FIRST TERM Basic Technology E-LEARNING NOTE

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FIRST TERM E-LEARNING NOTE

SUBJECT: BASIC TECHNOLOGY **CLASS: JSS3**

SCHEME OF WORK

WEEKS TOPICS
1. PRODUCTION OF MATERIAL: WOOD
2. PRODUCTION OF MATERIALS : WOOD
3. PRODUCTION OF MATERIAL: WOOD
4. PROCESSING OF MATERIALS: ALLOYS
5. PROCESSING OF MATERIALS: CERAMICS AND GLASS, PLASTICSAND RUBBER.
6. ISOMETRIC DRAWING
7. OBLIQUE DRAWING
8. PERSPECTIVE DRAWING
9. ORTHOGRAPHIC DRAWING
10. ORTHOGRAPHIC DRAWING
11. SCALE AND SCALE DRAWING/ SIMPLE BLUE PRINT READING.

REF MATERIALS

- EVANS BASIC TECH FOR JSS BOOK 3
- NERDC BASIC TECH FOR JSS BOOK THREE

WEEK ONEAND TWO
PRDUCTION OF MATERIALS: WOOD

CONTENT

- Concept of wood processing:
- Timber growth
- Wood felling
- Wood conversion
- Wood seasoning
- Wood preservation

PRDUCTION OF WOOD

Wood gotten from trees must pass through processing stages before it becomes useful for domestic and industrial purposes.

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Production of wood involves the following stages:

1. Timber growth
2. Wood felling
3. Wood conversion
4. Wood seasoning
5. Wood preservation

TIMBER GROWTH: Timber is used for various domestic and industrial woodwork. Timber is obtained from trees especially the trunk and branches. Trees that provide timbers are usually trees with big trunk. These trees are grown in the southern parts of Nigeria in the Rain Forest vegetation. Common examples of such trees areOmo, Iroko, Oak, Obeche, teak etc.

WOOD FELLING: The process of cutting down a tree in the forest is called felling of timber. The felling of tree is done with the aid of chain saws. The wood that is suitable for technology work is called timber. The process of felling of trees for timber use in the forest is called LUMBERING.
The felling of timber for use can be done broadly in two areas:

(1) The Free Area (F. A.): This is owned by individuals, the amount of money paid to the government by the timber contractor for permission to cut down any tree for commercial purpose is called TARRIF.

(2) The Forest Reserve Area (F.R.A.): This is owned by the government. The amount of money paid for the timber to be cut in F.R.A. depends on the volume of tree to be cut down. Hence this is termed O.T.V. (Out Turn Volume)
The log of wood obtained from the forest can be transported to the sawmill where it is converted into planks by road transport, by train and by waterways.

EVALUATION

1. State the five stages of wood processing
2. What is wood felling?
3. What is limbering?
4. Where can felling takes place?

WOOD CONVERSION: this is the process of sawing log of wood into commercial or marketable sizes. The popular methods of wood conversion are plain sawn method and quarter sawn method

PLAIN SAWN METHOD: This is also known as ‘’through and through method”. Here, the planks are sawn plank after plank without paying attention to the rays. The method is simple, quick and cheap.
QUARTER SAWN METHOD: This method is the method of sawing log of wood into planks by cutting along the rays of the wood. In quarter sawn method planks are cut at right angle to the growth rings.The planks produced by this method have fine figures.

EVALUATION

(I) Define wood conversion
(II) Differentiate between plain sawn method and quarter sawn method.

SEASONING OF TIMBER: This is the process of reducing the moisture content or drying the timber. There are two methods of seasoning

THE AIR SEASONING (NATURALSEASONING): This method of seasoning wood involves stacking the wood in the open shed for a long period of time and allows it to dry naturally. The stacked planks (wood) are arranged on top of one another with one piece of wood called STACKER.

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This method of seasoning is relatively cheap and requires little attention although the rate of drying is slow.

THE KILN SEASONING (ARTIFICIAL SEASONING): This method of seasoning wood involves stacking the timber in a specially heated chamber.The planks are stacked in the same way as in air seasoning. In this process, the planks dry quicker.

REASONS FOR SEASONING WOOD

1 It makes the wood lighter in weight.
2 It makes the wood more stable
3 It makes the wood to take paints, polishes and preservatives.
4 It makes the wood to be durable i.e. last longer.
5 It reduces the insect and the fungi attack on wood
6 It reduces the moisture content of the wood.

MOISTURE CONTENT(M.C.) The moisture content is defined as the excess water in the wet wood. The moisture content is expressedas a percentage.Moisture Content of the wood MC

$$MC = \frac{\text{Wet Weight-Dry Weight}}{\text{Dry weight}} \times 100\%$$

EXAMPLE (1): If a sample of wood weight 80Kg before and 50 Kg after drying. What is the percentage moisture content of the wood sample?

$$MC = \frac{\text{Wet Sample} - \text{Dry Sample}}{\text{Dry sample}} * 100\%$$

$$MC = \frac{80Kg - 50Kg}{50Kg} X 100$$

$$= \frac{30Kg}{50Kg} X 100\% = 60\%$$

ACTIVITY: the weightof a sample of wood after drying was found to be60Kg. The percentage moisture content was 40%,what is the weight of the wood before drying?

EVALUATION

(1) Define wood seasoning.
(2) Mention the two types of wood seasoning we have and differentiate between them.
(3) The weight of sample of woodbefore drying was found to be 10Kg. The percentage moisture content was found to be 50%, whatis the weight of the sample of woodafter drying.

WOOD PRESERVATION: This is the process of applying chemicals on wood to prevent insect and fungi attack. Preservatives help to protect wood against termite, insect and fungi. Examples include coaltar,solignum, creosote, chlorinated phenol and sodium PCP.

