DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2013

FORM 3 (1st Yr) **DESIGN & TECHNOLOGY** **TIME: 2 hours**

Name: _____ **Class:** _____

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

You are required to answer all questions.

Useful Formulae:

$$V = IR \qquad V_{OUT} = \frac{R_2}{R_1 + R_2} \times V_{IN}$$

FOR TEACHERS' USE ONLY DISTRIBUTION OF MARKS

	Areas corrected					Marks for Written Exam.	Marks for Design Folio	TOTAL	**FINAL MARK**
	D	**RM**	**E**	**F**	**T**				
Max. Marks	20	20	20	20	20	100	100	200	**%**
Student's mark									

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

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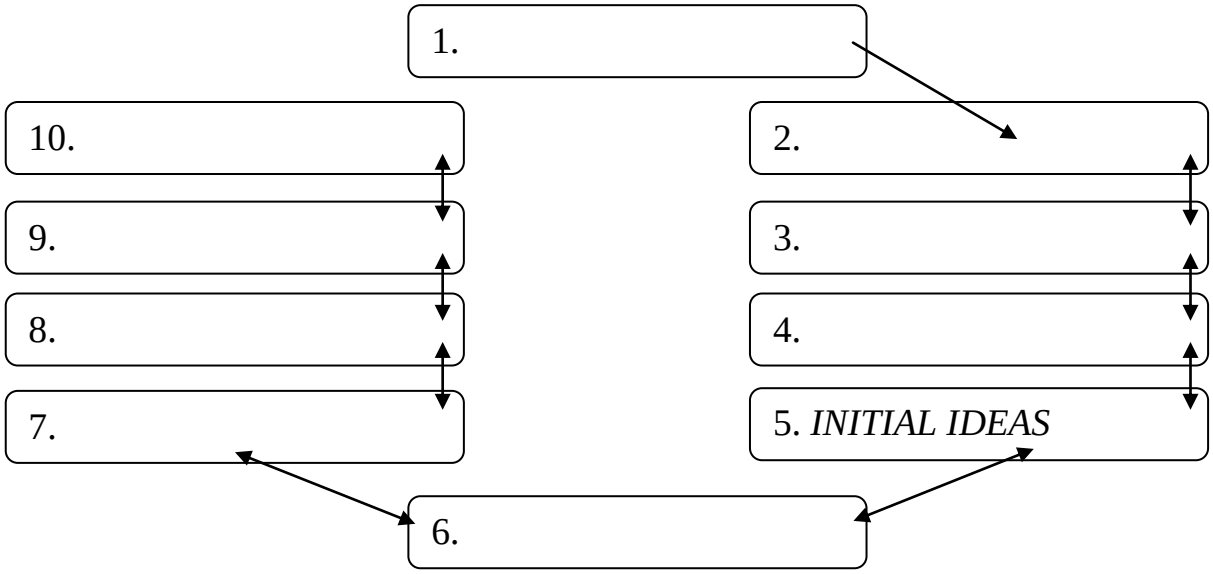
SECTION A: **Design Process**

1. Put the following stages of the design process in the correct place. One has been com for you.

▪ **Situation** ▪**Development** ▪**Planning** ▪ **Design brief**
▪ **Testing and Evaluation** ▪ **Research** ▪ **Chosen Idea**
▪ **Specifications** ▪ **Making** ▪ **~~Initial Ideas~~**



1 mark × 9 = 9 marks

2. Carefully read the following design brief.

Design and make a textile bag to hold some promotional items. The bag will be distributed by the local council during an activity to encourage recycling of waste in the village amongst children.

a. Write down FOUR keywords from this design brief.

▪ _____ ▪ _____

▪ _____ ▪ _____

½ mark × 4 = 2 marks

b. State TWO sources from where you can get information during the research on this design brief.

▪ _____ ▪ _____

½ mark × 2 = 1 mark

c. Give TWO design requirements you would include in the specification list for the bag.

▪ _____

▪ _____

1 mark × 2 = 2 marks

3. In the space provided, sketch one idea for the design brief. Your sketch must [illegible] show materials, fastening method and aesthetic features.

