are used for fixing or removing screws by their heads. This is done using the blade of the screwdriver. Screwdrivers are made from carbon steel (hardened and tempered)

Types of screwdriver

1. Flat screwdrivers
2. Star screwdrivers
3. Ratchet screwdrivers
4. Allen key

General Evaluation

1. Define driving tools
2. State 8 driving tools and their uses.
3. State 3 examples of screwdriver

WEEKEND ASSIGNMENT

1. Which of the following is not a cutting tool? (a) File (b) Chisel (c) Ceramic (d) Hacksaw
2. One of the following is used for removing imperfection from a surface that has been previously worked on. (a) Hammer (b) Chisel (c) Scraper (d) Hacksaw
3. The following are examples of driving tools except ___(a) hammer (b) screwdriver (c) caliper (d) punch
4. Which of the following is not a grade of file? (a) Rough grade (b) Bastard grade (c) Second grade (d) fine grade
5. Which of the following hammer is used for riveting in awkward places and flat end used for striking to determine the centre of round shafts and holes? (a) Ball Pein hammer (b) Cross Pein hammer (c) Straight Pein hammer (d) Special hammer

THEORY

1. Define the following hand tools (i) Cutting tools (ii) Driving tools
2. State (i) 4 Cutting tools (ii) 3 Driving tools

WEEK: 3 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Differentiate the various tools used for metal work**
2. Highlight examples of each of the tools

KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards

CONTENT: METAL WRK- HAND TOOLS, MEASURING , MARKING , HOLDING DEVICES

TOPIC: METAL WORK- HAND TOOL-Marking out and measuring tools

Metal is one of the materials used in technology for construction and fabrication of devices. Metal as a material can be fabricated into various shapes and products. However, to be able to do that, you need appropriate tools. These tools are either hand tools or machine tools.

I. MARKING OUT TOOLS:

Marking out tools are hand tools used for making lines on metal surfaces, checking alignment, and indicating points or positions on a work piece.

Tools for making out in the workshop include:

1. Surface plate

2. Surface table
3. Scriber
4. Odd-leg caliper
5. Divider
6. Punches
7. Try square
8. Box Square

1. **Surface plate**
   The surface plate is a precision piece of equipment with a flat surface of high-grade finish, on which work piece are placed for marking out. It is also used for testing the flatness of surfaces.
   Care of surface
   1. Cover the surface after use to keep it free from dirt
   2. Do not hammer it.
   3. Do not scratch or deform the surface

2. **Surface table**
   The surface or marking out table is larger than the surface plate. It is used for supporting bigger work piece, so that marking out can be carried out with ease and accuracy. It is made up of cats iron and has a high grade surface.

3. **Scriber**
   The scriber is the metal worker's pencil. It is used for marking out lines by hand and together with straight edges like steel rules, try squares or box rules. It is made from high carbon steel or stainless steel, hardened and tempered. They are of various sizes.

4. **Divider**
   Dividers are two-legged steel instrument used for scribing arcs, curves and for setting off distances. Dividers are available in various sizes, and may be available in various sizes, and maybe spring-loaded with a fine adjusting screw or may be firmly joined at the head.

5. **Punches**
   This is either a medium or high carbon steel material. We have dot punch and the centre punch.
   Dot Punch: This is used for denting scribed lines. This is done some space apart; to make the lines indelible while one is working. It is 60^0 at its conical end.
   Centre Punch: It is used for providing a heavy conical dent at the end point where a hole will be drilled in a work piece. This prevents the drill from deviating from the current location of the hole. It is 90^0 at its conical end.

6. **Try square:** The try square is used for testing the squareness of surface, and marking out lines at right angles to given edges. It is a high precision tool that should be handled with care. The stock and the blade, which are the main parts, make 90^0 with each other

7. **Box Square:** The box square is used for the making parallel lines on a round bar, It is made from medium carbon steel (hardened and tempered) and has graduations on its body to facilitate marking off dimensions, while marking out

Evaluation
1. Define marking out tools
2. State 8 marking out tools and their uses.

II. MEASURING TOOLS

Measuring tools are tools of measuring lengths, widths, thicknesses, or sizes of metals. Measuring is usually done during marking out.