TYPES OF WOOD PRESERVATIVES

(i) Water soluble preservatives
(ii) Oil soluble preservatives
(iii) Solvent soluble preservatives

METHODS OF APPLYING PRESERVATIVES

(i) By bushing: This is the process of using brush to apply the preservatives to the wood
(ii) By spraying method: This is the method of using spraying gun in applying the preservatives to the wood.
(iii) By cold immersion method: This is the process of immersing (dipping) the plank in an unheated solution of preservatives for one or two days

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(iv) By open tank method (hot and cold method): This is the process in which the plank is immersed in a tank containing hot preservatives liquid.This process is normally used for treating poles and fence posts.

(v) By pressure treatmentmethod: This is the process in which the plank is placed inside an enclosed metal cylinder. In this process, the preservatives are being forced into the plank under high pressure.

PROPERTIES OF GOOD PRESERVATIVES

1. It must be poisonous to the destructive agent.
2. It must be safe to handle.
3. It must be permanent to the wood on application.
4. It must be easy to apply on the wood
5. It must be chemically stable

EVALUATION

1. What are preservatives?
2. Mention four properties of a good preservative.
3. Mention three methods of applying preservatives.

GENERAL EVALUATION

1. Name three important things to consider before a tree is felled.
2. Mention two methods of wood conversion.
3. What is seasoning?
4. Why should timber be seasoned?
5. How do you prevent insect and fungi attack on wood?

READING ASSIGNMENT

Read about wood defects and manufactured board.
REF. BOOK:NERDC BASIC TECH FOR JSS BK 3 PG 13-18.

WEEKEND ASSIGNMENT

(1) Which of the following is not a stage of woodproduction and processing?(a) wood seasoning (b) wood logging (c) wood conversion (d) wood preservation.

(2) Felling of trees is done with aid of ------- (a) Chain saw (b) German knife (c) Israel hoe (d) Oxford scriber.

(3) Trees that provide timbers are usually trees with big trunk, which include the following except (a) Mahogany (b) Palm Tree (c) Obeche (d) Teak

(4) The kind of seasoning that involves putting a stacker between logs of wood in a saw-mill is called---------- (a) kiln (b) air (c) plain sawn (d) artificial.

(5) What is the weight of wood that weighs 20Kg after seasoning? If the percentage moisture content is 40% (a) 28Kg (b) 140Kg (c) 78Kg (d) 56Kg.

THEORY

(1) What is wood conversion? Mention the two methods of wood conversion.

(2) List five reasons for seasoning wood. (b) list five properties of a good preservatives.

WEEK THREE

CONTENT

- Wood defects
- Veneer

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- Manufactured boards

WOOD DEFECTS:

A defect in timber is any feature in timber that reduces the quality and market value of timber. Defects in timber can be grouped into two types

1. The natural defects: these are the defects that occur during the growth of the tree. Examples include knots, shakes, upset grains and cross grains.
   (i) **KNOT:** These occur at the point where branches grow from the trunkof trees. When the knot rot away and fall out of position it leaves what is known as knot-hole
   (ii) **SHAKES**: These are splits and complete separation of parts of a stem in a living tree. Shakes may be heart shake. star shakes , cup shakes and ring shakes
2. The artificial defects. These are caused by careless handling faulty seasoning and preservation of wood. Artificial defects include cup, bow, twist, check and insect attack
   1. CUP: This is a concave curvature across the face of the timber. It is caused by bad stacking during drying. Plain sawn planksare more affected than quarter sawn.
   2. BOW: This is either convex or concave curvature along the length of the plank.
   3. TWIST: This is a spiral from of distortion along the length of the plank.
   4. INSECT ATTACK: These are visible minute holes seen the surface of boards.

EVALUATION

1. What is wood defect?
2. State the differences between natural defects and artificial defect.
3. Mention three examples each o f natural defect and artificial defect

VENEER

A VENEER is a thin sheet or slice of sheet obtained from wood. The thickness of such veneer ranges from 0.5mm to 3mm.

USES OF VENEER

1. It is used for manufacturing plywood.
2. It is used in decorating furniture
3. It is used in making faces of other types of composite boards.

METHODS OF MAKING VENEER

1. ROTARY OR PEELING METHOD
2. SLICING METHOD
3. ECCENTRIC PEELING METHOD

ROTARY METHOD

The log of wood is mounted on a heavy lathe machine and a cutting knife peels off a continuous sheet as the log is rotating. Then the continuous sheet is later cut into the required size.

SLICING METHOD

This method involves serving the log to the lathe machine bed surface top and the slices of veneer are gotten by peeling knife back and forth. This method is used to produce decorative veneer.

ECCENTRIC PEELING METHOD

The log is first sawn to quarter log with the sapwood corner as centre. The log is mounted on the lathe machines and veneers are sliced off with cutting knife

MANUFACTURED BOARDS

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Manufactured boards are man-made (artificial) wood products. They vary in sizes weight and structure.

ADVANTAGES OF MANUFACTURED BOARD OVER SOLID WOOD

1. They can be made into large, flat sheets.
2. They do not check and warp like solid wood.
3. Some of them can be bent to form curves.
4. They can be worked on and cut easily.
5. They can be nailed without splitting.

EXAMPLES OF MANUFCATURED BOARDS

1. **PLYWOOD**: This is obtained by gluing three or more sheets of veneer together.
2. **BLOCK BOARD**: This board resembles plywood but it has a core which is made of strips usually 20mm-25mm wide and covered with two skins of veneers .It has all the quantities of plywood but cannot be bent .It is used for table tops, cupboards e.t.c
3. **LAMINATED BOARD**: It is similar to block board but its core materials are usually thinner, being 3mm- 7mm wide. It is heavier than block board .It is used for high-class veneer furniture.
4. **CHIP BOARD**: This is the board manufactured from wood chips. Chips are mixed with glue and pressed together under heat to form solid boards of varying thickness .It is used for kitchen furniture and panelling.
5. **HARD BOARD**: This is made from wood (mashed wood) with hardness and holding agent's very high temperature and compression are essential for its production.

