

# **INDUSTRIAL TECHNOLOGY**

## **MECHANICAL ENGINEERING LEVEL 8**

| Topic              | Skills                                                                                                    | Knowledge                                                                                                                                                                    | Understanding                                                                                           | Attitude                                                                                                | Content                                                                      | Method/<br>Strategies                                                                                                                                                      | Evaluation                                                                                                                                                                                                                          | Area of<br>Integration  |
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| Holding<br>Devices | 1 Use<br>various<br>holding tools<br>to clamp/hold<br>workpieces.<br><br>2. Sketch<br>holding<br>devices. | 1. Identify the<br>types of holding<br>tools.<br><br>2. State use of<br>holding devices.<br><br>3. Describe<br>various holding<br>devices –<br>G-clamps Mole<br>grid wrench. | The use of various<br>holding devices to<br>perform operations<br>such as, cutting, filing<br>drilling. | Observe good<br>safety<br>practices<br>associated<br>with the use<br>and care of<br>holding<br>devices. | Machine vice<br>vee blocks and<br>clamps.<br>Mole grip<br>wrench<br>G-clamp. | Discussion<br>on the use of<br>holding<br>devices.<br><br>Demonstratio<br>n on the<br>proper uses<br>of various<br>holding<br>devices.<br>Sketching<br>holding<br>devices. | Students may<br>be given oral<br>and written<br>questions<br>related to the<br>topic.<br><br>Let students<br>state the uses<br>of specific<br>holding<br>devices.<br><br>Let students<br>describe<br>various<br>holding<br>devices. | Wood<br><br>Electricity |

| Topic               | Skills                                                                                                                                 | Knowledge                                                                                                                                                                          | Understanding                                                                                                                                                                                            | Attitude                                                                                                                                                                                              | Content                                                                                                            | Method/<br>Strategies                                                                                                                                                               | Evaluation                                                                                                  | Area of<br>Integration          |
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| Drills and Drilling | <p>1. Use drilling machine to produce holes.</p> <p>2. Select, remove, and replace drill bits.</p> <p>3. Secure work for drilling.</p> | <p>1. Identify the various types of drilling machines.</p> <p>2. Identify parts of the floor model drill press.</p> <p>3. Identify parts of the twist drill and the two types.</p> | <p>1. The use of various types of drilling machines.</p> <p>2. Functions of each part of the twist drill.</p> <p>3. Materials used to make twist drills and use of the center punch before drilling.</p> | <p>Students must display safe working habits.</p> <p>Develop personal responsibility.</p> <p>Check to see that work is properly secured before drilling.</p> <p>Use the right drilling procedure.</p> | <p>Types of drilling machines- hand, portable, chest brace, press drill. Twist drills Drilling machine safety.</p> | <p>Discussion on the types and use of drilling machines and twist drills and their parts. Demonstration on the use of drilling machines.</p> <p>Drawing drills and label parts.</p> | <p>Examine the work done by students.</p> <p>Give written questions, to test understanding of concepts.</p> | <p>Woods</p> <p>Electricity</p> |

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| Production of Iron |        | i. Explain method of production of iron.<br><br>ii. State what is meant by sintering.<br><br>iii. State the process of smelting. | Reasons for sintering<br><br><br>Discuss how Iron ore is converted to iron.<br><br><br>Contrast between slog and molten iron. | Accept the reasons given for sintering<br><br><br>Aware of safety practices in the iron and steel industry. | The production of iron starts with the process of sintering i.e<br><br>1. Preheat to remove unwanted solid matter, moisture and carbon-dioxide and to produce pieces of ore suitable for smelting.<br><br>2. Refining the ore this process begins with smelting in the blast furnace. | Show video or slide pertaining to production of iron/steel.<br><br><br>Show students an enlarged view of a flow chart which includes the blast furnace. | Question students during the course of lesson .<br><br>Let students explain in their own words the processes discussed.<br><br>Paper and pencil test. | Reading                |