5 marks

4. Mention an activity that is performed during the 'evaluation stage' as part of the design process.

_____

1 mark

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.

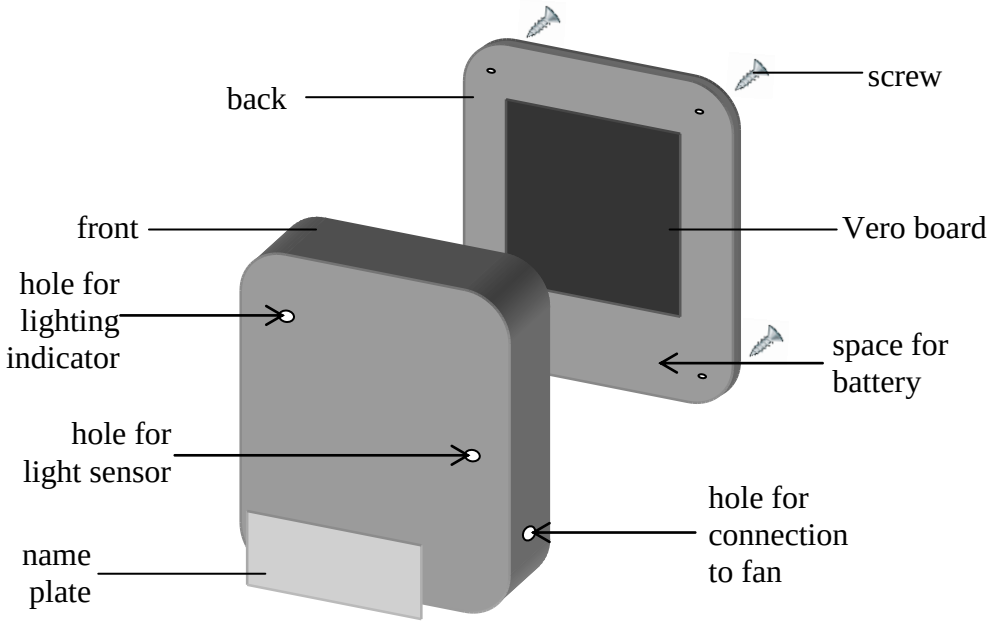


Figure A: Casing for the control circuit

5. 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 m

b. Complete the following work plan for the process of vacuum forming. Use the following words to fill in the blanks:

▪ **heater** ▪ **clamp** ▪ **cool** ▪ **mould** ▪ **vacuum** ▪ **remove**

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.

PLASTIC	THICKNESS (mm)	HEATING TIME (sec)
X	2	120
	3	150
Y	2	150
	3	180

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 burnt. Explain why this happened and propose a solution.

REASON: _____

SOLUTION: _____

1 mark × 2 = 2 marks

d. A flat area of 200mm × 200mm 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

6. **Figure B** shows the incomplete vacuum forming mould which will be used to shape part of the casing.

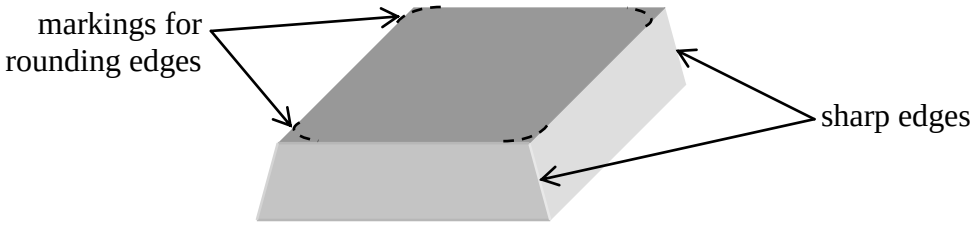


Figure B: Incomplete mould

a. Underline the most suitable material for making the vacuum forming mould.

▪ **PVC** ▪ **Acrylic** ▪ **MDF**

1 mark

b. Give ONE reason for the choice you made in question **6a**.

▪ _____

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. Choose the suitable hand tools required for each process from the following list:

▪ **pair of compasses** ▪ **pencil** ▪ **flat file** ▪ **steel rule**
▪ **sanding block** ▪ **try square** ▪ **coping saw**

Note that a tool can be mentioned more than once.