Common measuring tools include the following:

1. Steel rule
2. Caliper
3. Combinations sets
4. Micrometer
5. Vernier Caliper
6. Depth gauge
7. Height gauge

- **Steel rule**

The steel rule is made of carbon steel or stainless steel. It is graduated in millimeters and centimeters. To take a measurement with it, the steel rule should be placed on its edge to touch the work, so that an accurate reading can be taken from the centre of the division lines.

- **Caliper**

Calipers are used for measuring diameters, width, and thickness of objects.
We have:

1. External Caliper: It is used for measuring diameters, width, and thickness from the outside of the objects.
2. Internal Caliper: It is used for measuring diameters, width, and thickness from the inside of the objects.
3. Odd-leg Caliper: It is used for measuring diameters, width, and thickness from the middle of the objects to the outside.

- **Combinations sets**

The combination set, as the name implies, is a measuring instrument, which consists of three heads:

1. The centre square: It is used to determine the centre of round shafts or holes
2. The square head: It is used for measuring and setting out 90^0 and 45^0 angular surfaces. It is a standard tool, which require no setting.
3. The protractor head: It performs dual functions as (i) marking out tool and (ii) measuring tool. It is a semicircular precision tool for measuring angular surfaces. It is graduated between 0^0 and 180^0.

- **Micrometer**

It is used for taking precision measurements. We have both internal and external micrometer, which are used for measuring diameter of small objects in millimeter.

- **Vernier Caliper**

It is used for both external and internal precision (accurate) measurements of objects in centimeter.

- **Depth gauge**

It is used for measuring the depth of holes similar to that of an outside micrometer.

- **Height gauge**

It is used to perform two functions namely:

1. To determine the height of components.
2. To mark out dimensions.

GENERAL EVALUATION

1. Define measuring tools
2. State 5 measuring tools and their uses.
3. Define marking out tools
4. State 8 marking out tools and their uses.

WEEKEND ASSIGNMENT

1. Which of the following is not a material used in technology? (a) Metal and Wood (b) Plastic and Rubber (c) Ceramic (d) Internet
2. The following are marking out tools except ___(a) surface plate (b) scriber (c) hammer (d) try square
3. The following are measuring tools except ___(a) steel rule (b) scriber (c) caliper (d) micrometer
4. Which of the following is the metal worker's pencil (a) surface plate (b) scriber (c) hammer (d) try square
5. Which of the following is used to determine the centre of round shafts and holes (a) try square (b) centre square (c) set square (d) diameter square

THEORY

1. Define the following hand tools (i) marking out tools (ii) measuring tools
2. State (i) 8 marking out tools (ii) 5 measuring tools

WEEK: 4 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Define driving tools, cutting tools, boring tools,**
2. **State types and uses**

KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards

CONTENT: METAL WORK – HAND TOOLS – DRIVING, CUTTING , BORING TOOLS AND USES

III. DRIVING TOOLS

Driving tools are tools used for moving objects into metals through hammering, punching, or screw driving.
Driving tools are tools include the following:

4. Hammers
5. Punches
6. Screwdrivers

HAMMERS

Hammers are the most commonly used of all tools. They consist of a metal head and a wooden handle.

Types of hammer

5. **Ball Pein Hammer**: Used for riveting conical end rivets, while the other flat end is for striking.
6. **Cross Pein Hammer**: Used for riveting in awkward places and flat end used for striking
7. **Straight Pein Hammer:** Used for riveting in Vee-grooves.
8. **Special Hammers (Mallets):** Used when steel head may be too strong for the job. They are made of lead, copper, rawhide, wood, plastic or rubber. They are called Mallet

PUNCHES

Punches are driving tools. They are used for punching holes in steel metal, driving out rivets, tapered pins or dowels from holes.

4. **Pin Punches:** They are used for driving dowel pins, and holding shafts and lubs together.
5. **Round Punches:** They are useful when a round sleeve or shaft has to be removed from a hole
6. **Square Punches:** They are useful where a square bar sleeve has to be removed from a hole in which it is. It must be noted that all punches are aided by hammer strikes to achieve their goal.