Other types of manufactured board include:

1. Particle board
2. Composite board
3. Batten board

EVALUATION

1. Mention three ways veneer can be obtained.
2. State five advantages of manufactured boards over solid wood

GENERAL EVALUATION

1. What is veneer?
2. Mention five examples of manufactured board
3. Mention four advantages of veneer over solid wood
4. Mention two uses of veneer

READING ASSIGNMENT

Read about processing material: metal

REF BOOK:NERDC BASIC TECH FOR JSS3 PG 18-21

WEEKEND ASSIGNMENT

1. A thin slice of sheet obtained from wood is a ____(a) lamina (b) plank (c) plywood (d) veneer.
2. The following are methods of producing veneer except ___ (a) cutting (b) peeling (c) sourcing (d) slicing
3. Which of the following materials cannot be produced from wood (a) Hook (b) paper (c) cloth (d) shoe?
4. Which of the following is not a manufactured board? (a) Composite board (b) block board (c) particle board (d) shopping board.

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5. The type of man-made board obtained by gluing three or more sheets of veneer together is called ___ (a) Hard board (b) Chip board (c) Plywood (d) Block board

THEORY

1. State the advantages of manufactured board over solid wood
2. Mention three uses of veneer.

WEEK FOUR
TOPIC: PROCESSING OF MATERIALS: ALLOYS

CONTENT

1. Metal processing methods
2. Metal alloys, examples, properties and uses.

Metals are materials used in producing some equipment used in everyday life. Metals are usually solid but a few ones are liquid or powder form. They are made raw forms called ore.

METHODS OF PROCESSING METALS

Most metals do not occur in a pure state they are usually combined with other metals and earthly impuritiesto form what is called mineral ore. The ore is then mined and processedto extract the metal of interest. The methods of processing metals include:

1. Casting
2. Smelting
3. Annealing

CASTING

This is the process of melting and pouring molten metal into the mould to take the shape of the mould when it cools down or solidifies.

SMELTING

This is the process of extracting metals from iron ore dug from the ground.

ANNEALING

This is the process by which metals can be softened.

EVALUATION

1. Explain the following terms: (a) casting (b) annealing (c) smelting.
2. Briefly describe metals

STAGES OF METAL PRODUCTION

There three stages in the production of metals

STAGE ONE: EXTRACTION STAGE: The rock containing the metal is dug from the ground with drilling and excavating. The rock and the metal mixed togetherare calledthe metal ore(the impure metal)

STAGE TWO: SMELTING STAGE: The metal ore is heated in a furnace(e. g blast furnace) until the metal melts into liquid form with other impurities that have mixed with it .

STAGE THREE: CASTING STAGE: The hot molten (liquid) metalis poured into container of different lengths and sizes called moulds .it is left there to solidify to take up the shape of the mould, this is called casting. This is how round bars, square bar,wires and others are produced

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EVALUATION

Briefly explain the three stages of metal production.

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METAL ALLOYS,EXAMPLES PROPERTIES, AND USES

An alloy is a metal that is obtained by mixing two or more metals together examples are ferrous alloys and non- ferrous alloys

FERROUS ALLOYS	COMPOSITION	PROPERTIES	USES
High speed steel	Iron, carbon, vanadium and tungsten	Hard and brittle it will withstand temperatures up to 600 ^{0}C	Machine cutting tools such as drill bits.
Stainless steel	Iron ,carbon, chromium and sometimes nickel	Hard and difficult towork,resist corrosion takes a high polish and will not rust.	Cutlery, hand cutting tools, washbasins and sink containers for corrosives.
High tensile steel	Iron, carbon,nickel and chromium	Very strong and tough	Components where high strength is needed, engine parts, bolts and nuts for cars and machinery

NON FERROUS ALLOYS

ALLOYS	COMPOSITION	PROPERTIES	USES
Brass	Copper65%, zinc 35%	Can be bent and pressed into shapes, resist corrosion very well	Plumbing industry, ammunition(bullet and shell) Castings, wires rivets screws decorative works
Duralumin	4.5%copper, 0.5% manganese, 0.5% magnesium, and 94.5% Aluminium	It becomes hardened with age	It is used to make aircrafts and sheets
Gilding metal	Copper 90%, zinc 10%	Very malleable and ductile, resist corrosion well	Decorative beaten work, cheap jewellery.
Bronze	80%copper,20% tin	Strong and tough with high tensile strength, resist corrosion and machine well	Statues, ornaments, Bearings, springs electrical and architectural work.

EVALUATION

1. What is an alloy?
2. State three examples of alloy ferrous metals and mention (2) practical uses of each.
3. State three (3) examples of non-ferrous metal and mention (2) practical uses of each.

GENERAL EVALUATION

1. Defines metals.
2. Mention the classes of metals with examples.
3. Differentiate between ferrous metals and non ferrous metals.
4. Describe the processes of processing metals.

READING ASSIGNMENT

Read about 'processing clay, ceramics, plastics,rubber and glass

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REFERENCE BOOKS

(i) EVANS Basic Technology for JSS book 3.
(ii) NERDC Basic Technology for JSS book 3.pg.22-36.