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| Production of<br>Steel |        |           |               |          | <p>Furnace is charged with coke, iron ore and lime stone.</p> <p>Function of limestone and coke.</p> <p>Products of the blast furnace (eg pig-iron and slag).</p> |                       |            |                        |

| Topic               | Skills | Knowledge                                                                                                                                                    | Understanding                                                                                                 | Attitude                                                        | Content                                                                                                                                                                                                                                                                                           | Method/<br>Strategies                                                                                                                                                                                                                      | Evaluation                                                                                                                                                                               | Area of<br>Integration                   |
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| Production of Steel |        | <p>Explain method of production of steel.</p> <p>Identify the furnaces used.</p> <p>Explain the difference in quality of steel produced by each furnace.</p> | <p>Steel contains carbon in varying amounts.</p> <p>Steel can be made many times stronger than cast iron.</p> | Will accept that steel companies produce a wide range of steel. | <p>Beginning with Pig-iron containing 0.5 to 5.0% Carbon and other elements e.g. sulphur, silicon etc.</p> <p>Processes:-<br/>(a) Bessemer furnace its charged with pig-iron but only about 3% of steel is produced from this furnace . This furnace is replaced by the Basic Oxygen furnace.</p> | <p>Teacher explains difference between Iron and Steel<br/>- steel is on ally of iron and carbon.</p> <p>Teacher displays picture/diagrams of furnaces and give brief description of furnaces<br/>- bessemer<br/>-basic oxygen furnace.</p> | <p>Ask questions in reviewing lesson.</p> <p>Show students enlarged diagrams/pictures of furnaces for them to identify each by name paper and pencil test (short answers objective).</p> | <p>Integrated Science</p> <p>Reading</p> |

| Topic | Skills | Knowledge | Understanding                                                              | Attitude | Content                                                                                                                                           | Method/<br>Strategies                               | Evaluation                                | Area of<br>Integration |
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|       |        |           | The difference in operation between the Bessemer and open-hearth furnaces. |          | (b) Open hearth or Sigmens Merten.<br><br>It's first charged with lime stone then scrap steel about 90% of all steel is produced by this furnace. | Teacher explains advantages of open hearth furnace. | Assignments<br><br>Paper and pencil test. | Integrated Science     |

| Topic     | Skills | Knowledge                                                                                                                                                               | Understanding                                                                                                                                                                               | Attitude                                                                                                                                                                                                                                                     | Content                                                                                                                                                                                                                                                                      | Method/<br>Strategies                                                                                                                                                   | Evaluation                                                                                                                     | Area of<br>Integration                   |
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| Cast Iron |        | <p>Explain briefly the method of production of cast-iron.</p> <p>List the various kinds of cast-iron.</p> <p>Identify grey cast-iron from other types of cast-iron.</p> | <p>That :</p> <p>(i) fractured/broken grey cast-iron show a granular structure.</p> <p>(ii) Parts subjected to horse conditions of service are made of steel <b>NOT</b> grey cast-iron.</p> | <p>Will appreciate the reason (s) given for the dark gray almost black appearance of freshly cut grey cast-iron.</p> <p>Students will be aware that small thin castings should not be dropped.</p> <p>It is easily broken and must be handled with care.</p> | <p>Producing Cast iron is:</p> <p>A smelting process.</p> <p>i The furnace used</p> <p>ii materials required (pig-iron, scrap, steel, coke, limestone etc)</p> <p>Slag and impurities appear.</p> <p>Quality of cast-iron is determined by the ratio of materials above.</p> | <p>Review production of pig-iron.</p> <p>Show students samples of cast-iron.</p> <p>Explain importance of grey cast iron.</p> <p>Characteristics of gray cast-iron.</p> | <p>Review lesson by asking individual students specific question.</p> <p>Paper and pencil Test; Content extended response.</p> | <p>Reading</p> <p>Integrated Science</p> |

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| Sketches of Design | Produce neat representative sketches of design in good proportion.<br><br>Sketch in good proportion e.g. size of one part in relation to another. | Explain the reasons for making pictorial sketches of a product design simple projects to be constructed in workshop. | Sketching is the first phase in designing of a product.<br><br>The basic rule when making a freehand sketch. | Participate in class/group discussion<br><br>Accept that free hand sketches are useful. | Definition of design.<br><br>Type of design<br>(a) original<br><br>b) improvement to an existing idea.<br><br>Process of sketching<br>(1) Using short light strokes. | Show students an original design of a project explain/discuss (involve students) how it could be improved.<br><br>Sketch a simple project on chalkboard.<br><br>Let students make the same sketch (project) using short, light strokes. | Performance test.<br><br>Students to sketch a pictorial view of a given project. | Technical Drawing<br><br>Building Technology. |