SCREWDRIVERS

Screwdrivers are used for fixing or removing screws by their heads. This is done using the blade of the screwdriver. Screwdrivers are made from carbon steel (hardened and tempered)

Types of screwdriver

5. Flat screwdrivers
6. Star screwdrivers
7. Ratchet screwdrivers
8. Allen key

General Evaluation

1. Define driving tools
2. State 8 driving tools and their uses.
3. State 3 examples of screwdriver

IV. CUTTING TOOLS

Cutting tools are tools used for cutting materials by either sawing, filing, chiseling, scraping.

Cutting tools include the following:

1. Hacksaw
2. Files
3. Chisel
4. Scraper

1. Hacksaw

The hacksaw consists of two parts: the frame and the blade. It is used mainly for cutting metals in the metal workshop. We have (i) the adjustable hacksaw (accommodates different blades) (ii) tubular hacksaw (It has fixed frame) (iii) junior hacksaw (For cutting thin sheets)

2. Files

Files are used in forming metals to shape, by the principle of bit-by-bit removal. Files are used for finishing jobs to the required sizes and shapes, after they have been previously cut, using either a chisel or a hacksaw. Files are commonly made from high carbon steel (hardened and tempered). Their length, cross sectionals, shapes, grade, areas of cut and the nature of their cutting teeth, classifies files.

Grade selection

1. **Rough grade:** Used for heavy cuts.
2. **Bastard grade:** Used for medium cuts.
3. **Second grade:** Used for light cuts.
4. **Smooth grade:** Used for finish cuts.
5. **Dead smooth cut**: Used for light grade finish cuts.

Types

1. **Flat file**: Used to obtain flat surfaces.
2. **Hand file**: Used to obtain flat surfaces.
3. **Round file:** Used for forming small radii, and for opening out round holes.
4. **Half-round file:** Used for filing curves of all shapes. It is usually double cut.

5. **Triangular file:** Used for forming dovetail joints to shape and open up triangular holes and awkward corner.
6. **Knife-edge file:** Used for forming small V-grooves to shape.
7. **Square file:** Used for filing rectangular hole, narrow slots ad grooves, and for the finishing of square edges.

Methods of filing

1. **Across and from left to right**
2. **Across and from right to left**
3. **Draw filing**

Evaluation

1. State 3 key points about the use of chisel.
2. Mention 7 types of chisel and their uses

3. Chisel

Chisels are mainly chipping tools used for shaping metals, where finishing by other means, such as filing, cannot be carried out. Chisels are made from high carbon steel (hardened and tempered)

Types of chisel

Flat chisel: Used for general work such as:

1. Leveling metal surfaces
2. Removing rivets, screws and bolt heads
3. Rough-cutting sheet metals, and
4. Cutting off excess metal after drilling

Cross-cut chisel: Used for:

1. Cutting keyways on shafts and in holes
2. Cutting spines and
3. Cutting slots

Round-nose chisel: Used for:

1. Cutting oil grooves in bearings and
2. Cutting V-shaped grooves.

Diamond point Chisel: Used for:

1. Cutting Vee grooves, and
2. Cutting oil wells bearings:

Evaluation

1. State 5 key points about the use of chisel.
2. Mention 4 types of chisel and their uses

4. Scraper

Scrapers are used for removing imperfection from a surface that has been previously worked on. Scrapers are made from medium carbon steel (hardened and tempered)

Flat scraper: Used for making a surface accurately flat, after it has either been machined or filed. It requires high-level skill to use

Half-round scraper: Used for removing high spots on curved surfaces such as holes, bearings and large bores.

Triangular scraper: Used in awkward corners, where the use of the other scrapers proves difficult

Evaluation

1. Outline the procedure for carrying out scraping work
2. Mention 3 types of scraper and their uses

BORING TOOLS

Boring tools are the tools used for making holes on wood. The major types are

1. The brace
2. The bits
3. Gimlet
4. Bradawl

1. **THE BRACE**: This is a tool used for holding and turning the drill bits or twist drill when drilling hole. There are two types of brace and they are plain brace and ratchet brace.

