Name: _________________________________
Class: __________

------------------------------------
Note to student: ---------------------------

You are required to answer all questions.

Useful Formulae:

\[ V = IR \quad \quad V_{\text{OUT}} = \frac{R_2}{R_1 + R_2} \times V_{\text{IN}} \]

FOR TEACHERS’ USE ONLY

DISTRIBUTION OF MARKS

<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>F</td>
<td>T</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>

Enter student’s mark obtained in every area of study in the above table.
D for Design, RM for Resistant Materials, E for Electronics, F for Food and T for Textiles
SECTION A: Design Process

1. Put the following stages of the design process in the correct place.

- Situation
- Development
- Planning
- Design brief
- Testing and Evaluation
- Research
- Chosen Idea
- Specifications
- Making
- Initial Ideas

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

½ mark × 10 = 5 marks

2. Carefully read the following situation.

The local council will be organising an activity for children to encourage recycling of waste in the village. During this activity some promotional items are going to be distributed and therefore the local council needs a textile bag for each child so that all items are held in them.

a. Prepare a design brief for the situation above.

________________________________________________________________________
________________________________________________________________________

2 marks

b. Write down FOUR keywords from your design brief.

* ____________________________________________  * ____________________________
* ____________________________________________  * ____________________________  

½ mark × 4 = 2 marks

3. Give TWO design requirements you would include in the specification list for the design brief you have decided in question 2a.

* ____________________________________________
* ____________________________________________

1 mark × 2 = 2 marks
4. In the space provided, sketch one idea for the design brief decided in question 2a. Your sketch must be clear and show materials, fastening method and aesthetic features.

5. Explain what is meant by the term ‘Chosen Idea’ as part of the design process.

2 marks

6. Give TWO instances when ICT can be used during a Design & Technology project.

- __________________________________________________________________________
- __________________________________________________________________________

2 marks

SECTION B: Resistant Materials

A food preparation area has an automatic ventilation system which switches on a fan when the place is in the dark. Figure A shows the different parts which make up the casing of its control unit.

![Figure A: Casing for the control circuit](image)
7. The front part of the casing is to be vacuum formed from a plastic sheet.

a. State which type of plastic can be shaped by vacuum forming. _______________________ 1 mark

b. Complete the following sentences in order to obtain a work plan for the process of vacuum forming.

i. Position the ____________________ on the platen.

ii. Tightly _______________________ the plastic sheet and set heating timer.

iii. Move ____________________ onto the plastic sheet and switch it on.

iv. Remove heater, lift the platen mould table and switch on ____________________ pump.

v. Leave plastic to ____________________ down and ____________________ the mould. ½ mark × 6 = 3 marks

c. Study carefully the following data related to vacuum forming.

<table>
<thead>
<tr>
<th>PLASTIC</th>
<th>THICKNESS (mm)</th>
<th>HEATING TIME (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>150</td>
</tr>
<tr>
<td>Y</td>
<td>2</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>180</td>
</tr>
</tbody>
</table>

3mm thick Plastic X sheet was heated for 180 seconds and then vacuum formed. However, the resultant form was not satisfactory because the plastic became ripped. Explain why this happened and propose a solution.

REASON: ____________________________________________________________________________

SOLUTION: __________________________________________________________________________ 1 mark × 2 = 2 marks

d. A flat area of 200mm × 130mm is required to form one front part.

i. If the vacuum forming machine holds plastic sheets of size 400mm × 400mm, what is the maximum number of parts that can be extracted from each sheet?

______________________________ 1 mark

ii. State ONE reason why it is important to use the plastic sheet to its maximum.

_________________________________________________________________________________ 1 mark
8. **Figure B** shows the incomplete vacuum forming mould which will be used to shape the front part of the casing.

![Figure B: Incomplete mould]

a. Underline the most suitable material for making the vacuum forming mould.
   - PVC
   - Acrylic
   - MDF

   Underline the most suitable material.  
   1 mark

b. Give TWO reasons for the choice you made in question 8a.

   - _________________________________________________________________________
   - _________________________________________________________________________

   1 mark × 2 = 2 marks

c. The sharp edges of the incomplete mould need to be rounded to obtain the required shape of the front part of the casing. Write down the hand tools required for the following processes:

   i. Marking out the centre of the arcs: _________________________________________
   ii. Marking out the arcs: ____________________________________________________
   iii. Cutting out the curves: _________________________________________________
   iv. Smoothing down the edges: _____________________________________________

   ½ mark × 8 = 4 marks

9. **a.** Consider that the food preparation area may be humid due to steam generated from cooking. Suggest ONE reason why the screws and name plate of the casing were also made from plastic.

   _________________________________________________________________________

   1 mark

   **b.** Mention ONE adhesive which can be used to join the plastic name plate to the front of the casing.

   ______________________________________

   1 mark
10. By means of sketches, show how the back of the casing can be modified so that the unit can be fixed to the wall. Remember that the user still has to have access to open the casing when replacing batteries.

3 marks

SECTION C: Electronics

**Figure C** shows the complete automatic ventilation system for the same food preparation area. The system switches ON a 12V d.c. motor of a fan when there is no light on an LDR. The system also has a lighting indicator to show that the motor is turning.

![Figure C: Automatic ventilation system](image)

11. On **Figure C**, label the LDR and the LED.

½ mark × 2 = 1 mark

12. **Figure D** shows an incomplete design idea for electronic circuit of the system used to control the motor.