| <b>Topic</b>    | <b>Skills</b>                      | <b>Knowledge</b>                                   | <b>Understanding</b>                                            | <b>Attitude</b>                                             | <b>Content</b>                                                                        | <b>Method/<br/>Strategies</b>                      | <b>Evaluation</b>                       | <b>Area of<br/>Integration</b>       |
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| Working Drawing | Draw two or more views of project. | Prepare detailed drawings of each part of project. | The positioning of each view.<br><br>- Front<br>- Plan<br>- End | Strive forwards the attainment of neatness of presentation. | Difference between first and third angle projections.<br><br>Methods of dimensioning. | Use the said project to prepare a working drawing. | Prepare a working drawing of a project. | Technical Drawing<br><br>Mathematics |

| Topic                 | Skills                                                                                     | Knowledge                                                               | Understanding                                                                                         | Attitude                                                                                           | Content                                                                                                                                                                                                              | Method/<br>Strategies                                                                                                                                   | Evaluation                                                                                                                                                                                                                                                                                | Area of<br>Integration                                          |
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| Planning<br>Procedure | Write in<br>sequential<br>order an<br>operation<br>sheet for<br>constructing<br>a project. | Plan carefully<br>for every<br>item/project<br>they (students)<br>make. | As students plan their<br>projects they will<br>learn many of the<br>same things done in<br>industry. | Will accept<br>that planning<br>each<br>manufactur-<br>ing step will<br>result in time<br>serving. | Steps of<br>procedure<br>consist of :<br>i. Writing brief<br>statements of<br>each task in a<br>sequential<br>order.<br><br>ii. Listing<br>correct tools/<br>equipment to<br>carry out each<br>task or<br>operation. | Give students<br>examples of<br>an operation<br>sheet.<br><br>Teacher<br>gives written<br>example and<br>discuss<br>appropriate<br>tools/equipm<br>ent. | Assignment<br><br>1. Give<br>students a<br>given shape<br>say a<br>rectangle with<br>specific<br>dimensions.<br><br>Let them state<br>how they will<br>find its center<br>also marking<br>off 4 equally<br>spaced points<br>along its<br>center length.<br><br>All tools to be<br>stated. | Home<br>Management<br><br>English<br><br>Building<br>Technology |

| <b>Topic</b>      | <b>Skills</b>                | <b>Knowledge</b>                                                                    | <b>Understanding</b>               | <b>Attitude</b>                                                  | <b>Content</b>                                                                                    | <b>Method/<br/>Strategies</b>                                                     | <b>Evaluation</b>                                                                                 | <b>Area of<br/>Integration</b> |
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| Bill of Material. | Prepare a bill of materials. | Explain the procedure for preparing a bill of materials for constructing a project. | Importance of a bill of materials. | Appreciate the reasons discussed for having a bill of materials. | State the name of each part of project.<br><br>Type of material to be used and cost of each part. | Show students CXC Plan Sheet which illustrates how Bill of Materials is prepared. | Similar exercise of bill of materials.<br><br>Review lesson by questioning paper and pencil test. | Mathematics                    |

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| Hermaphrodite | <p>1. Scribe lines parallel to ( an edge) a datum.</p> <p>2. Prepare a datum edge on metal.</p> | <p>1. Identify various types of odd-leg calipers.</p> <p>2. Explain what is datum.</p> | Laying out of work requires special tools. | Show awareness of care when using measuring and layout tools. | <p>Hermaphrodite sometimes called jenny caliper or odd-leg. It has two legs one pointed and the other is bent.</p> <p>i. Used to draw/scribe lines parallel to a datum (an edge).</p> <p>ii. Find center of circular work pieces also rectangular shape.</p> | <p>Explain to students with the aid of diagrams various types of odd-leg calipers and demonstrate its use.</p> <p>Let students carry out similar demonstration with scrap metal.</p> <p>Define the term datum and explain its importance and how it (datum) may be obtained.</p> | <p>Show students each tool.</p> <p>Call on individual student(s) to name a specific tool and explain its use.</p> <p>Assignment to:- Sketch the odd leg caliper.</p> <p>Explain the term datum and its importance.</p> | <p>Building Technology</p> <p>Technical Drawing</p> |