Parts of brace are the head, crank, chuck and ratchet.

The head: this is made of hard wood and shaped to fit the hand of the user. It is screwed to a steel sleeve it fits over the the crank rod and runs on the hardened steel balls.

The crank: This is a rectangular bent metal rod, it fits into hardwood plastic handle. It moves in circular way called “the sweep of the brace”.

The chuck: the end of the crank is enlarged, threade and slotted to receive the socket and the jas respectively.

The ratchet: This is a mechanical device fitted to the brace so that holes can be braced in confined places such as close corners and enable the use of “Half the sweep” of the brace. A ratcet brace allows the bit to be rotated in one direction only.

2. **BITS**: A bit is a tool used in wood. Bits generally have a threaded centre point for drawing.

TYPES OF DRILL BITS

1. Twist drill
2. Twist bits or auger
3. Countersink bits

3. BRADAWL: This is used to make small holes in wood before using screws or nails. It can also be used to mark position of a hole before drilling.
4. GIMLET: This is used chiefly to make holes in wood before inserting small screws and nail.

EVALUATION

1. What are boring tools?
2. Mention three types of boring tools and state their uses.

CUTTING TOOLS

A saw is a tool for sawing or cutting wood into two or more parts. The teeth of saws are set alternately left and right to allow clearance.

TYPES OF SAW

We have various types saw based on their on specific operational usefulness.

These are:

1. RIP SAW
2. CROS-CUT SAW
3. PANEL SAW
4. BACK SAW

5. TENON SAW
6. DOVETAIL SAW
7. COPING SAW
8. FRET SAW

RIP SAW
The is used for sawing along the grain of wood .It has 4-5 points per 25mm and it is 610-710mm **long**

CROSS-CUT SAW
This is used for cutting wood across the grain .It is similar to the rip saw in appearance but it is only 460mm-10mm long. It has 6-9point per 25mm.

CROSS-CUT SAW
This is used for cutting wood across the grain .It is similar to the rip saw in appearance but it is only 460mm-10mm long. It has 6-9point per 25mm.

PANEL SAW
This is a saw that is capable of doing the work of both the rip saw and the cross-cut saw. It is an all-purpose saw>It is 460-550mm.

BACK SAW
This saw is called backsaw because it has a steel or brass beck.
These includes
1. Tenon saw
2. Dovetail saw

TENON SAW
The tenon saw is used for cutting tenon, joints and other small jobs on the bench. It has a folded steel or brass back pressed to the blade. This gives it stiffness and weight when cutting. The saw 12 –14 points per 25mm and a length 200-350mm

DOVETAIL SAW
The saw is used for dovetailing and other small jobs on the bench. It is a smaller version of the tenon saw, but has an open handle. The length is 200- 260 mm. It has 20 points per 250mm.

COPING SAW
This is used for cutting accurate curves in thin wood and plywood. The blade can be adjusted to cut in any direction. The blade is about 150 mm long and has about 14 points per 25mm.

FRET SAW
It is used for complex shapes and curves in plywood and veneers. The blade of this saw is finer than the coping saw blade .It has a high frame, which allows it to be used over a wide area.

EVALUATION QUESTIONS
1. What is a saw?

2. State 7 types of saws
3. Describe the following saw and the uses (a) fret saw (b) panel saw

PLANES

We have:

1. JACK PLANE
2. SMOOTHING PLANE
3. SPOKESHAVE
4. THE FORE PLANE
5. THE TRYING PLANE

JACKPLANE

The jackplane is so called because it is a general-purpose plane. It is used generally to plane rough surface of timber and to prepare timber to size. The length of the plane is 250mm – 380mm.

SMOOTHING PLANE

It is used after the jackplane for final cleaning up of the surfaces of wood. It is 140 –250mm long.

EVALUATION QUESTIONS

1. Mention three types of plane.
2. State the functions of the planes mentioned above.

THE CHISEL

A chisel is a chipping tool made from high carbon steel. It is used for shaping wood where finishing by other means such as filling can be carried out.

