FORM 4 DESIGN & TECHNOLOGY TIME: 2 hours

Name: _______________________________ Class: ___________ Set: _____

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

<table>
<thead>
<tr>
<th>Areas corrected</th>
<th>Marks for Written Exam</th>
<th>Marks for Design Folio</th>
<th>TOTAL</th>
<th>FINAL MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>RM</td>
<td>E</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>Max. Marks</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Student’s mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FOR TEACHERS' USE ONLY

Enter student’s mark obtained in every area of study in the above table.

D for Design, RM for Resistant Materials, E for Electronics, T for Textiles technology and F for Food technology
Situation:
The school administration has noticed that a number of students come to school without lunch. Every morning these students come to school with unhealthy take-away food like burgers, hotdogs, pastizzi and pizza they buy from a shop situated next to the school. The school administration wants to provide healthy snacks which can be bought during midday break from the school tuck shop at a minimal cost.

1. Write down a design brief for the given situation and underline TWO keywords in your design brief.

____________________________________________________________________________
____________________________________________________________________________

3 marks + (1 mark × 2) = 5 marks

2. Give THREE design specifications that you would consider essential for an appropriate snack required by your design brief.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

1 mark × 3 = 3 marks

3. In the space provided below, draw a coloured sketch of one idea for your design brief. Give also an indication of portion size and the ingredients you intend to use.

8 marks
4.  a. Designers study similar products that are already on the market so that they can improve upon them. What is this study called?

____________________________________

1 mark

b. Study carefully the sports bag shown in Figure A, and then give ONE possible answer for each of the following questions.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Who will use this bag?</td>
</tr>
<tr>
<td>ii</td>
<td>Where will the bag be used?</td>
</tr>
<tr>
<td>iii</td>
<td>What items will it hold?</td>
</tr>
</tbody>
</table>

1 mark \( \times 3 = 3 \) marks

SECTION B: RESISTANT MATERIALS

5. Laura built a model of a monster by using the following plastic objects:

- an empty ketchup bottle
- a flexible tube
- a balloon
- a take-away food box

Figure B shows a diagram of how she assembled the objects together so that her monster can open its mouth.

a. State what happens to the balloon when the empty ketchup bottle is squeezed.

__________________________________________________________________________

1 mark

b. Underline the correct mechanical system by which the monster works.

- pulley and belt
- linkage
- pneumatic
- cam and follower

2 marks
c. Underline the most suitable plastic from which the empty ketchup bottle can be made.

- Polyethylene  - Acrylic  - GRP

1 mark

d. Give TWO reasons why Expanded Polystyrene (EPS) is used for the manufacture of take-away food boxes.

__________________________________________________________________________
__________________________________________________________________________

1 mark × 2 = 2 marks

6. a. Give TWO reasons why mild steel is not suitable for the manufacture of cutting tools such as pliers and chisels.

__________________________________________________________________________
__________________________________________________________________________

1 mark × 2 = 2 marks

b. Give ONE example of a steel that can be used for making cutting tools.

______________________________

1 mark

7. The following is a list of manufacturing processes.

- lamination  - extrusion  - vacuum forming  - casting  - injection moulding

Use this list to fill in the boxes, matching each product to its corresponding manufacturing process.

a. plastic bathtub

b. 3-ply plywood

c. plastic toy

d. metal section

e. metalwork bench vice

1 mark × 5 = 5 marks
8. a. Mark the EFFORT, LOAD and FULCRUM on Figure C.

![Figure C]

b. State what class of lever is the broom.

c. The design of the broom needs to be improved by adding some form of rubber grip/s to make it more comfortable to use. Indicate where such grip/s can be placed by sketching on Figure C.

![Figure C]

SECTION C: ELECTRONICS

9. Figure D shows the top and bottom view of a Veroboard.

![Figure D]

a. Which view is showing the side from where the legs of components are inserted?

b. Which view is showing the side from where soft solder is applied?

c. Mention TWO safety precautions that should be observed when soldering electronic components.
10. Mention the tool or equipment used for the following processes.

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>TOOL/EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>measuring the current in electronic circuits</td>
<td></td>
</tr>
<tr>
<td>cutting excess lengths of the legs of electronic components after soldering</td>
<td></td>
</tr>
<tr>
<td>varying the value of a pre-set resistor</td>
<td></td>
</tr>
<tr>
<td>soldering electronic components on a Veroboard</td>
<td></td>
</tr>
</tbody>
</table>

½ mark x 4 = 2 marks

11. a. On the IC shown in Figure E, label Pin 1 and Pin 8.

b. A student needs a monostable timing of 2 seconds for his project. Figure F shows the electronic circuit involved with the NE555 to create the period of 2 seconds.

If C1 has a value of 100µF, calculate the value of R1 to produce a time period of 2 seconds.

\[ t = R \times C \]

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

2 marks

c. What component can be added to the electronic circuit, shown in Figure F, so that the student can vary the time?