| Topic    | Skills                                                                                                                        | Knowledge                                                                                          | Understanding                                                                                 | Attitude                                                                                                       | Content                                                                                                                                                            | Method/<br>Strategies                      | Evaluation                                                                                                                                              | Area of<br>Integration |
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| Calipers | Measure internal diameters.                                                                                                   | Describe an inside caliper.                                                                        | Inside and outside calipers are used in conjunction with an engineer's rule.                  | Students will be aware that calipers are used to transfer measurements and will take extreme care in so doing. | Inside calipers their legs are curved outwards and they are used mainly to:<br><br>i. measure internal diameters.<br><br>ii. check internal faces are parallelism. | Show students how calipers are adjusted.   | Paper and pencil test.<br><br>Give students unlabelled diagrams of both calipers.<br><br>Let them name both calipers and label the parts and state use. |                        |
|          | Measure:<br>(a) external diameter<br>(b) Internal diameters<br><br>Sketch each type of caliper and label the parts correctly. | Describe an<br>(a) outside caliper<br><br>(b) inside caliper<br><br>State the use of each caliper. | Circular stocks/ work pieces e.g. internal and external diameters are measured with calipers. | Appreciate the importance of: accurate measurements handling of tools with extreme care.                       | Outside Caliper is a two legged steel instrument.<br><br>Its legs are curved inward.                                                                               | Show students inside and outside calipers. | Let students:<br><br>1.Set calipers (outside and inside) to specific dimensions.<br><br>Teacher will state dimensions.                                  |                        |

| Topic | Skills | Knowledge | Understanding | Attitude | Content                                                                                                          | Method/<br>Strategies                                                                                                                                                                                                                 | Evaluation                                                                                 | Area of<br>Integration |
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|       |        |           |               |          | Outside calipers are used primarily to measure outside diameters and ensure that external surfaces are parallel. | <p>Explain that there are two types</p> <p>i. firm joint<br/>ii. spring joint.</p> <p>Use large diagrams to</p> <p>i. Show parts of each type.</p> <p>ii. Use(s) of each caliper.</p> <p>Demonstrate and explain the use of each.</p> | Measure round stocks external diameters and out this same activity for internal diameters. |                        |

| Topic                                     | Skills                                                                        | Knowledge                                                                                                                         | Understanding                                                                                                                                                          | Attitude                                                                                                            | Content                                                                                                                                                                                                                                       | Method/<br>Strategies                                                                                                                                                         | Evaluation                                                                                                                                                                                                | Area of<br>Integration             |
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| Punches<br>Prick and<br>Centre<br>Punches | Mark out center of work, dot punch center mark and enlarge with center punch. | Identify the difference between prick and center punch.<br><br>Explain the specific use of<br>i. prick punch<br>ii. center punch. | Method of ensuring layout lines last longer on work pieces.<br><br>Punches-prick and center- are not to be used on hard surface i.e. metal surfaces that are hardened. | Strive towards safe working practices.<br><br>-personal and class mates- also use tools for their intended purpose. | Prick punch sometimes called Dot punch. It is made of hardened steel.<br><br>The point is ground at an angle of 30° or 60°.<br><br>Center punch is similar to prick punch except it has a large cross section and its point is ground to 90°. | Define the term punch.<br><br>Explain the purpose of prick punch and center punch.<br><br>Diagram to show students the difference between punches i.e prick and center punch. | Review topic by posing question to individual students.<br><br>Give assignment.<br><br>Let students demonstrate the use of each punch.<br><br>Paper and pencil test: content objective and short answers. | Wood work<br><br>Technical Drawing |

| Topic                    | Skills                                             | Knowledge                            | Understanding                                                                                               | Attitude                                                                                                 | Content                                                                           | Method/<br>Strategies                                                                                                        | Evaluation | Area of<br>Integration |
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| Surface<br>Plate (Table) | Layout work<br>on the<br>surface table<br>(plate). | State the use of<br>a surface table. | That surface<br>plate/table is a major<br>piece of equipment in<br>Mechanical<br>Engineering<br>Technology. | Willingly<br>accept that<br>surface table<br>or plate<br>must be used<br>ONLY for<br>laying out<br>work. | Surface plate:<br><br>A large iron or<br>granite plate<br>with a flat<br>surface. | Explain to<br>students.<br>- purpose of<br>table<br><br>- describe the<br>finish it has.<br><br>-no<br>hammering<br>and why. |            |                        |