TYPES OF CHISEL

1. The flat chisel: this is used for general purpose in the workshop such as leveling surfaces and removing rough surfaces.
2. The cross cut chisel: this is used for making narrow groves, key ways and slots in a shaft or in a hole.
3. The round nose chisel: this is used for making oil grooves in shaft or in a hole.
4. Thediamond nose chisel: this is used for cutting inside corners and “Vee” grooves.

EVALUATION QUESTIONS

1. Define chisel as a cutting tool.
2. Mention four types of chisel and state their uses.

GENERAL EVALUATION QUESTIONS

1. State the uses of the following wood work cutting tools:
   (a) Dovetail saw
   (b) Tenon saw
   (c) Spokeshave
2. What are boring tools?
3. Mention four (4) examples of boring tools and state their uses.
4. Mention four (4) types of chisel and state their uses.

WEEKEND ASSIGNMENT

1. The types of saw that can perform both the work a rip and cross-cut saw is in ____
   (a) Tenon saw (b) Dovetail saw (c) Panel saw (d) Back saw
2. When sharpening, oil is added to the sharpening stone to avoid ____ (a) burning of the stone (b) cutting of the stone (c) clogging of the work (d) clogging of the stone
3. The type of saw used for complete shape curves in plywood and veneer is ____
   (a) Tenon saw (b) Fret saw (c) Dovetail saw (d) back saw
4. 1000m: 1m is _____ scale drawing. (a) Full size (b) enlarge (c) reduced
   (d) proportioned.
5. ____ Provides accurate representation of objects (a) freehand sketching (b) ordinary drawing (c) scale drawing (d) art work

THEORY

1. State five (5) types of saw you know.

2. Mention three (3) examples of boring tools.

WEEK: 5 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Define maintenance**
2. **State types of maintenance**

KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards

CONTENT: MAINTENANCE AND TYPES

DEFINITION OF MAINTENANCE
Maintenance in engineering work is defined as the functions that should be carried out every day in order to keep the plant or any engineering equipment in good operating condition. Any breakdown in plant and engineering equipment is the result of inadequate maintenance of equipment.

TYPES OF MAINTENANCE
1. Predictive maintenance: This is a method of using modern device to predict, or foresee an impending breakdown in a machine.
2. Preventive maintenance: This is the maintenance carried out on any equipment or machinery even before the need arises. This type of maintenance begins right from the time the equipment is first installed.
3. Corrective maintenance: This is repair work carried out when equipment has broken down.

EVALUATION
1. Define maintenance
2. State 3 types of maintenance

READING ASSIGNMENT
Read more on maintenance (Intro Basic for JSS1- pg 122-123, NERDC Basic Tech for JSS 1, page 113-114)

GENERAL EVALAUTION
1. State three uses of (i) ceramic (ii) rubber
2. Mention 5 woodwork bench fittings

WEEKEND ASSIGNMENT
1. Define maintenance
2. State 3 types of maintenance
3. Mention 8 forms of energy

WEEK: 6 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Define Electric circuit**
2. **Basic Component of electric circuit**
3. **Arrangement of electric circuit**

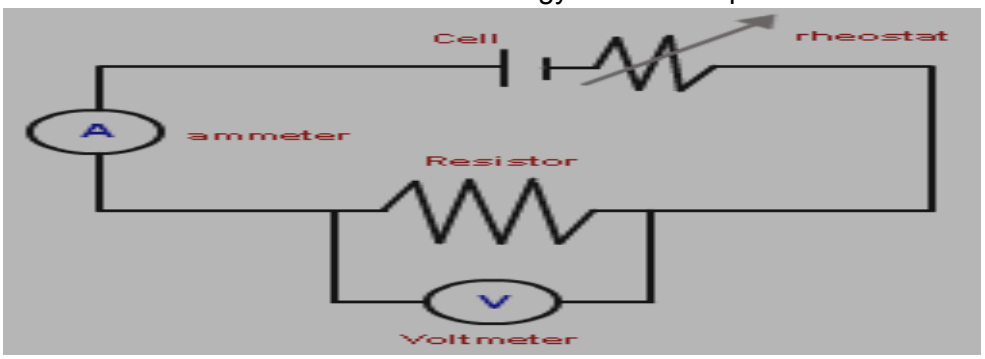
KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards

CONTENT: BASIC ELECTRICITY – CURRENT , ELECTRIC CIRCUIT

ELECTRIC CIRCUITS

Electric circuit can be defined as the path provided for easy flow of electric current. It is for conversion of the electric current into useful purposes such as lighting and heating. Electric circuit is connected or fitted with devices that control and measure the current and energy used in the process.