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

7. **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**

8. By means of sketches, show how the back of the casing can be modified so that it can be fixed to the wall. Remember that the user still has to have access to open the case for 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.

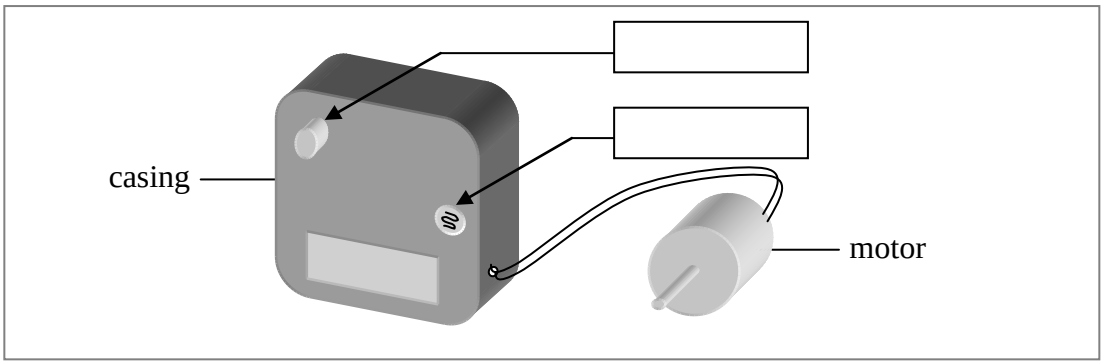


Figure C: Automatic ventilation system

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

½ mark × 2 = 1 mark

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

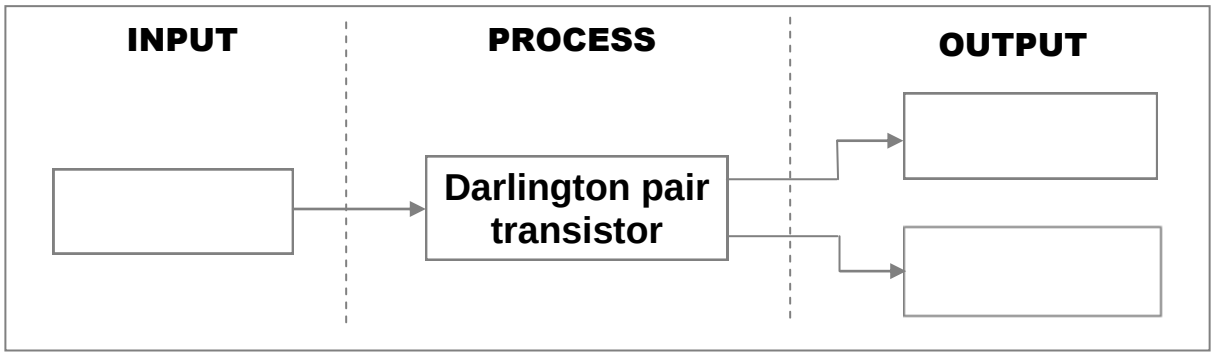


Figure D

a. Tick (✓) the correct statement from the following:

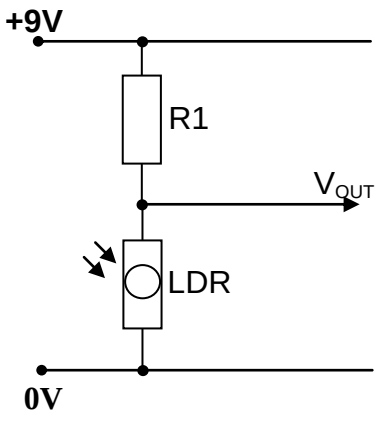
- ☐ **Figure D** shows a schematic diagram.
- ☐ **Figure D** shows a web diagram.
- ☐ **Figure D** shows a block diagram.

b. Use the following components to complete the diagram shown in **Figure D**.

▪ *LED*	▪ *Low voltage motor*	▪ *Light sensor*

½ mark × 4 = 2 marks

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



LDR Data	
Light	10Ω
Dark	100KΩ

Figure E

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_{OUT} when there is no light on the LDR.

