FORM 1                       DESIGN AND TECHNOLOGY                       TIME: 2 hours

Name: _____________________________________ Class: _______________
________________________________________________________________________________

Note to student: ----------------------------------
You are required to answer all questions

FOR TEACHERS' USE ONLY

D       RM     E       --      --

Areas corrected

Max. Marks 20 40 40 -- --

Marks for Written Exam. 100

Marks for Design Folio 100

TOTAL 200

FINAL MARK %

D - Design, RM - Resistant Materials, E - Electronics

In the above table, enter the marks obtained by student in each area.
1. Rewrite the following stages of the design process in the correct order.

<table>
<thead>
<tr>
<th>Making</th>
<th>Situation</th>
<th>First Ideas</th>
<th>Planning</th>
<th>Testing and Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>Design brief</td>
<td>Specifications</td>
<td>Research</td>
<td>Chosen Idea</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td></td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

½ marks x 10 = 5 marks

2. Read carefully the design brief given below before answering questions a to e.

**Design brief:**
Design and make a night light for a ten year old child. The night light should be switched on and off manually.

a. Write down TWO keywords from the given design brief.

________________________________________________________________________

________________________________________________________________________

1 mark x 2 = 2 marks

b. List down TWO specifications that you would consider before designing the night light.

________________________________________________________________________

________________________________________________________________________

1 mark x 2 = 2 marks

c. State TWO methods by which you can communicate your ideas about the night light to other persons.

________________________________________________________________________

________________________________________________________________________

1 mark x 2 = 2 marks
d. In the space below sketch ONE idea for a night light. Your sketch must be clear, showing approximate overall sizes, materials, and any proposed finish or decoration. You are free to colour your sketches.

8 marks

e. Give ONE reason for the choice of material you indicated on your sketch for question d.

1 mark
3. You need to cut the following two shapes from a sheet of 3mm PVC.

![Shapes Diagram]

The rectangle below represents the PVC sheet. Inside the rectangle, mark out the two shapes with the least wastage possible.

4. a. State to which type of plastic each of the following statements refer to. Mark your answers with a ✓ under the correct column.

<table>
<thead>
<tr>
<th>Statement</th>
<th>THERMOPLASTIC</th>
<th>THERMOSETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>These plastics can be reshaped.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>These plastics are very difficult to recycle.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>These plastics withstand high temperatures before burning.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>These plastics tend to be more brittle.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

½ mark × 4 = 2 marks
b. Mention THREE objects that are made from thermosetting plastics and THREE objects that are made from thermoplastics.

<table>
<thead>
<tr>
<th>THERMOSETTING</th>
<th>THERMOPLASTIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

½ mark × 6 = 3 marks

5. Complete the following passage by filling in the missing words.

_______________ timbers are classified under two groups: hardwood and softwood.

_______________ come from deciduous trees having wide leaves which normally fall in

autumn. _______________ trees are mostly evergreen and have needle-like leaves.

Examples of hardwood are _______________ and _______________. Examples of

softwood are _______________ and _______________. With technological advances, man

started to produce new kinds of woods called _______________ boards. Examples of

such wooden boards are _______________ and _______________.

½ mark × 10 = 5 marks

6. Alex is doing some research on metals. Since he knows that iron is attracted by a magnet, Alex

can find out which metals contain iron. He tested the following metals:

▪ Mild steel  ▪ Copper  ▪ Aluminium  ▪ Cast iron

a. Fill in the following table so that Alex can check whether his findings are correct.

<table>
<thead>
<tr>
<th>Metals attracted by magnet</th>
<th>Metals NOT attracted by magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

½ mark × 4 = 2 marks

b. By using the results of the magnet test, Alex can later classify the above metals under TWO

groups: those containing iron and those that do not contain iron.

i. How is the group of metals containing iron called? _______________

ii. How is the group of metals containing no iron called? _______________

1 mark × 2 = 2 marks

c. Alex found out that mild steel is a metal made up from a mixture of two elements.

What is such a mixture called? _______________ 1 mark
7. Look at the following signs and then answer the following questions.

<table>
<thead>
<tr>
<th>Sign A</th>
<th>Sign B</th>
<th>Sign C</th>
<th>Sign D</th>
<th>Sign E</th>
</tr>
</thead>
</table>

a. Which sign shows the way to an emergency exit? ___________

b. Which sign can be found printed on the package of certain adhesives? ___________

c. Which sign should be placed near a fire extinguisher? ___________

d. Which sign indicates the location of an Emergency switch? ___________

e. Which sign obliges you to wear a pair of safety glasses? ___________

1 mark × 5 = 5 marks

8. Complete the following table by drawing the appropriate standard form of these metals in 3D.

<table>
<thead>
<tr>
<th>STANDARD FORM</th>
<th>SKETCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square bar</td>
<td></td>
</tr>
<tr>
<td>Tube</td>
<td></td>
</tr>
<tr>
<td>Round bar</td>
<td></td>
</tr>
</tbody>
</table>

1 mark × 3 = 3 marks
9. **Figures A and B** show two tasks commonly carried out during Design and Technology work. State the process, tools and material that are shown in each figure.