| Topic                | Skills                                  | Knowledge                                 | Understanding                                                                                            | Attitude                                                  | Content                                                                                                                                                                            | Method/<br>Strategies                                                                                                                                                                        | Evaluation                                                                        | Area of<br>Integration |
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| Vee-Block and Clamps | Set-up work using Vee-block and clamps. | Explain the use of the V-block and Clamps | That: Vee-block and clamps are useful accessories for<br><br>- drilling operation<br><br>- marking our.. | Appreciate the importance and use of these support tools. | Vee-block and clamp are support tools in laying out.<br><br>They hold and support work pieces.<br><br>V-blocks are made of cast iron or steel. They are sold in pairs with clamps. | Display V-block and clamps.<br><br>Show how they holds the stock.<br><br>Students should be taken on tours to Mechanical work shop where they will observe these and other equipment in use. | Assignment<br>1. sketch<br>2. V-block clamps.<br><br>Ask questions during lesson. |                        |

| Topic        | Skills                                               | Knowledge                                                                                               | Understanding                                                                                              | Attitude                                                                                         | Content                                                                                                                                                       | Method/<br>Strategies                 | Evaluation                                                                                                              | Area of<br>Integration |
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| Angle Plates | Set up and (clamp) work securely to the angle plate. | Describe an angle plate and a surface plate.<br><br>State the use of the surface plate and angle plate. | Work is held to the angle plate with bolts.<br><br>The angle plate has holes through which the bolts pass. | They will use these tools with due care to avoid damage to the (support tools) working surfaces. | Plates are support devices in layout operations.<br><br>Types of plates:<br>- surface plate<br>- Angle plate are used in conjunction with other layout tools. | Show students<br><br>- surface plate. | Performance test i.e. students demonstrate use of equipment.<br><br>Content: Objective and extended response Questions. |                        |

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| Combination Set | Use each part to perform operations namely<br>- squaring work<br><br>- checking and scribing angles<br><br>- centering work.t | Identify the various components of the combination set.<br><br>- squaring head<br><br>- center head<br><br>- protractor<br><br>- ruler. | That each component of the combination set has a specific use. |          | Combination set consist of:<br>- a rule and 3 heads namely<br>- centre<br>-protractor<br>-square.<br><br>The square has a scribe and a spirit level. | With the aid of diagram teacher shows students the combination set with each head labelled.<br><br>Explain and illustrate the use of each head.<br>- the square<br>- checking squareness<br>-measuring 45° and 90°. | Check<br>- squareness of work.<br><br>Set protractor to specific angle.<br><br>Check<br>- level of surface. | Woodwork               |

| Topic                    | Skills                                                                        | Knowledge                                   | Understanding                                                                                           | Attitude                                                                                                         | Content                                                                                                                                                                   | Method/<br>Strategies | Evaluation                                                                                                                  | Area of<br>Integration |
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| Combination Square (Set) | Check squareness of work and measure/ check 45° angles using the combination. | 1. Layout parallel and perpendicular lines. | Combination square consist of a blade which may be used in conjunction with any one of the three heads. | Students will be pleased for having the experience of using the tool as a square, protractor, or a guage-centre. | <p>The combination square is used most often for:</p> <ul style="list-style-type: none"> <li>- measuring angles of 45° and 90°.</li> <li>-Checking squareness.</li> </ul> |                       | <p>Students to demonstrate the use of each head.</p> <p>Note:<br/>Students must measure/ check 45 and 90 degree angles.</p> |                        |

