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

<table>
<thead>
<tr>
<th>Areas corrected</th>
<th>D</th>
<th>RM</th>
<th>E</th>
<th>F</th>
<th>T</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>Max. Marks</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>%</td>
</tr>
<tr>
<td>Student’s mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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.  
“ACS Airlines” is due to celebrating its fiftieth anniversary. “ACS” is asking you to design one of the following products to promote the airline’s achievement:

- a textiles headrest cover for its passenger seats
- a light meal which will be distributed in-flight
- a small and simple electronic gadget for children
- a keychain for adult passengers

Before answering questions 1 – 4, choose ONE product from the above list. Underline your choice.

1. a. Write a design brief according to your choice of product.

2 marks

b. Find TWO keywords from your design brief.

1 mark × 2 = 2 marks

2. State TWO methods by which you would complete research to prepare a design for your choice.

1 mark × 2 = 2 marks

3. Give THREE design specifications that you would consider for your chosen project.

1 mark × 3 = 3 marks
4. In the boxes provided below, sketch TWO ideas for your chosen product. Add notations and colour to your sketches.

IDEA 1:

IDEA 2:

4 marks × 2 = 8 marks

5. Give THREE reasons why testing is necessary in product design.

___________________________________________________ ________________________

___________________________________________________ ________________________

___________________________________________________ ________________________

1 mark × 3 = 3 marks

SECTION B: RESISTANT MATERIALS 20 marks

6. a. Complete the following table by mentioning the most suitable wooden manufactured board for each purpose. A material should only be mentioned once.

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MANUFACTURED BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>colourful and easily machined indoor furniture</td>
<td></td>
</tr>
<tr>
<td>tabletop laminated with plastic</td>
<td></td>
</tr>
<tr>
<td>cupboard thin back</td>
<td></td>
</tr>
<tr>
<td>high-strength non-warping sheets for chair seats</td>
<td></td>
</tr>
</tbody>
</table>

½ mark × 4 = 2 marks
b. Give ONE reason why a dust mask is needed when machining wooden manufactured boards.

_________________________________________________ ________________________  
1 mark

7. A side-cutter was heat-treated and dip-coated before it is put on the market.

![Figure A](image)

a. Fill in the boxes provided in Figure A showing which part of the side-cutter was HEAT-TREATED and which part was DIP-COATED.  
1 mark

b. State ONE heat treatment process which is suitable for this tool. Give ONE reason for your answer.

PROCESS: _________________________________________ ______________________  
REASON: __________________________________________ ______________________  
1 mark × 2 = 2 marks

c. Give ONE reason why this tool was dip-coated.

__________________________________________________ ________________________  
1 mark

8. Figure B shows a sketch of a magazine rack in 3D as seen from below.

![Figure B](image)

a. Complete the following part list for the magazine holder shown in Figure B.

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>MATERIAL</th>
<th>SIZE (mm)</th>
<th>NO. OF ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>outer shell</td>
<td>acrylic</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>shelf</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>supporting rod</td>
<td></td>
<td>Ø 6 × 380</td>
<td>2</td>
</tr>
</tbody>
</table>

1 mark × 4 = 4 marks
b. Illustrate TWO methods by which the 6 mm Ø supporting rods can be held securely in place without slipping out of the outer shell.

METHOD 1:  

METHOD 2:  

1 mark × 2 = 2 marks

9. Sarah is designing an etching tank which will help her produce PCBs at home. In order to obtain better etching results, she included an agitator inside the tank to stir up the acid. Figure C shows a sketch of one of her ideas for the agitator.

a. Draw an arrow on Figure C to describe what happens at the OUTPUT of the system when syringe A is held pushed.  

1 mark

b. Name the TWO types of mechanical systems used to obtain the oscillating movement of the plate.  

__________________________________          ______ ____________________________  

1 mark × 2 = 2 marks

c. What is the function of the spring?  

__________________________________________________ _______________________

1 mark
d. Suggest, by means of a sketch, ONE other mechanism by which Sarah can obtain the same output movement.

SECTION C: ELECTRONICS

10. Figure D shows an incomplete timing circuit which Sarah used for her etching tank.

![Figure D](image)

a. What type of capacitor is used in the electronic circuit shown in Figure D?

b. Connect the two resistors shown in Figure E to complete the timing circuit shown in Figure D.

c. Give the name of the component VR1 in Figure E.
d. Calculate the minimum timing using the data given on the completed circuit.

___________________________________________________ ______________________
___________________________________________________ ______________________
___________________________________________________ ______________________

1 mark

e. Calculate the maximum timing of the completed circuit.

___________________________________________________ ______________________
___________________________________________________ ______________________
___________________________________________________ ______________________

2 marks

11. Circuit A and B are two potential divider circuits. Circuit A uses an LDR while Circuit B uses a thermistor.

Using the datasheets for the LDR and thermistor, a student collected the following information:

<table>
<thead>
<tr>
<th>LDR</th>
<th>Thermistor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low resistance</td>
<td>Light</td>
</tr>
<tr>
<td>High resistance</td>
<td>Dark</td>
</tr>
<tr>
<td></td>
<td>Low resistance</td>
</tr>
<tr>
<td></td>
<td>High Temperature</td>
</tr>
<tr>
<td></td>
<td>High resistance</td>
</tr>
<tr>
<td></td>
<td>Low temperature</td>
</tr>
</tbody>
</table>

a. Using the above information, briefly describe the function of the two circuits.

i. Function of circuit A:

________________________________________________________________________

1 mark

ii. Function of circuit B:

________________________________________________________________________

1 mark

b. Show how a voltmeter is to be connected to check the output voltage $V_{out}$ on circuit A.

