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# **GCSE MARKING SCHEME**

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**SUMMER 2025**

**GCSE  
ELECTRONICS – COMPONENT 2  
C490U20-1**

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## About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

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**GCSE ELECTRONICS**  
**COMPONENT 2 – APPLICATION OF ELECTRONICS**  
**SUMMER 2025 MARK SCHEME**  
**GENERAL INSTRUCTIONS**

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (except for the extended response question).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement.

Marking abbreviations

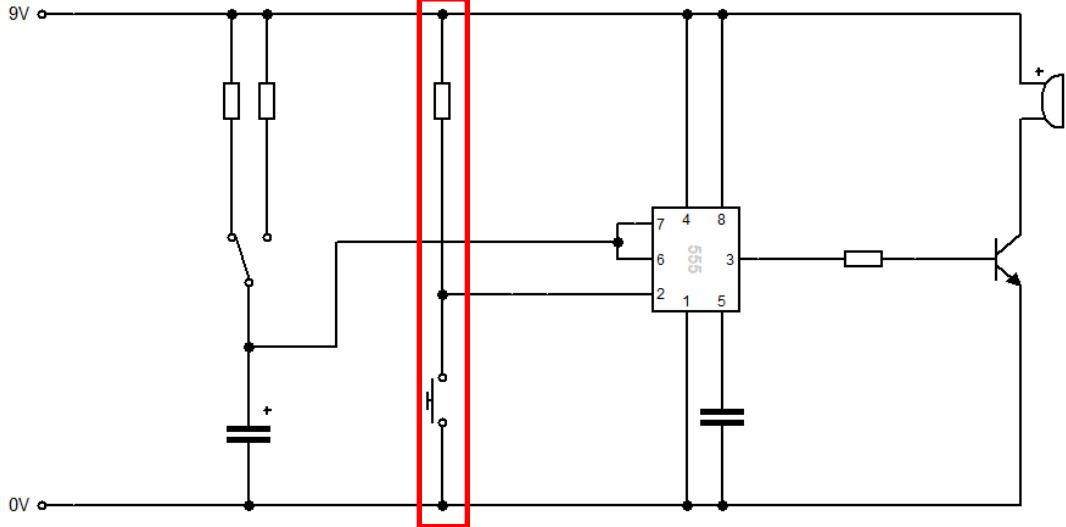
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only