![Figure D](image)
a. Give the name of the type of diagram shown in Figure D. ____________________________

b. Fill in the empty boxes on Figure D to form a complete design idea for the automatic ventilation system.

½ mark $\times 4 = 2$ marks

13. Figure E shows the INPUT circuit used for the automatic ventilation system and the data for the LDR.

a. What is the circuit shown in Figure E called?

____________________________________ ½ mark

b. Is R1 connected in series or in parallel with the LDR?

____________________________________ ½ mark

c. Calculate $V_{\text{OUT}}$ when there is no light on the LDR.

________________________________________

________________________________________

________________________________________

________________________________________ 2 marks

d. The company decided to have a variable control for $V_{\text{OUT}}$. Add components to the electronic circuit shown in Figure F to show how this is possible.

3 marks

e. What type of board is shown in Figure G?

________________________________________ 1 mark

f. Connect the circuit shown in Figure E on the board shown in Figure G.

2 marks

g. What tool is used to solder the components on the board shown in Figure G?

________________________________________ 1 mark
14. **Figure H** shows the PROCESS circuit used for the automatic ventilation system. The circuit consists from TR1 and TR2 to form a Darlington pair.

a. State why the design uses a Darlington pair rather than a single transistor. ________________________________ 1 mark

b. On **Figure H** show how the input circuit shown in **Figure E** is to be connected to the Darlington pair transistors. *In your answer do not include the source of electrical energy.* 2 marks

15. **Figure I** shows the electronic circuit used for the OUTPUT stage.

![Figure I](image)

a. The relay used to switch on the motor needs 6V; 35mA to be energized. Hence, calculate the value of R2.

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

2 marks

b. On **Figure I** draw the 12V d.c. motor connected to the relay. 2 marks
SECTION D: Food

Pastry products in take away outlets are very popular and sell well; however the manufacturer of these products would like to introduce flavoured pastry to increase the sales.

16. a. What are the THREE main ingredients in pastry?

- ___________________________
- ___________________________
- ___________________________

1 mark × 3 = 3 marks

b. List TWO flavourings that can be added to the pastry.

- ___________________________
- ___________________________

1 mark × 2 = 2 marks

17. Mention ONE skill you have learnt in pastry making.

__________________________________

1 mark

18. What method do we use to make the pastry?

__________________________________

1 mark

19. What do you add to the dry mixture to form the dough?

__________________________________

1 mark

20. State whether the following statements are TRUE or FALSE.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Keep ingredients, utensils and hands as cool as possible.</td>
</tr>
<tr>
<td>b.</td>
<td>Sieve flour to add air so that the pastry remains light.</td>
</tr>
<tr>
<td>c.</td>
<td>Work slowly so that the fat softens and the pastry becomes greasy.</td>
</tr>
<tr>
<td>d.</td>
<td>For short crust pastry the ratio of the flour to fat is 2:1.</td>
</tr>
<tr>
<td>e.</td>
<td>Roll out pastry on a warm surface.</td>
</tr>
<tr>
<td>f.</td>
<td>Pastry and pastry products cannot be frozen.</td>
</tr>
</tbody>
</table>

½ mark × 6 = 3 marks

21. Suggest ONE savoury and ONE sweet filling both rich in iron you would use to fill your pastry keeping in line with dietary guidelines.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td><strong>SAVOURY FILLING</strong></td>
</tr>
<tr>
<td>b.</td>
<td><strong>SWEET FILLING</strong></td>
</tr>
</tbody>
</table>

1 mark × 2 = 2 marks
22. Fill in the table below with sensory descriptors after evaluating the characteristics of the fillings you suggested in question 21.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Pie</th>
<th>Appearance</th>
<th>Smell</th>
<th>Flavour</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. SAVOURY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. SWEET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[\frac{1}{2} \text{ mark} \times 8 = 4 \text{ marks}\]

23. a. State ONE type of packaging you would use for such pies.

_______________________________________________________________

1 mark

b. Give ONE advantage and ONE disadvantage of the chosen packaging.

ADVANTAGE: _______________________________________________________

DISADVANTAGE: ___________________________________________________

1 mark \times 2 = 2 \text{ marks}

SECTION E: Textiles

A designer came up with the design of the dish cosy shown in Figure J. A dish cosy helps to keep food warm during travel.

24. Explain why woollen fibre fabrics are more suitable to be used in the making up of the dish cosy.

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

3 marks
25. State TWO ways for giving shape to the dish cosy.
   • ________________________________  • ________________________________ 1 mark \times 2 = 2 marks

26. Suggest a textile product which can be recycled and/or reused in the manufacture of the dish cosy.
   ___________________________________________ 3 marks

27. Give THREE methods by which the dish cosy can be coloured and decorated.
   • ________________________________  • ________________________________  • ________________________________ 1 mark \times 3 = 3 marks

28. The dish cosy should be securely fastened. Suggest THREE fasteners that can be applied.
   • ________________________________  • ________________________________  • ________________________________ 1 mark \times 3 = 3 marks

29. a. Give TWO reasons for applying overlock stitch to the edge of your dish cosy.
   • ____________________________________________________________________
   • ____________________________________________________________________ 1 mark \times 2 = 2 marks

b. Name and sketch TWO alternative methods which can replace the overlock stitch.

   NAME: _________________________   NAME: _________________________

   2 marks \times 2 = 4 marks