WEEKEND ASSSIGNMENT

1. The metal obtained from the processing of iron ore in blast furnace is __ (a) limestone (b) steel (c) pig iron (d) coke .
2. The best material for making cooking pots is ___ (a) Tin (b) steel (c) clay (d) aluminum.
3. The process of melting and pouring molten metal into the mould to take the shape of the mould when it cools down or solidifies is called _____ (a) smelting (b) casting (c) annealing (d) furnishing.
4. Which of the following is not a stage in the metal production? (a) extraction stage (b)fabrication stage (c)smelting stage (d)casting stage.
5. The following are examples of alloys except(a) bass (b) bronze (c)copper (d) duralumin.

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THEORY

1. In tabular form, mention two example of ferrous alloys and non-ferrous alloys, state their components, properties and uses
2. Explain the process of processing metal.

WEEK FIVE

TOPIC: PROCESSING OF MATERIALS- CERAMICS AND GLASS,PLASTIC AND RUBBER

CONTENT

- METHODS OF PROCESSING
- PRODUCTION AND USES OF CLAY, CERAMIC AND GLASS
- PRODUCTION OF PLASTICSAND RUBBER

PROCESSING CLAY

Pottery is the act of using clay to make different objects like pots, flower vases, tea cups and dishes.
Procedure

I. Clay preparation: Clay is first dug from the soil. It is thoroughly mixed with water in the right proportion and pounded using hands, feet or pestle and mortal. Air bubbles are removed and it becomes soft. Sand particles as well as stones are removed during mixing.
II. Moulding of articles: There are two methods of moulding the article
   (a) Pinch pot method
   (b) Potter's wheel method: This is the method with a rotating disc upon which the clay is mould
III. Firing/Baking of articles: This is the process of hardening the article e. g. pot. This is a furnace or oven specially designed for baking finished wet clay products.
IV. Decorating of articles: This can be done before or after firing.

MUD

In order to make articles, houses and object from mud, we dig pure earth that does not contain sand. Then follow the following procedure:

1. Mud preparation
2. Moulding of articles
3. Firing of articles
4. Decorating of articles

CONCRETE

Concrete is a hard material formed when cement is mixed with aggregate of sand (coarse sand, gravel or stone) and water only. The mixture is turned into a uniform paste by using a shovel or a concrete mixer. Then made into objects e. g blocks or for construction

EVALUATION

1) Define pottery.
2) Outline the procedure for making pottery.
3) State five uses of ceramics.
4) State five products of ceramics.

PROCESSING GLASS

The mineral glass belongs to a group of ceramic material. It is made from inorganic resin made from refining petroleum product.

The raw materials used in making glass are sand,soda,lime, potash and lead oxide. These materials are thoroughly mixed together. The mixture is melted in a furnace at a very high temperature to

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produce molten glass. While in its molten state various shapes of glass are made by blowing air into the mixture. The rigid glass is heated again and allowed to cool gradually. This process of re-heating and allowed to cool is called **annealing.**

EVALUATION

(i) Mention the five materials used in making glass.
(ii) Explain the process of processing glass
(iii) Mention FIVE example materials made from glass

PROCESSING PLASTIC

There are five methods of processing plastics material namely:

1. Vacuum forming
2. Injection moulding
3. Extrusionmoulding
4. Calendaring
5. Compression moulding

Production of plastic involves heating at a very high temperature.

VACUUM FORMING

This is an enclosed method from which air has been completely removed. It is a method for making plastic buckets and cup.

INJECTION MOULDING

This is a method of forming an object by injecting hot molten or plastic materials into the mould by means of plungers.

EXTRUSION

This is a method of heating a plastic material and forcing it through a mould followed by continuous cooling. It is a method used for manufactured thermoplastic pipe.

CALENDARING

This is a method of making a continuous sheet of the thermoplastic material in paste form between heated and cooled rollers.

COMPRESSION MOULDING

This is a method of forcing plastics materials into a mould by the application of pressure and heat

USES OF PLASTIC

1. Plastics are increasingly being used in every day's life because of its lightness in weight.
2. The top of your ballpoint pen is made of plastic.
3. The family products are obtained from plastics: buckets, cup, radio case battery case , protractors , ruler , set square, in mathematical set, button, electrical switches sockets toys , telephones, helmet etc.

The main disadvantage of plastic products is that it is breakable.

PROCESSING RUBBER

Rubber is a non- metal product. It looks like plastics but it is more elastic than plastic. The raw rubber occurs in LATEX. If the latex is heated, it changes into an elastic, soft and sticky solid which is called rubber.

TYPES OF RUBBER

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NATURAL RUBBER:this is obtained from the white milk sap-like fluid found in rubber tree. The raw rubber produced can be improved through the process called vulcanization.

SYNTHETIC RUBBER: The synthetic rubberis an artificial rubber sometimes called **elastomer.** It is made from petroleum products.

Both the natural and the synthetic rubber are processed through the following stages:

(i) The rubber is softened by adding chemicals such as coal, limestone, natural gas, petroleum,oil, acetylene,water and sodium chloride by a process called polymerization and mixing them thoroughly to bring it to mould able stage.

(ii) It is then heated in a chamberinto a molten form

(iii) The molten rubber is forced into a mould already designed to take the shapes of the object.

The methods of processing rubber are:

I. Vacuum forming
II. Extrusion
III. Calendaring
IV. Compression moulding.

USES OF RUBBER

II. It can be used as an elastic materials e.g. for making catapult.
III. Rubber is water proof, so it is used in making rubber sandals and gloves
IV. Rubber has electrical insulating property i.e. it is an insulator. Thus, it is used in covering electrical wires that supply electricity to the iron or kettle.
V. Rubber can be used as shock absorber, thus it is used in making bumper of cars tyres and tubes of cars

EVALUATION

1. List the methods of processing rubber
2. Mention the processing plastics.
3. State two advantages of rubber over plastic.