_____

_____

_____

_____

_____

2 marks

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

3 marks

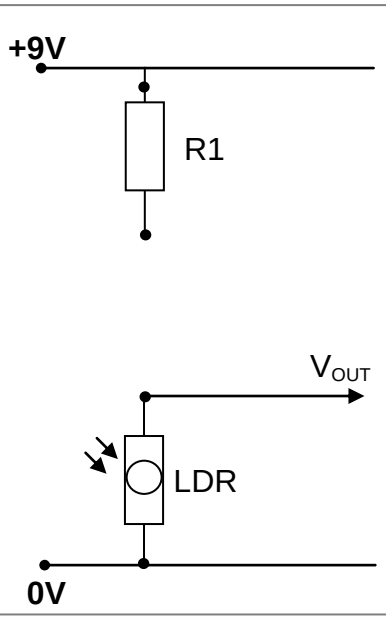


Figure F

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

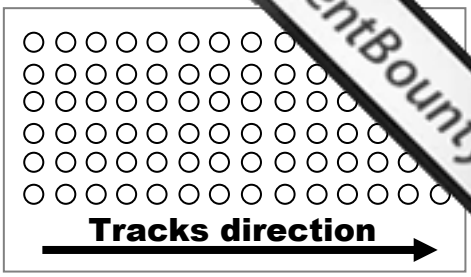


Figure G

12. **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. Tick (✓) the correct ending for the following statement.

The Darlington pair transistors were used to:

☐ amplify the current.

☐ control the INPUT circuit.

☐ save the energy of the battery.