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| Surface<br>Guage | i. Set scribe point accurately to specific height using the combination square rule.<br><br>ii. Scribe layout lines. | Identify surface gauge and label the parts correctly. | The surface guage is used either to scribe layout lines or to measure heights. |          | Surface guage has<br><br>- a flat heavy base<br>- a spindle<br>-a scribe<br>-an adjusting screw | Explain and demonstrate use of each part.<br><br>Students to sketch and label each part. | Students to name each part.<br><br>Set scribe point to specific height. |                        |

| <b>Topic</b>        | <b>Skills</b>                                          | <b>Knowledge</b>                                                                        | <b>Understanding</b>                                                                 | <b>Attitude</b>                                                                               | <b>Content</b>                                                            | <b>Method/<br/>Strategies</b>                                                                      | <b>Evaluation</b>                                          | <b>Area of<br/>Integration</b>   |
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| Bevel<br>Protractor | Mark layout<br>lines on work<br>at specific<br>angles. | Read the<br>protractor<br>accurately.<br><br>Set protractor to<br>prescribed<br>angles. | Bevel protractor<br>makes it possible to<br>layout or check an<br>angle of any size. | Appreciate<br>setting<br>protractor<br>accurately to<br>the specific/<br>required<br>degrees. | Bevel<br>protractor<br>consist of:<br>- protractor<br>head<br>-steel rule | Demonstrate its<br>use.<br>Explain<br>-advantage(s)<br>-disadvantage(s)<br>- how scale is<br>read. | Students must<br>set protractor<br>to specific<br>degrees. | Technical<br>Drawing<br><br>Math |

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| Colouring Metal for Laying Out | Apply layout fluid(s) on metal surfaces. | State<br>- different types of layout fluids.<br><br>- use of layout fluids.<br><br>- fluids could be applied either by. | The reason(s) for metal surface to be coloured with layout fluid or chalk. | Will accept willingly that layout fluids ensure visibility of layout lines. | Laying out fluids<br><br>- different colour<br><br>- clean surface of metal<br><br>- applying fluid<br><br>- brush on<br><br>- spray on. | Show students samples of laying out fluid.<br><br>Explain purpose of laying-out fluid.<br><br>Use of chalk advantage and disadvantage. | Give students piece of material and ask them to apply layout fluid and layout lines at specific distance apart. |                        |

| <b>Topic</b>       | <b>Skills</b>                                            | <b>Knowledge</b>                                  | <b>Understanding</b>                                            | <b>Attitude</b>                                                                            | <b>Content</b>                                                                                            | <b>Method/<br/>Strategies</b>                     | <b>Evaluation</b>          | <b>Area of<br/>Integration</b>            |
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| Non-Ferrous Metals | Select materials according to their physical properties. | Define non-ferrous metal.<br><br>Define an alloy. | Non-ferrous metals, (unlike ferrous metal) do not contain iron. | Complete assigned tasks.<br><br>Listen attentively and respond appropriately to questions. | Discussion on groups of non-ferrous metals:<br><br>- Base metal<br><br>- Alloys<br><br>- precious metals. | Have discussion on non-ferrous metals and alloys. | Given written assignments. | Electricity<br><br>Science<br><br>English |

| <b>Topic</b>                     | <b>Skills</b>                                                                                | <b>Knowledge</b>                             | <b>Understanding</b>                                                             | <b>Attitude</b>                                                                            | <b>Content</b>                          | <b>Method/<br/>Strategies</b>                                | <b>Evaluation</b>                                                              | <b>Area of<br/>Integration</b> |
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| Production of Non-Ferrous Metals | Apply the concept of properties/ Characteristics whenever selecting materials for a project. | List types of non-ferrous metals and alloys. | Alloys are made in order to obtain materials which cannot be obtained otherwise. | Complete assigned tasks.<br><br>Listen attentively and respond appropriately to questions. | Types of non-ferrous metals and alloys. | Discuss the various uses of non – ferrous metals and alloys. | Ask students questions during and after lesson to test students understanding. | Wood work<br><br>Electricity   |