GENERAL EVALUATION

1) Discuss five methods of processing plastics
2) Explain the three stages of processing rubber
3) Outline four methods of processing rubber
4) State three uses of rubber

READING ASSIGNMENT

Read about processing ceramic, rubber and plastic

REF. BOOKS:i) EVANS Basic Technology for JSS book 1.
ii) NERDC Basic Technology for JSS book 1.

WEEKEND ASSIGNMENT

1) All solids objects made from clay, mud or cement are called ____(a) plastics (b) rubber (c) semiconductors (d) ceramics.
2) The art of using clay to make various objects is called ____ (a) plastics (b) rubber (c) semiconductors (d) pottery.
3) Which of the following is not a method of processing rubber (a) Vacuum forming (b) Injection moulding (c) Extrusion (d) Calendaring.
4) Which of the following material is made from inorganic resin made from refining petroleum(a) rubber (b) ceramic (c)glass (d) plastic.
5) _____ is a hard heat resistant material made by firing a mixture of clay and chemicals at high temperature(a) plastic (b) rubber (c) ceramic (d) wood.

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THEORY

1) Define rubbermaterials and uses
2) List the methods of processing plastic s and state THREE (3) uses of plastics.

WEEK SIX
TOPIC: ISOMETRIC DRAWING.

CONTENT

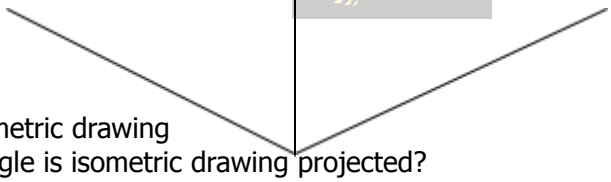
1. Meaning Of Isometric Drawing
2. Angles Of Projection
3. Differences Between Isometric Drawing And Isometric Projection
4. Uses of isometric drawing
5. Making Isometric Projection

ISOMETRIC DRAWING

This is a clear way of presenting information about the physical outlook of objects.
One method of pictorial representation of objects is isometric drawing. Isometric means "equal measures". It shows the three faces of an object. It indicates the length, width and height. In this manner the shape can be easily understood.

ANGLES OF PROJECTION

Isometric drawing is the pictorial method of drawing an object in which all its isometric axes are projected 30^0 to the horizontal and 120^0 to one another.
Any line parallel to any of three lines or isometric axes is known as an isometric line



EVALUATION

1. Define isometric drawing
2. At what angle is isometric drawing projected?

IMPORTANCE OF ISOMETRIC DRAWING

1. It helps us to develop the ability to draw every object to appear look like photograph
2. It also helps the designer to put down ideas easily before going into the detailed description of various parts of the system.
3. It is used for explaining the true shapes of objects to technical and non-technical people

SOLID SHAPES

The following objects can be drawn in isometric drawing: a block, a hammer, a prism, a pyramid, truncated objects, a cone, right objects, regular polygons.

DIFFERENCES BETWEEN ISOMETRIC DRAWING AND ISOMETRIC PROJECTION

Isometric drawing is the drawing in which the full dimension is achieved as this is normally marked. The scale is 100:100.
Isometric projection is the fore-shortened size of an object. The scale is 81: 100
Whereas an isometric drawing is drawn with an ordinary scale, an isometric projection is drawn with an isometric scale which makes the look shorter (foreshortened) than the real size.

MAKING ISOMETRIC PROJECTION

1. Draw a horizontal line.
2. At a point A on the line, erect line AC

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3. On the left side of A, use the 30^0 set squares to draw line AD. Do the same for line AB on the right side of A.
4. At point B, erect line BE and at point D erect line DG.
5. At point C, draw CE parallel to AB and CG parallel to AD.
6. Draw GF parallel to CE and EF parallel to GC.

USES OF ISOMETRIC DRAWING

Isometric drawings are used to:

1. Promote quick and easy understanding of the shape and size of an object.
2. Make quick design and construction of objects.
3. Give a more realistic impression of the form of an object than by orthographic drawing.
4. Produce catalogues, leaflets and manuals by artists.

EVALUATION

1. State the importance of isometric drawing
2. Draw a cube of 60mm in isometric drawing

PROJECT

1. Construct a DODECAGON using cardboard made up of 12 regular pentagons of 50mm length.

GENRALEVALUATION

1. Define Isometric drawing
2. Draw the following shapes (a) right rectangular pyramid (b) oblique pentagonal pyramid
3. Measure the length, width and height of your mathematical set and produce a reduced scale of it.
4. Differentiate between isometric projection and isometric drawing.

READING ASSIGNMENT

OBLQUE DRAWING AND PERSPECTIVE DRAWING

REFERENCE MATERIALS

1. EVANS- INTRODUCTORY TECHNOLOGY BOOK 3, pages 8-12.
2. NERDC, BASIC TECHNOLOGY,BOOK 3 pages 42-47.

WEEKEND ASSIGNMENT

1. Which of the following is the foreshortened size of an object? A. Isometric projection B. isometric drawing C. projector line D. identification line.
2. In isometric drawing, objects are always drawn at ____ angle to the horizontal (a) 60^0 (b) 30^0 (c) 120^0 (d) 40^0.
3. A polygon with 12 sides is called ____A. Nonagon B. Dodecagon C. Decagon D. Pentagon
4. A pyramid is right if its ____ coincides with the axis A. pyramid B. altitude C. vertex D. oblique.
5. Which of the following depict pictorial method of drawing objects? A. scale drawing B. perspective drawing C. isometric drawing D. oblique drawing.

THEORY

1. State the differences between Isometric drawing and Isometric projection.
2. Construct a cube of 70mm in an isometric drawing.