1 mark

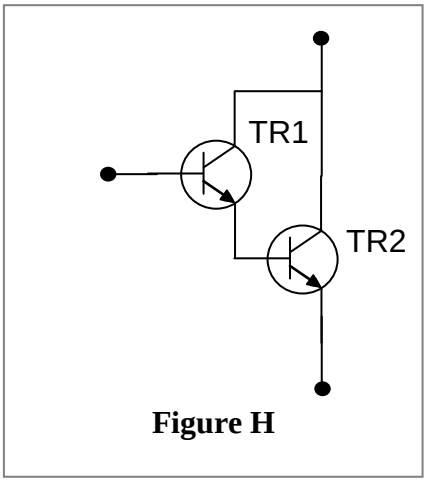


Figure H

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

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

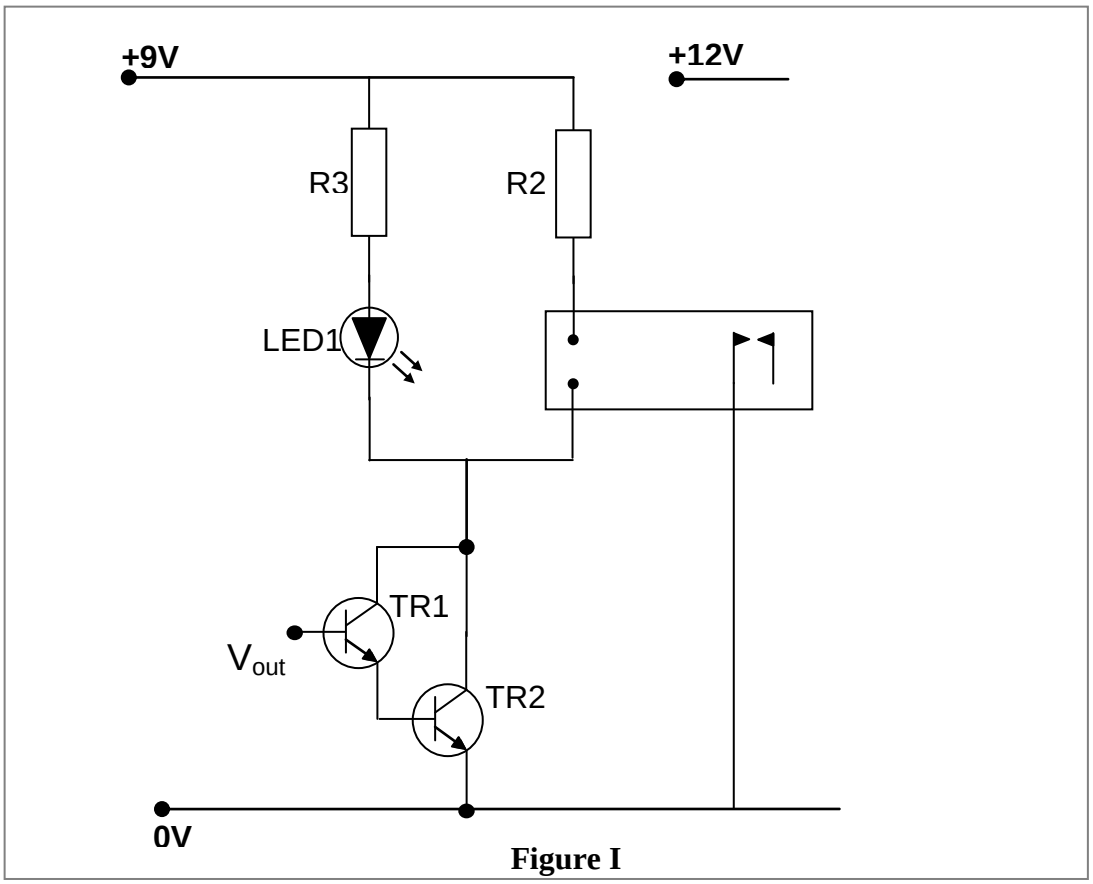


Figure I

a. The relay used to switch on the motor needs 6V; 35mA to be energized. Hen[illegible] 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.

14. **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

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

_____ **1 mark**

16. What ingredients do we rub in together in pastry making?

▪ _____ ▪ _____

½ mark × 2 = 1 mark

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

_____ **1 mark**

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

a.	Keep ingredients, utensils and hands as cool as possible.	
b.	Sieve flour to add air so that the pastry remains light.	
c.	Work slowly so that the fat softens and the pastry becomes greasy.	
d.	Wrap the pastry and chill for at least 30 minutes.	
e.	Roll out pastry on a warm surface.	
f.	Pastry and pastry products cannot be frozen.	

½ mark × 6 = 3 marks

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

a.	**SAVOURY FILLING**	
b.	**SWEET FILLING**	

1 mark × 2 = 2 marks

20. Fill in the table below with sensory descriptors after evaluating the characteristics of ONE of the fillings you suggested in question **19**.

Characteristics				
Filling	**Appearance**	**Smell**	**Flavour**	**Texture**
SAVOURY/ SWEET				

1 mark × 4 = 4 marks

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

_____ **1 mark**

b. Give TWO advantages of the chosen packaging.

- _____
- _____

1 mark × 2 = 2 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.

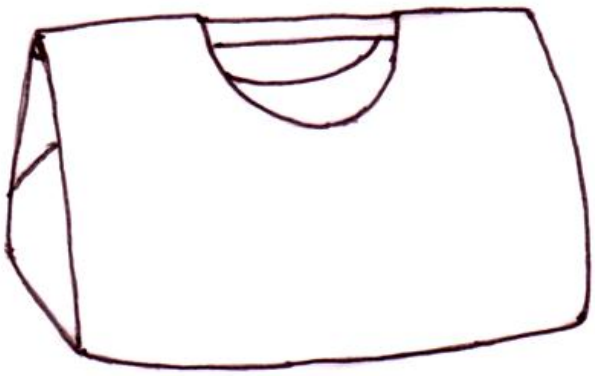


Figure J

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

_____

_____

_____

3 marks

23. State ONE way for giving shape to the dish cosy.

_____

2 marks

24. Suggest a textile product which can be recycled and/or reused in the manufacture of the dish cosy.

_____

2 marks

25. Give TWO methods by which the dish cosy can be coloured and decorated.

▪ _____ ▪ _____

2 marks × 2 = 4 marks

26. The dish cosy should be securely fastened. Suggest TWO fasteners that can be applied.

▪ _____ ▪ _____

2 marks × 2 = 4 marks

27. **a.** Give ONE reason for applying overlock stitch to the edge of your dish cosy.

_____

2 marks

b. Name and sketch ONE alternative method which can replace the overlock stitch

NAME: _____

3 marks