| Topic                                                                             | Skills                                                                                                                                                                                       | Knowledge                                                                                                                                                            | Understanding                                                                                                                                                                                                     | Attitude                                                                                                    | Content                                                                                                                                                                                              | Method/<br>Strategies                                                                                                                                                                    | Evaluation                                               | Area of<br>Integration                                                               |
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| Character-<br>istics and<br>Properties.<br><br>Uses of Non-<br>Ferrous<br>Metals. | Character-<br>istics<br>whenever<br>selecting<br>materials for<br>a project.<br><br><br><br><br><br><br>Students will<br>use metal<br>and non-<br>metal<br>materials to<br>make<br>projects. | State the uses<br>of non-ferrous<br>metals and<br>alloys.<br><br><br><br><br><br>Identify non-<br>ferrous<br>materials<br><br>Describe non-<br>ferrous<br>materials. | Alloys have a<br>combination of<br>properties not<br>available in pure<br>metal and to fulfill<br>needs for which no<br>pure metal can.<br><br><br><br><br>The terms non-<br>ferrous materials and<br>non-metals. | <br><br><br><br><br><br><br>Listening<br>attentively<br>and<br>responding<br>appropriately<br>to questions. | Description of<br>each type of<br>non-ferrous<br>metals<br>-copper<br>-aluminium<br>-tin<br>-zinc ,etc.<br><br><br>Definition of :<br>- non-ferrous<br>materials.<br><br>-non-metal eg.<br>plastics. | Let students<br>identify<br>metals.<br><br><br>Give<br>examples of<br>non-ferrous<br>metals.<br><br><br>Have<br>discussion on<br>non-ferrous<br>materials and<br>non-metal<br>materials. | <br><br><br><br><br><br><br>Give written<br>assignments. | <br><br><br><br><br><br><br>Electricity<br><br>Woods<br><br>Science<br><br>English A |

| Topic                                                              | Skills                                                                                           | Knowledge                                                                                                                                                         | Understanding                                                                                                                | Attitude                | Content                                                                                                                                                                               | Method/<br>Strategies                                                                                                                | Evaluation                                                   | Area of<br>Integration |
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| Characteristics and Properties.<br><br>Uses of Non-Ferrous Metals. | Prepare folders showing non-metal materials.<br><br>Select materials appropriate for given jobs. | List types of non-ferrous metals and non-metal materials.<br><br>State properties and characteristics of non-ferrous metal and non-metal materials e.g. plastics. | Two main grouping of non-ferrous metals are those used in their pure state and those that are made up of two or more metals. | Complete assigned work. | Definition of properties/ Characteristics.<br><br>Discussion on properties/ Characteristics<br>- colour<br>- weight<br>- fusibility<br>- conductivity<br>- corrosion<br>- resistance. | Let students identify non-ferrous metal and non-metal materials.<br><br>Give examples of non-ferrous metals and non-metal materials. | Ask questions during and after lesson to test understanding. | Wood work              |

| Topic                                                                             | Skills | Knowledge                                                                                             | Understanding                                          | Attitude | Content                          | Method/<br>Strategies                                                                                                                                                                                                                                                                                                                | Evaluation                                                         | Area of<br>Integration |
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| Character-<br>istics and<br>Properties.<br><br>Uses of Non-<br>Ferrous<br>Metals. |        | Discuss<br>properties and<br>characteristics of<br>non-ferrous<br>metals and non-<br>metal materials. | Non-metals include<br>plastics, wood, and<br>ceramics. |          | - Strength<br><br>- Formability. | Have students<br>identify metals<br>and compare<br>their properties<br>and character-<br>istics.<br>Prepare short<br>notes for<br>students.<br>Entertain<br>questions during<br>discussions.<br>Let students<br>prepare<br>report/folder from<br>observing the<br>uses of materials<br>in their homes,<br>school and<br>communities. | Paper and<br>pencil test<br><br>-Extended<br>response<br><br>-M.C. | Reading                |

| Topic              | Skills                                                      | Knowledge                                                                                                                                                                                                                                                                | Understanding | Attitude | Content                                                                                                                                                                                                                                                         | Method/<br>Strategies                                                                                                                                                                                                                                                            | Evaluation | Area of<br>Integration |
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| Non-Ferrous Alloys | Prepare report and other assignments on non-ferrous metals. | <p>Types of non-ferrous metals and alloys.</p> <p>Identify types of non-ferrous metals and alloys.</p> <p>Discuss properties and characteristics of non-ferrous metals and alloys.</p> <p>Recognise the uses of non-ferrous metals in schools homes and communities.</p> |               |          | <p>Type of alloys</p> <p>-Brass<br/>-Bronza</p> <p>-Solder etc. (and their composition).</p> <p>Properties and characteristics</p> <p>-colour<br/>-weight<br/>-fusibility<br/>-formability, etc.</p> <p>Uses of each type of non-ferrous metals and alloys.</p> | <p>Have students identify metals and compare their properties and characteristics.</p> <p>Organise field trips/tours to e.g. Linmine,, Gafsons, Ind. Ltd.</p> <p>Prepare short notes for students.</p> <p>Let students prepare report/folder on types of non-ferrous metals.</p> |            |                        |