WEEK SEVEN AND EIGHT
TOPIC: OBLIQUE DRAWING AND PERSPECTIVES

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CONTENT

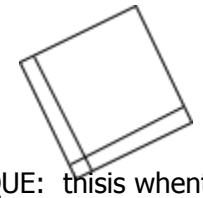
1. Meaning of oblique drawing
2. Methods of drawing oblique drawing
3. Meaning of perspective drawing
4. Classes of perspective drawing

OBLIQUE DRAWING: This is a method of drawing the shape of solid object in which the projection angles are drawn at an angle$45^0$to the horizontal plane. It recognizes objects in three (3) dimensions i.e. length, breadth, and depth.

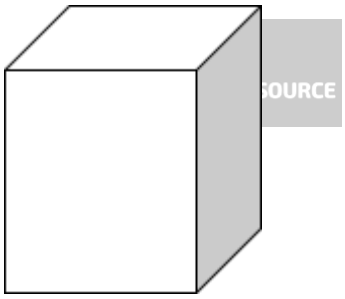
ACTIVITY: Produce an oblique drawing of an isometric drawing of a rectangular block with the given dimension length 50mm, width 30mm and height 70mm.

METHODS OF DRAWING OBLIQUE

1. CAVALIER METHOD: when the receding axis of an angle 45^0 is drawn in full length



2. CABINET OBLIQUE: thisis whenthe receding axis of an angle $45^0$is half the length.



EVALUATION

(i) Define oblique drawing.
(ii) Differentiate between cavalier type of oblique drawing and cabinet oblique drawing.

PERSPECTIVE DRAWING

This is a method of drawing the shape of solid object such that the THREE sides of an object are shownat once. Of all the pictorial drawing, it is the closest to how the eye actually sees objects. Their principal distinguishing feature is that they make allowance for the fact that as an object recedes from the eye, the image observed by the eye become smaller.
In perspective drawing, all the lines of an object converge to a point called **varnishing point.** Varnishing point is the point in the perspective drawing where all thevisual rays converged. This can be classified according to the number of varnishing point the drawing may have, the number of varnishing point depends on the position of the object with respect to the picture.

(i) One point perspective means one varnishing point
(ii) Two point perspective means two varnishing point.

ONE POINT PERSPECTIVE DRAWING: Here the four parallel edges of the cube are converged at a particular point called varnishing point.

TWO POINT PERSPECTIVE DRAWING: this contains two varnishing pointsand the two varnishing point appears at a point in two directionscalled sight line.

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A perspective drawing is not drawn to scales and does not give any information about hidden details.

EVALUATION

(I) Define perspective drawing
(II) What is varnishing point?

GENERAL EVALUATION

(i) Using one point perspective draw a cube
(ii) Differentiate between one point perspective and two point perspective
(iii) Using oblique drawing draw a rectangle of length 70mm/width 50mm and height 40mm.

READING ASSIGNMENT

Read orthographic drawing.
Ref book: NERDC, Basic Tech for JSS book Three. Pg. 50-60.

WEEKEND ASSIGNMENT

1. A pictorial drawing of solid objects projected at angle 45^0 is called A. varnishing point B. isometric drawing C. oblique drawing D. perspective drawing.
2. The point in the perspective drawing where all the visual rays converge at appoint is called_____ A. varnishing point B. perspective point C. annealing point D. orthographic drawing.
3. Which of the following is a method of drawing oblique drawing A. casting method B. extrusion method C. cavalier method D. rotary method.
4. _____ contains two varnishing points and the two varnishing point appear at a point in two directions called sight line.A. One point perspective B.Two point perspective C. Cabinet drawing D. Cavalier method.
5. The method of drawing shapes of solid objects such that it shows the three sides of an object at once is called_____A. scale drawing B. perspective drawing C. orthographic drawing D. oblique drawing.

THEORY

1. With the aid of diagram draw one point perspective view of a cube.
2. Differentiate between one point perspective view and two point perspective view.

WEEK NINE AND TEN
TOPIC: ORTHOGRAPHIC DRAWING

CONTENT

1. ORTHOGRAPHIC DRAWING
2. METHODS OF PROJECTIONS
3. ANGLES OF PROJECTION
4. DIMENSIONING

ORTHOGRAPHIC DRAWING

The draughtsman or engineer uses two basic methods to represent an object on paper, board, or similar surfaces. The two basic methods are:

- Orthographic projection
- Pictorial projection

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Orthographic projection is used to show at least three views. The three views usually shown in orthographic projection are: front view (elevation), side view (either right side or left side), and plan (top view). Orthographic drawing is the method of producing the drawing of an object so it can be fabricated accurately.