Simple electric circuit

BASIC COMPONENTS OF ELECTRIC CIRCUIT

THE CELL OR BATTERY: The cell or battery is to push the free electrons round the circuit. The work done when one coulomb of charge moves from one point to the other in the conductor is known as potential difference (p.d). It is measured in volt. The instrument used for measuring the potential difference is called the voltmeter (v).The ammeter (A) is used to measure the current flow. Current is represented by the symbol I and it is measured in Amperes. The instrument used for measuring current is called the ammeter.

RESISTANCE AND E.MF

RESISTOR: This is a component that opposes the free flow of electrons in the circuit. Resistance (R) is measured in Ohms (Ω) using Ohmmeter.

E.M.F (Electromotive force): this is the force that moves the electrons in the circuit. It is represented with V and measured in voltage using a voltmeter. It is the force that moves the current round electric circuit

SOURCES OF E.M.F

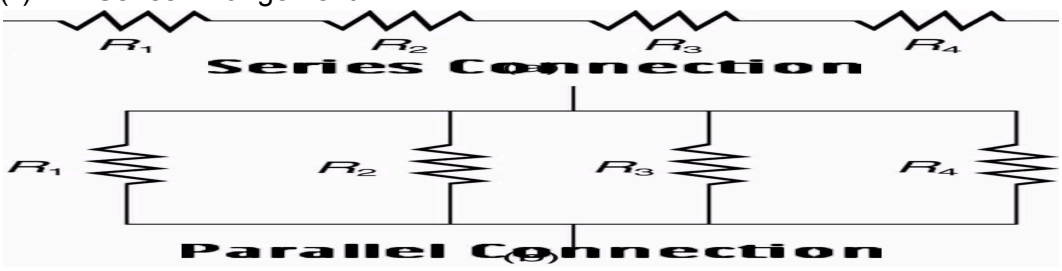
1. Dry cell or primary cell (1.5V each)
2. Wet cell or secondary cell (12V each)

ARRANGEMENT OF ELECTRIC CIRCUIT

Electric circuits can be arranged in the following ways

(i) Series arrangement (ii) parallel arrangement (iii) combination of series and parallel arrangement

(ii) Series Arrangement



Parallel Arrangement

EVALUATION QUESTION

1. (a) Define an electric circuit (b) draw a simple electric circuit

2. State the instrument used in measuring (i) potential difference (ii) current
3. Define: (a) potential difference (b) E.M.F (c) state two source of E.M.F

READING ASSIGNMENT
Read more on electric circuit and its basic component (Intro Basic for JSS1- pg 107-108)

GENERAL EVALUATION
1. Mention 5 workshop safety devices
2. Mention 5 drawing instruments and materials

WEEKEND ASSIGMENT
1. The instrument used in measuring the potential difference across the conductor is …… (a) ohmmeter (b) voltmeter (c)ammeter (d) waltmeter
2. Resistance is measured in (a) ampere (b) volt (c) ohms (d) watt
3. We can measure resistance using ---------- (a) ammeter (b) ohmmeter (c) voltmeter
4. Which of the following is not possible in the arrangement of the electric circuit? (a) series (b) parallel (c) buttress (d) combination of series and parallel.
5. Which of the following is not a basic component of electric circuit (a) resistance (b) cell (c) current (d) capacitor

THEORY
1. State the unit of measurement and the instrument used in measuring the following
(a) resistance (b) electric current (c) potential difference
2. How would you take care of file

WEEK: 7 MID-TERM BREAK / MID-TERM TEST / CONTINOUS ASSESSMENT / OPEN DAY

WEEK: 8 – 10 **`DAY:** **SUBJECT:**
DATE: **TOPIC:**
SUBTOPIC: **PERIODS:** **DURATIONS:**
LEARNING OBJECTIVES: At the end of the lesson, students should be able to