| Topic                                                       | Skills                                                                                                                              | Knowledge                                                                                                                                                 | Understanding                                                                                                                                                                                                                                                                                                                                        | Attitude                       | Content                                                                                                                                                                                                                             | Method/<br>Strategies                                                                                                                                                                                                                | Evaluation                                                                                                    | Area of<br>Integration                                                          |
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| Non Metal<br>Materials.<br><br>Introduction<br>To Plastics. | Grasp<br>Concept of<br>non-metal<br>materials<br>e.g. plastics.<br><br><br><br><br><br><br><br><br><br>Introduction<br>to plastics. | Describe<br>properties of<br>plastics.<br><br>Identify plastic<br>articles.<br><br><br><br><br><br><br>Select materials<br>appropriate for<br>given jobs. | Metals are useful<br>to the individual, but<br>it is difficult to<br>imagine life without<br>plastic articles: for<br>example, carpets,<br>buckets, bowls,<br>toothbrushes and<br>toys are all made<br>of plastics.<br><br><br><br>List types of<br>thermo plastic<br>materials and<br>thermo-setting<br>plastics.<br><br>State uses of<br>plastics. | Complete<br>assigned<br>tasks. | Definition of<br>plastics.<br><br>Properties of<br>plastics.<br><br>Advantages and<br>disadvantages of<br>plastics.<br><br><br><br>Two headings of<br>plastics<br>-thermo-plastic<br>materials.<br><br>-thermo-setting<br>plastics. | Have discussion<br>on plastics.<br><br>Discuss the<br>various uses of<br>plastics.<br><br><br><br>Let students<br>identify plastic<br>articles.<br><br>Organise field<br>trips/tours to<br>industries for e.g.<br>Gafsons, Ind. Ltd. | Give written<br>assignments.<br><br><br>Ask questions<br>during and<br>after lesson to<br>test understanding. | Electricity<br><br>Woods<br><br>Science<br><br>Home-<br>Economics<br><br>Visual |

| Topic                                       | Skills                                                           | Knowledge                                                                                                                                                                                                                                                    | Understanding                                                                                                                                                                                                                                                             | Attitude                                                                                               | Content                                                                                                                                                                                                                                                                                                                    | Method/<br>Strategies                                                                                                                                                                                                                                          | Evaluation                                                                                                    | Area of<br>Integration |
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| Commercial Forms and Supply Steels/ Metals. | Select appropriate shape of material for a given job or project. | <p>Identify shapes and forms of iron and steel.</p> <p>List figures of shapes and forms of iron and steel.</p> <p>Discuss the processes of forging, hot rolling and cold rolling of iron and steel.</p> <p>Discuss uses of steel supplied to industries.</p> | <p>After iron and steel have been produced they find their way onto the market to be put to various uses.</p> <p>This involves shaping or changing them into suitable forms and shapes so that they will be useful for making a wide range of articles or components.</p> | <p>Listening attentively and responding appropriately to questions.</p> <p>Complete assigned work.</p> | <p>Forging of metals.</p> <p>Hot rolled metals.</p> <p>Cold rolled metals.</p> <p>The product ion of</p> <ul style="list-style-type: none"> <li>-bars</li> <li>-rods</li> <li>-tubes</li> <li>-sheets</li> <li>-wire</li> <li>-strips</li> <li>-black bars</li> <li>-bright bars etc.</li> </ul> <p>Picking of metals.</p> | <p>Have discussions on forging.</p> <p>Hot rolling and cold rolling.</p> <p>Have discussions on forms/ shapes of iron and steel .</p> <p>Let students identify shapes and forms of steel.</p> <p>Organise field trips and tours to industries for example.</p> | <p>Give written assignments.</p> <p>Ask questions during and after lesson to test students understanding.</p> | Science                |