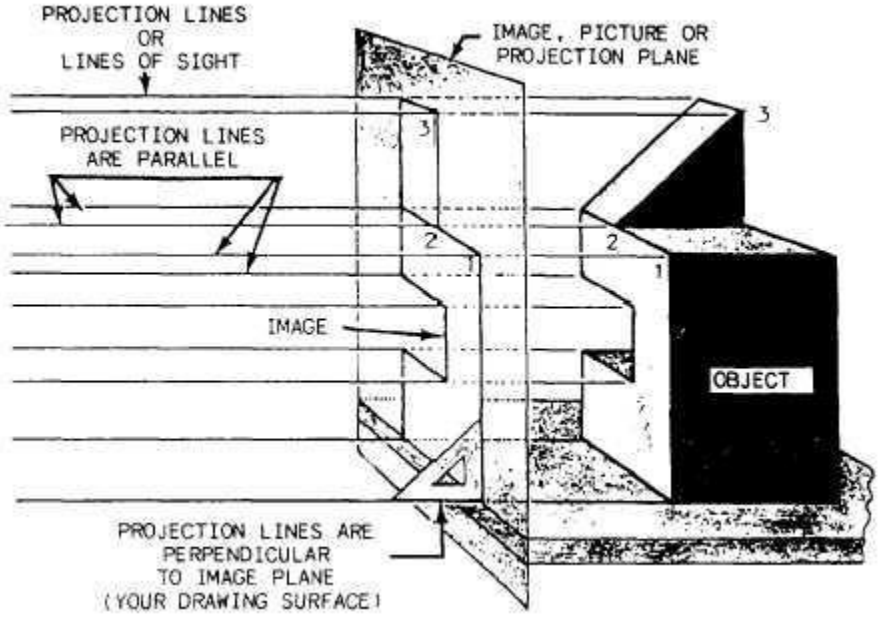
CHARACTERISTICS OF ORTHOGRAPHIC DRAWING

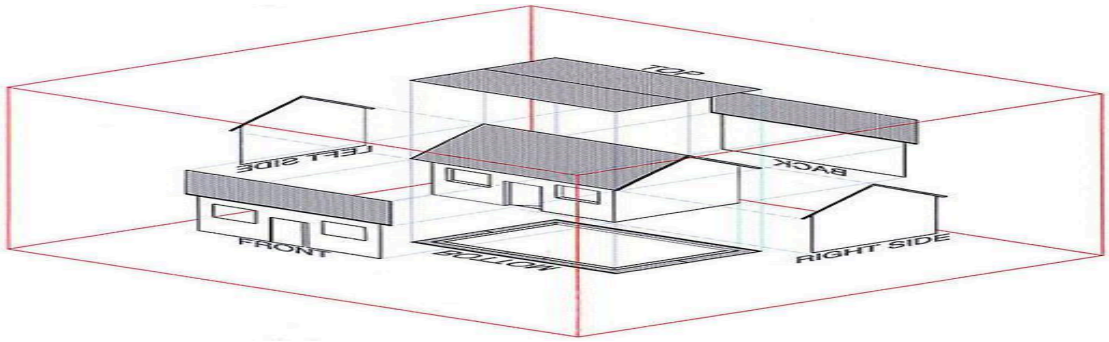
1. Standardize lines are used
2. The plan, front and side views of the object are properly drawn
3. Objects are drawn to scale

IMPORTANCE OF ORTHOGRAPHIC DRAWING

1. It shows accurately the shape of the object
2. It shows clearly the size of each part of the object

Dimension of an orthographic drawing is usually measured in millimeters





EVALUATION

1. Define orthographic drawing
2. State characteristics orthographic drawing

METHODS OF PROJECTION

Orthographic views of objects are drawn on surfaces called planes. A projection plane can be likened to a screen on which a film is projected. If the screen is placed vertically, the plane is called a

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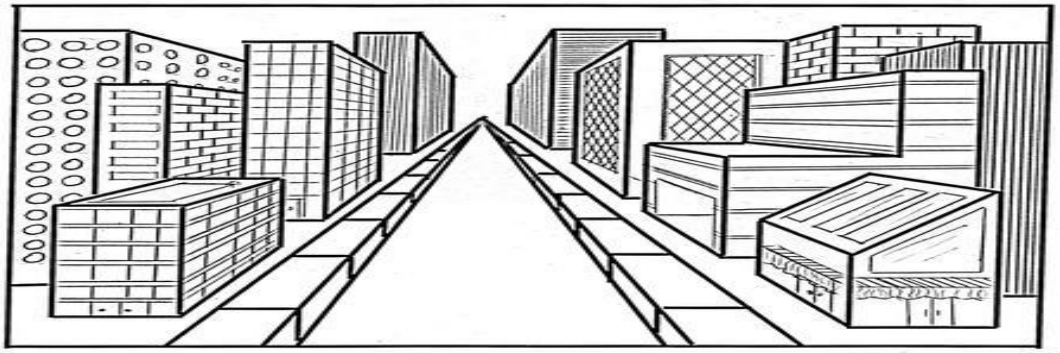
vertical plane. If it is placed horizontally, it is called a horizontal plane. It is equally called a side vertical plane, if it is placed by either the right hand side or the left hand side.
The method of projection varies depending on the rays of light the object is taken to the plane. When the projection rays are perpendicular to the plane, the projective method is called ORTHOGRAPHIC. If the rays are at right angle to the plane, the projection is called OBLIQUE. If the rays are taken to a particular station, the projective method will result PERSPECTIVE,thereby presenting the object as would appear to the eye.



ANGLES OF PROJECTION
The angle of projection in common use areof two types namely:

1. First angle projection
2. Third angle projection

The first angle projection method is mainly used in European countries. In this projection, the front elevation drawing is followed by the plan elevation

The third angle projection method is mainly used in USA and Canada. In this projection, the plan elevation is followed by front elevation.
There are three types of views in orthographic drawing:

a. Horizontal plan views
b. Vertical plan views
c. Side plan views

DIMENSIONING
This is act of using lines to indicate the length and breadth of a particular object. Lines indicating extremes of dimension are drawn where required either to the right side or below it.
Arrowheads are drawn to point inwards and the figure is printed between the arrowheads in case of small dimension.
Hidden details are indicated with dotted lines. Hidden details and hatching line indicate a sectional view of objects. Rounded corners and small diameter holes should also be dimensioned

EVALUATION

1. Explain the two types of angle of projection .
2. Define dimensioning.
3. Differentiate between the angles of projection with the aid of a sketch.

GENERAL EVALUATION

(1) Define orthographic projection.
(2) Draw letter "F" and produce it in first angle projection.
(3) Draw a rectangle of length 70mmand width 50mm and dimension it.