1 mark
12. a. Indicate whether the given components are used as INPUT, PROCESS or OUTPUT. Mark ✓ under the correct heading. (Note that two are given).

<table>
<thead>
<tr>
<th>Component</th>
<th>INPUT</th>
<th>PROCESS</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>✓✓</td>
<td></td>
<td>✓✓</td>
</tr>
<tr>
<td>Push-to-make switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOT GATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AND GATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistor</td>
<td></td>
<td>✓✓</td>
<td></td>
</tr>
<tr>
<td>LED</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

½ mark × 4 = 2 marks

b. Figure F shows an electronic circuit with two push-to-make switches connected to a logic system together with its corresponding truth table.

In the space provided design a circuit to satisfy the logic in the new truth table shown below.

<table>
<thead>
<tr>
<th>New Truth Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT</td>
</tr>
<tr>
<td>SW1</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

3 marks
13. The cam shown in Figure G rotates in an anticlockwise movement. When the cam hits the lever-type SPDT micro switch, the switch is activated.

[Diagram of a cam and a micro switch]

a. What does SPDT refer to? ____________________________ __________________________ 1 mark

b. Draw the electronic symbol for a SPDT switch.

[Diagram of a SPDT switch]

1 mark

c. By completing the electronic circuit shown in Figure G, design a system that lights up a red LED when the cam hits the micro switch but lights up a green LED when the cam is not in touch with the micro switch. 
*Label all electronic components used in your design.*

3 marks

14. From which food group should we eat (a) most and (b) sparingly?

a. eat most : __________________________________________________________

b. eat sparingly : ____________________________________________________

1 mark × 2 = 2 marks

15. Give TWO reasons why it is important for food industries to provide good packaging for their products.

________________________________________________________________________

________________________________________________________________________

1 mark × 2 = 2 marks
16. State ONE safety precaution that should be observed by a food handler to prevent each of the following:
   a. cuts _____________________________________________
   b. hair catching fire: ________________________________
   c. tipping over saucepans while cooking:____________________

   1 mark x 3 = 3 marks

17. Match the following food with the appropriate method of cooking.

<table>
<thead>
<tr>
<th>METHOD OF COOKING</th>
<th>FOOD COOKED BY THIS METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Deep frying</td>
</tr>
<tr>
<td>2</td>
<td>Poaching</td>
</tr>
<tr>
<td>3</td>
<td>Shallow frying</td>
</tr>
<tr>
<td>4</td>
<td>Baking</td>
</tr>
<tr>
<td>5</td>
<td>Steaming</td>
</tr>
<tr>
<td></td>
<td>Sausages</td>
</tr>
<tr>
<td></td>
<td>Battered chicken</td>
</tr>
<tr>
<td></td>
<td>Vegetables</td>
</tr>
<tr>
<td></td>
<td>Eggs</td>
</tr>
<tr>
<td></td>
<td>Apple pie</td>
</tr>
</tbody>
</table>

   1 mark x 5 = 5 marks

18. Suggest a healthy meal and a desert for a group of elderly people.

   Meal: _____________________________________________
   Desert: ____________________________________________

   3 marks

19. Figure H shows the axis of the star diagram for a beef burger.
a. Plot the following information to complete the star diagram.

<table>
<thead>
<tr>
<th></th>
<th>Meaty</th>
<th>Greasy</th>
<th>Salty</th>
<th>Spicy</th>
<th>Appetising</th>
<th>Herby</th>
<th>Dry</th>
<th>Juicy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

1 mark

b. From the information given, suggest ONE healthy modification that could be made to the burger. Give a reason for your answer.

1 mark × 2 = 2 marks

20. Biotechnology is the use of living things to create or modify food products. These can be created either by traditional or by modern biotechnology. Which of the following statements is indicating traditional biotechnology?

A: Rice with built-in Vitamin A that can help prevent blindness in people suffering from Vitamin A deficiency.

B: The selection of the best fruit to ensure good quality seeds for the future crops.

Statement: [Blank]

2 marks

21. Give TWO reasons why manufacturers add finishes to fabrics.

___________________________________________________ ______________________

___________________________________________________ ______________________

___________________________________________________ ______________________

2 marks × 2 = 4 marks

22. Explain why designers sometimes use a Toile (a Mock-up model) when designing and developing a new textile product.

___________________________________________________ ______________________

___________________________________________________ ______________________

___________________________________________________ ______________________

4 marks
23. Give TWO reasons why the use of CAM (Computer Aided Manufacture) facilitates the production of textile products.

__________________________________________________________________________

__________________________________________________________________________

1 mark × 2 = 2 marks

24. Write a work plan with the five main stages for producing an appliqué design. The first stage has been done for you.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cut out the fabric shapes.</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

4 marks

25. Which fibres are represented by the symbols shown below?

1 mark × 2 = 2 marks

26. Give the meaning of the four symbols indicated on the following textiles care label.

1 mark × 4 = 4 marks