



Rewarding Learning

General Certificate of Secondary Education
2013

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Candidate Number

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Technology and Design

Unit 2:
Systems and Control

Element 1: Electronic and
Microelectronic Control Systems



[GTD21]

GTD21

FRIDAY 7 JUNE, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**

Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.



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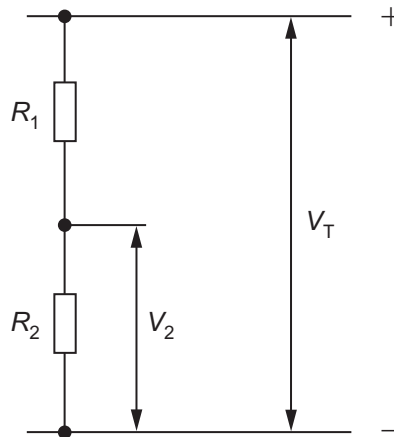
Formulae for GCSE Technology and Design

You should use, where appropriate, the formulae given below when answering questions which include calculations.

1 Potential Difference = current \times resistance ($V = I \times R$)

2 For potential divider

$$V_2 = \frac{R_2}{R_1 + R_2} \times V_T$$



3 Series Resistors $R_T = R_1 + R_2 + R_3 \text{ etc}$

Parallel Resistors $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$ or $R_T = \frac{R_1 \times R_2}{R_1 + R_2}$

4 Time Constant $T = R \times C$

[Turn over



(f) A student is to design an electronic circuit for a rotating night-light using a PIC microprocessor. The night light is to operate automatically once the toggle switch is turned on. An LDR will act as a sensor to determine when the room becomes dark. The PIC microprocessor will control a motor and some LEDs.

The PIC has 2 inputs and 5 outputs.

The inputs and outputs are shown in **Tables 2** and **3**.

When the room is dark the LDR input will be high.

Binary 1 indicates high (on) and binary 0 indicates low (off).

Digital Panels

Table 2

| BIT | 1 | 0 |
|-----------|---------------|-----|
| PIC Input | Toggle Switch | LDR |

Table 3

| BIT | 4 | 3 | 2 | 1 | 0 |
|------------|-------|----------|-----------|------------|---------|
| PIC OUTPUT | Motor | Blue LED | Green LED | Yellow LED | Red LED |

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |



THIS IS THE END OF THE QUESTION PAPER





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| For Examiner's use only | |
|-------------------------|-------|
| Question Number | Marks |
| 1 | |
| 2 | |

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| Total Marks | |
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Examiner Number

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