1. **Define plane figures / Area of plane figures**
2. Enlargement and reduction of plane figures
3. Triangle, rectangle, and square in a given ratio
4. Length of sides and radial line method

KEY VOCABULARY WORDS:

INSTRUCTIONAL MATERIALS: Wall charts, Pictures, Related Online Video, Flash Cards
CONTENT: ELECTRICITY (TRANSMISSION DEVICES)

TOPIC: VOLTAGE, RESISTANCE, INDUCTANCE AND CAPACITANCE

CONTENT

- **Voltage (Potential Difference)**
- **Resistance**
- **Inductor**
- **Inductance**

- **Induced current**

VOLTAGE (POTENTIAL DIFFRENCE)

Difference between points in electric field: the work done in moving a unit electric charge between two points in an electric field.

Electric potential: electric potential expressed in volts

It is measured in volts. The instrument for measurement is a voltmeter.

RESISTANCE

Resistance is the opposition that a circuit, component, or substance presents to the flow of electricity. *Symbol R*

ELECTRICITY source of resistance: something that is a source of opposition to the flow of electricity, e.g. a resistor. It is measured in ohms. The instrument for measurement is a ohmmeter

INDUCTORS

An inductor is a circuit element which has the ability to produce an induced voltage in response to changing current.

A device, usually a compact coil, which opposes any change in a circuit current is called an inductor. Inductance is a measure of this ability.

When an electric current is passed through a coil it does generate induced electromotive force ability to do this is called inductance. The basic unit of inductance is Henry.

The ability of a coil to generate induced electromotive force is therefore called inductance

INDUCED CURRENT

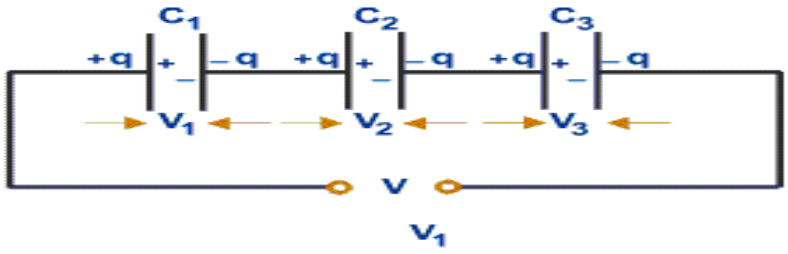
Any electromotive force set up on a conductor by the relative motion between conductors and magnetic field induced electromotive force, the current made to flow from it is called induced current. It can also be defined as the current generated when a magnet moves in a coil.

EVALUATION

Define (a) inductor (b) inductance (c) induce current

DEFINITION OF CAPACITOR AND CAPACITANCE

A capacitor is a device for storing electrical charges



Capacitor

The capacitance of a capacitor can be defined as the ratio of the electric charge to the potential difference between or across the plates of the capacitor. The charge storing ability of a capacitor is also referred to as capacitance of the capacitor. It is measured in farad (F)

PRINCIPLE OF OPERATION OF A CAPACITOR

When two flat plates parallel to each other are charged, either positively or negatively with electrical force e.g cell connected to points A and B.

After charging for some time, the cell is removed. The plates continue to retain the charges. This plate can be said to be bank or an electric stone and this is what a capacitor is. The plates are usually called electrodes and the gap between the plates is called the dielectric (another name for insulators). The plates are separated with air, mica, paper or rubber depending on the value of the capacitance required.

TYPES OF CAPACITOR

We have the following types of (i) air capacitor (ii)paper capacitor (iii)mica capacitor

1. Air capacitor: The dielectric is air. This type of capacitor is commonly used in electric circuit. Two aluminum plates are used. One part of the aluminum is fixed while the other can be turned
2. Paper capacitor: This consists of thin strip of paraffin's waxed paper rolled between the coatings of thin aluminum foil
3. Mica capacitor: This type of capacitor has a solid material as its dielectric constant. It can be used where many capacitors are required.
4. Electrolytic capacitor.
5. Polyethene capacitor.