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>TOOLS</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure A**

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>TOOLS</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure B**

1 mark × 9 = 9 marks

10. Tony and Debbie decided to race two model cars having exactly the same body shape and powered by the same system. The body was produced from sheet material 2 mm thick as shown in **Figure C**. Tony used mild steel sheet while Debbie used aluminium sheet.

![Car body produced from 2mm sheet material](image)

**Figure C**

a. Tony’s mild steel car lost the race. Give ONE reason why this happened.

__________________________________________________________________________
__________________________________________________________________________

2 marks

b. Tony wants to produce another car body with the same shape to win over Debbie’s car. Suggest ONE suitable material which he can use for the new body.

__________________________________________________________________________

2 marks

c. Debbie wants to give some colour to her car body. Suggest a suitable surface finish she can use.

__________________________________________________________________________

2 marks
11 a. Why do we use fixed resistors in electronic circuits?

1 mark

b. Figure D shows an electronic circuit which a student used to switch on an LED. When the student tested the circuit, the LED burned out.

In the space provided re-draw the circuit in a way to prevent the LED from burning out.

![Figure D](image)

2 marks

12. Figure E shows THREE fixed resistors in a circuit.

![Figure E](image)

Study carefully the circuit shown in Figure E.

a. Which resistor is in series with resistor R1?

1 mark

b. Calculate the total resistance of the two resistors you identified as being in series.

2 marks
c. Why do we use the coloured bands of a fixed resistor?

__________________________________________________________________________

1 mark

d. What happens if the switch in Figure E is pressed?

__________________________________________________________________________

1 mark

e. Calculate the total resistance of the two resistors AFTER the switch is pressed.

__________________________________________________________________________

__________________________________________________________________________

2 marks

13. a. Why do we use batteries in electronic circuits?

__________________________________________________________________________

1 mark

b. Calculate the total voltage of the batteries shown in Figure F.

Answer: ___________

2 marks

c. Draw a sketch to show the following batteries.

PP3 – type Battery

AA – type Battery

2 marks

d. Complete the circuit diagram to show two batteries connected in series

2 marks
14. Complete the table given below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>INPUT</strong></td>
</tr>
<tr>
<td>LED</td>
<td>![LED symbol]</td>
<td></td>
</tr>
</tbody>
</table>

½ mark x 4 = 2 marks

15. **Figure G** shows an electronic circuit using different types of switches.

![Figure G diagram]

a. Switch SW1 is called a single pole single throw switch (SPST). What do we call switch SW2?

______________________________________________________

1 mark

b. What will happen when switch SW1 is pressed and switch SW2 is not pressed?

______________________________________________________

1 mark

c. What will happen when both SW1 and SW2 are pressed?

______________________________________________________

1 mark

16. **Figure H** shows the electronic circuit used for ultra bright LED torches. To work properly, the ultra bright LED needs 2.8V and 0.037Amps.

![Figure H diagram]
a. On figure H, label the voltage across the LED.  

b. On figure H, label the voltage across R1.  

c. On figure H, show the direction of the current passing through the circuit.  

d. Refer to figure H. Calculate the voltage across R1. (Show ALL working)  

Answer : ____________  

2 marks  

e. Refer to figure H. Using ohm’s law R = V/I, calculate the value of R1.  

Answer : ______________  

2 marks  

f. Figure I is showing a breadboard with two components from the circuit given in Figure H. Complete Figure I by adding the remaining components to show how the circuit in Figure H can be tested on the breadboard.  

2 marks
17.  a. What tool is used to solder electronic components on a Vero board?  

_______________________________________________________  

1 mark  

b. In the space provided sketch and label THREE copper tracks on a piece of Vero board.  

_______________________________________________________  

2 marks  

c. Mention TWO safety procedures that should be observed when soldering electronic components on a Vero board.  

_______________________________________________________  

2 marks  

18.  A design and technology student uses the circuit in Figure J to test whether a material is a conductor or an insulator.  

Figure J  

When the student places Material 1 between points A and B the bulb lights up.  

a. State whether Material 1 is a conductor or an insulator.  

_______________________________________________________  

1 mark  

b. The student requires a sound indicator instead of a light indicator when testing for conductive materials. In the space provided, re-draw the circuit to show how this can be achieved.  

_______________________________________________________  

3 marks