________________________________

1 mark
d. Waveforms A and B show the two possible outputs of an NE555 IC.

Waveform A

Waveform B

i. Which waveform shows an ASTABLE output? _________________________________ 2 marks

ii. What is meant by an ASTABLE output?

________________________________________________________________________

________________________________________________________________________

2 marks

12. a. In the space provided write the name of the TWO logic gate symbols shown below.

<table>
<thead>
<tr>
<th>LOGIC GATE SYMBOLS</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Logic Gate Symbol 1" /></td>
<td></td>
</tr>
<tr>
<td><img src="image2" alt="Logic Gate Symbol 2" /></td>
<td></td>
</tr>
</tbody>
</table>

½ mark x 2 = 1 mark

b. Figure G shows the two logic gates connected to form a new logic gate function. Complete the truth table for this new function.

<table>
<thead>
<tr>
<th>Truth Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUTS</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

2 marks
c. Complete the following electronic circuit diagram, showing TWO possible components to be used for the INPUTS. You should also include an LED in series with a fixed resistor for the OUTPUT.

+  

-  

3 marks

SECTION D: FOOD

13. What is meant by a ‘balanced diet’?

____________________________________________________________________________
____________________________________________________________________________

2 marks

14. Name TWO different methods of processing milk.

__________________________________                 __________________________________

1 mark × 2 = 2 marks

15. The following is a list of foods.
   • yoghurt       • lasagne       • wine       • blue cheese       • pastry

Which ONE of them is processed by:
   i. Mould? __________________________________
   ii. Yeast? __________________________________
   iii. Bacteria? ________________________________

1 mark × 3 = 3 marks

16. A private hospital specialising in the cure of heart diseases needs meals on daily basis. Write a plan for a breakfast, lunch and supper for ONE day which takes into account this particular dietary condition.

Breakfast: __________________________________
Lunch: __________________________________
Supper: __________________________________

2 marks × 3 = 6 marks
17. The nutrition information on a label reads:

<table>
<thead>
<tr>
<th>NUTRITION INFORMATION</th>
<th>PER PACKET</th>
<th>PER 100G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Kcal</td>
<td>394.5</td>
</tr>
<tr>
<td>Protein</td>
<td>g</td>
<td>2.5</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>g</td>
<td>22</td>
</tr>
<tr>
<td>Fat</td>
<td>g</td>
<td>4</td>
</tr>
</tbody>
</table>

Find the energy value of one packet.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

4 marks

18. Match the methods of cooking used with the description given.

<table>
<thead>
<tr>
<th>METHOD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Steaming</td>
<td>Food is immersed in a container of boiling fat.</td>
</tr>
<tr>
<td>2 Deep frying</td>
<td>Food is cooked in a frying pan with no additional fat.</td>
</tr>
<tr>
<td>3 Shallow frying</td>
<td>Food is cooked over a pan of boiling water.</td>
</tr>
</tbody>
</table>

1 mark x 3 = 3 marks

SECTION E: TEXTILES

19. Two origins of natural fibres are ANIMAL and VEGETABLE.
Use a ✓ to indicate from where the fibres for the following textile products originate.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>ANIMAL ORIGIN</th>
<th>PLANT ORIGIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A towel made of cotton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A jacket made of wool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A tie made of silk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A bed sheet made of linen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 mark x 4 = 4 marks

20. Mention TWO methods by which the edge of a piece of fabric can be finished.

____________________________________________________________________________
____________________________________________________________________________

1 mark x 2 = 2 marks
21. List TWO methods that can be used to decorate the surface of a cushion made from plain fabric.

__________________________________                 __________________________________

1 mark x 2 = 2 marks

22. a. Give TWO properties that a fabric should have for the manufacture of swimwear.

__________________________________

1 mark x 2 = 2 marks

b. State ONE example of a synthetic fabric that satisfies the properties you mentioned above.

__________________________________

2 marks

23. Draw arrows to match each textile product to the most appropriate chemical treatment for it. One has been done for you.

<table>
<thead>
<tr>
<th>TEXTILE PRODUCT</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>THEATRE CURTAIN</td>
<td>Antistatic</td>
</tr>
<tr>
<td>CARPET</td>
<td>Stain (soil) resistance</td>
</tr>
<tr>
<td>RAINCOAT</td>
<td>Flame (fire) retardant</td>
</tr>
<tr>
<td>SCHOOL TROUSERS</td>
<td>Crease resistance</td>
</tr>
<tr>
<td>SOFA COVER</td>
<td>Waterproof</td>
</tr>
</tbody>
</table>

1 mark x 4 = 4 marks

24. Give the meaning of the following pictograms or symbols found on textile products.

<table>
<thead>
<tr>
<th></th>
<th>![Symbol]</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>ii</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>iii</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>iv</td>
<td>![Symbol]</td>
</tr>
</tbody>
</table>

1 mark x 4 = 4 marks