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READING ASSIGNMENT
Read SCALES AND SCALE DRAWING
REFERENCE MATERIALS
1. NERDC, BASIC TECHNOLOGY,BOOK 1 pages 58-63

WEEKEND ASSIGNMENT
1. Which of the following lines can be used for hidden details A. hatching line B. short dashes C. continuous thin lines D. Straight lines.
2. The method of projection in which the plan elevation comes before the front elevation is called A. third angle B. first angle C. second angle projection D. fourth angle projection.
3. When the projection rays are perpendicular to the plane, the projective method is called A. orthographic B. oblique C. perpendicular D. plane views .
4. If the rays are at right angle to the plane, the projection is called _____ A. orthographic B. oblique C. perpendicular D. perspective .
5. If the rays are taken to a particular station, the projective method will result ____ A. orthographic B. oblique C. perspective (d) plane views.

THEORY
1. Define (a) Dimensioning (b) orthographic drawing.
2. Briefly describe first angle and third angle projection with sketch.

WEEK ELEVEN
TOPIC: SCALES AND SCALE DRAWING, SIMPLE BLUE PRINT READING
CONTENT
1 DEFINITION OF SCALE DRAWING
2 MATERIALS AND INSTRUMENTS FOR SCALE DRAWING
3 TYPES OF SCALE DRAWING
4 MEASURING AND COMPARING GIVEN SIZES
5 SIMPLE DETAILS OF A BUILDING PLAN
6 COMMON SYMBOLS USED AND THEIR INTERPRETATIONS

DEFINITION OF SCALE DRAWING
Scale drawing can be defined as the accurate representation of objects in a determined proportion .Scale drawing is different from ordinary drawing in that it presents the object either reduced or enlarged. There are scales for reduction and for enlargement of the size of the object.

MATERIALS AND INSTRUMENTS FOR SCALE DRAWING
A. Metric rule
This has two flat straight edges. It is usually 30cm long. Each main division on the metric rule is equal to one centimeter (1cm =10mm) and each division is sub divided into 10 units being 1mm .Always start from 0 as the beginning of your measurement.
B. Scale rule
These have three straight edges and are triangular in shape. Each edge is graduated and each scale designation is marked on the rule.

EVALUATION
1. Define scale drawing.
2. State the materials and instruments for scale drawing.

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SCALE

Some objects are too big for the actual size to be contained on a drawing paper, while some are too small for the parts to be clearly seen. Hence, such objects should be drawn to an appropriate scale. Scale is usually given as a ratio and they are stated in the title block.

TYPES OF SCALE DRAWING

Ascale is used to draw or read a scale on a drawing paper

We have the following scales:

1. Full scale drawing
2. Reduced scale drawing
3. Enlarged scale drawing

Therefore a cupboard of size 1800mm long drawn as 18mm has a reduced scale drawing of 1:100mm.

ENLARGED SCALE DRAWING

This is used when the object to be drawn is too small to be clearly seen.Here, the actual size of the object is enlarged in the proportion to the drawing.

Examples include 2:1, 10:1, 100:1,

Drawing size 100:1 actual size

REDUCED SCALE DRAWING: this is used when the object to be drawn is too big. Here the actual size of the object is reduced in the proportion of the drawing. Examples include 1:2, 1:5, 1:10, 1: 100 etc.

FULL SCALE DRAWING: This is when the object to be drawn is the same size as the size of the object the scale used is 1:1.

EVALUATION

1. Define scale drawing.
2. Mention three types of scale drawing.

TOPIC: SIMPLE BLUE PRINT READING

Blueprint is the means of communication between the builders and building designer(architect). They are finished plans of what is to be produced or built,i.e. it is the complete drawings builders use at their building site to build. In building industry, the blueprint is also called the working drawing. The blue print is prepared by the architect while the builder interpretsit correctly. Blue print reading requires high-level knowledge of architectural and engineering drawings. It also requires ability to understand measurements and to measure accurately. Any mistake error could be too costly.

The following are to be interpreted by the builders.

1. The floor plan
2. The elevation
3. The section
4. The detailed drawings
5. The schedule
6. The electrical plan

COMMON SYMBOLS USED AND THEIR INTERPRETATIONS.

S /N	SYMBOLS	MEANING
1		Earth or soil

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2		Strip foundation
3		Hardcore
4		Mass concrete floor slab
5		Stone work
6		Brickwork
7		Block work
8		Timber
9		Bath
10		Water closet
11		Sink
12		Wash hand basing
13		Fluorescent tube
14		Socket outline
15		Switch
16		Electric meter
17		Window
18		Door
19		Filament bulb

EVALUATION

1) Define simple blue print.
2) Mention five sections that can be find in a blueprint reading
3) Provide symbols for the following: doors, switch, hard core, concretes, wash hand basing.

GENERAL EVALUATION

(1) Define scale.
(2) Define scale drawing.
(3) Draw the top of your desk using scale rule.
(4) Draw a line 80mm and an equivalent of it in cm indicating the dimensions in cm.
(5) Produce the building plan of a bungalow on page 235 of NERDC BK3 On a drawing sheet.

READING ASSIGNMENT

READ "SIMPLE BLUEPRINT READING" AND SCALE DRAWING

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REFERENCE MATERIALS:

1. EVANS, BASIC TECHNOLOGY FOR JSS, BOOK 3 pages 97-101.
2. NERDC, BASIC TECHNOLOGY FOR JSS, BOOK 3 pages 220-236.

WEEKEND ASSIGNMENT

1. _____ 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.
2. 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.
3. 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.
4. _involves the assembly and erection of building structures. A. Building construction B. Architectural C. Marine engineering D. Forecasting engineering.
5. The following are the professionals in building industry except_____(a) Architect (b)structural engineer (c) quantity surveyor (d) agricultural engineer

THEORY

1. What do you understand by the word blueprint.
2. Mention types of scale drawing and explain them.