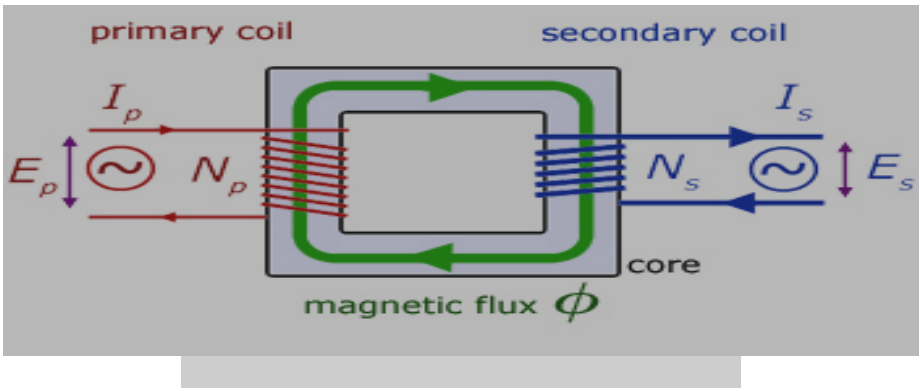
The plates and dielectric are rolled up to a convenient size and usually enclosed in a plastic cardboard or metal case. Capacitors are also classified in terms of 'fixed' and 'variable' capacitors.

Capacitors can be used in many electronic circuits e.g in a motor vehicle, air-conduction and so on.

TRANSFORMERS

A transformer is a device used in transferring electrical energy from one circuit to another by electromagnetic induction. A typical transformer consists of the primary winding A, the secondary winding B and the soft iron core, which helps to minimize the flux leakage.

One of the major uses of transformer is its ability to step up and down a voltage supplied. In Nigeria, we need a step down transformer to step the 220V to 110 V Such a transformer is shown below:



For example, if an appliance requires 440volts, the primary windings can have 20 turns. The secondary windings must have 20 turns. This is because, in general, the output voltage in relation to the input voltage is the same as the ratio between the number of turns in the secondary and primary

$$\frac{\text{Voltage in primary (Ep)}}{\text{Voltage in secondary (Es)}} = \frac{\text{Number of turns in the primary (Np)}}{\text{Number of turns in the secondary (Ns)}}$$

WORKED EXAMPLES

The primary voltage of a transformer is 10 volts and the primary winding is 20 turns. If the secondary winding is 100 turns, find the secondary voltage?

SOLUTION

Given data

Ep = 10 volts

Es =?

Np = 20 turns

Ns = 100 turns

We use formula below

$$\frac{Ep}{Es} = \frac{Np}{Ns}$$

$$Es = \frac{Ep \times Ns}{Np}$$

$$Es = \frac{10 \times 100}{20}$$

Es = 50 volts

Small transformers are used in stepping down voltages for some very low voltage household appliances

Very large commercial transformers are used at the substations to step high from the kanji dam to low voltage for residential houses.

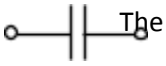
EVALUATION

1. Define (a) capacitor (b) the capacitance of a capacitor (c) Electrode
2. Explain the principle of operation of a capacitor

GENERAL EVALUATION

1. Mention three (3) types of scale drawing.
2. State and give examples of the types of wood.

WEEDEND ASSIGNMENT

1. The gap between the capacitors plate is called ___ (a) electric (b) dielectric (c)capacitance (d) Inductance
2.  The above symbol represents __(a)cell (b)switch (c)capacitor (d) resistor

3. Capacitors cannot be used in one of the following (a) air-conduction (b) motor vehicle (c) boiling ring (d) television

4. The SI unit of inductance is ___ (a) voltage (b) ampere (c) Henry (d) ohms

5. ___ is a circuit element which has the ability to produce in response to charging current (a) resistor (b) inductor (c) capacitor (d) cell

THEORY

1. Define (a) Potential Difference (b) Inductance (c) Resistance

2. What is capacitor? State the types of capacitor

WEEK: 11 REVISION

WEEK: 12 EXAMINATION