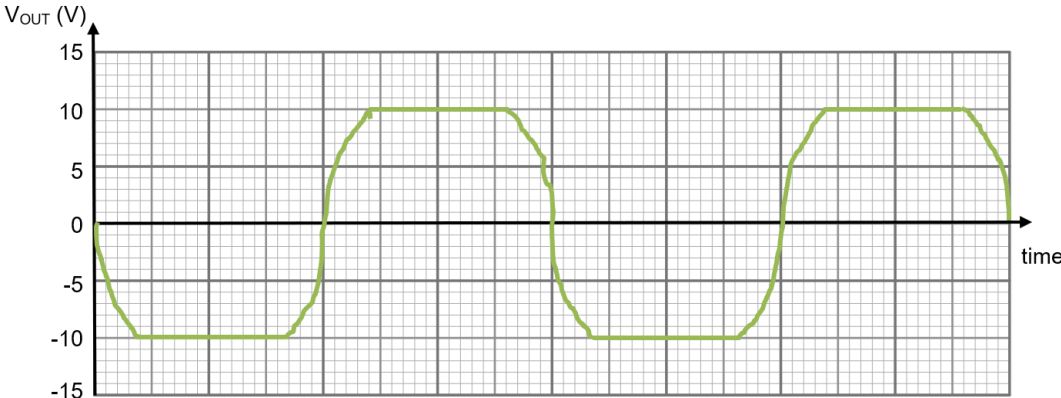
ecf = error carried forward

| Question |     |  | Marking details                                                                                                                                                                                                                                               | Marks available |     |     |       |       |
|----------|-----|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |     |  |                                                                                                                                                                                                                                                               | AO1             | AO2 | AO3 | Total | Maths |
| 1        | (a) |  | $f = \frac{1.44}{(R_1 + 2R_2) \times C_1}$ ----- Formula – 1 Mark<br><br>$f = \frac{1.44}{(7.2 \times 10^3 + 2 \times 2.4 \times 10^3) \times 1200 \times 10^{-6}}$ ---- Substitution – 1 Mark / Multipliers– 1 Mark<br><br>$f = 0.1Hz$ ----- Answer – 1 Mark | 2               | 2   | 0   | 4     | 3     |
|          | (b) |  | $\frac{T_{ON}}{T_{OFF}} = \frac{R_1 + R_2}{R_2}$ ----- Formula – 1 Mark<br><br>$\frac{T_{ON}}{T_{OFF}} = \frac{7.2k + 2.4k}{2.4k}$ ----- Substitution – 1 Mark<br><br>$\frac{T_{ON}}{T_{OFF}} = \frac{4}{1}$ ----- Answer – 1 Mark                            | 2               | 1   | 0   | 3     | 2     |
|          |     |  | Question 1 Total                                                                                                                                                                                                                                              | 4               | 3   | 0   | 7     | 5     |

| Question |     |      | Marking details                                                                                                                        | Marks available |     |     |       |       |
|----------|-----|------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |     |      |                                                                                                                                        | AO1             | AO2 | AO3 | Total | Maths |
| 2        | (a) |      | 4cm x 2V/cm = 8V<br><br>1 mark for amplitude = 4cm / 1 mark answer                                                                     | 1               | 1   |     | 2     | 1     |
|          | (b) | (i)  | Identification of mark / space time – 1 mark<br><br>Mark time - 1cm x 5ms = 5ms – 1 mark<br><br>Space time - 3cm x 5ms = 15ms – 1 mark | 1               | 2   |     | 3     | 2     |
|          |     | (ii) | Period = 5ms + 15ms = 20ms – 1 mark<br><br>$f = \frac{1}{T}$ ... .. (1 mark)<br><br>$f = \frac{1}{20ms} = 50Hz$ ... .. (1 mark)        | 1               | 2   |     | 3     | 2     |
|          |     |      | Question 2 total                                                                                                                       | 3               | 5   | 0   | 8     | 5     |

| Question |     |  | Marking details                                                                                                                                                                                                                                                                                      | Marks available |     |     |       |       |
|----------|-----|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |     |  |                                                                                                                                                                                                                                                                                                      | AO1             | AO2 | AO3 | Total | Maths |
| 3        | (a) |  |  <p>Trigger circuit containing Push-to-make switch and resistor between power rails – 1 Mark<br/> Correct orientation of trigger circuit – 1 Mark<br/> Correct connection of trigger circuit to Pin 2 – 1 Mark</p> | 3               | 0   | 0   | 3     | 0     |
|          | (b) |  | <p>Two resistors connected in series – 1 mark</p> <p>Values add up to 124k from E24.<br/> i.e. 100k + 24k, 91k + 33k, 68k + 56k, or 62k + 62k.</p>                                                                                                                                                   | 1               | 1   | 0   | 2     | 1     |

| Question |     |                  | Marking details                                                                                                                                                                                                                                                                                                                                                 | Marks available |     |     |       |       |
|----------|-----|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |     |                  |                                                                                                                                                                                                                                                                                                                                                                 | AO1             | AO2 | AO3 | Total | Maths |
|          | (c) | (i)              | $T = 1.1RC$ ----- (1 - Formula)<br>$T = 1.1 \times 124 \times 10^3 \times 2200 \times 10^{-6}$ ----- (1 – Substitution / 1 – Multipliers)<br>$T = 300.08s \cong 300s = 5\text{ minutes}$ ----- (1 – Answer)                                                                                                                                                     | 1               | 3   | 0   | 4     | 3     |
|          |     | (ii)             | $T = 1.1RC$<br>$R = \frac{T}{1.1 \times C}$ ----- (1 – Rearrangement)<br>$R = \frac{7 \times 60}{1.1 \times 2200 \times 10^{-6}}$ ----- (1 – Substitution)<br>$R = 173553.7\Omega \cong 173.6k\Omega$ ----- (1 – Answer)<br>Or<br>$R_2 = (7 / 5) \times R_1$ ----- (1)<br>$R_2 = (7 / 5) \times 124$ ----- (1)<br>$R_2 = 173.6\text{ k}\Omega$ ----- (1 Answer) | 1               | 2   | 0   | 3     | 2     |
|          |     | (iii)            | $R_2 = 180k\Omega$ ecf from c(ii)                                                                                                                                                                                                                                                                                                                               | 0               | 1   | 0   | 1     | 0     |
|          |     | Question 3 Total |                                                                                                                                                                                                                                                                                                                                                                 |                 | 6   | 7   | 0     | 13    |

| Question         |     |  | Marking details                                                                                                                                                                                                                                                                                            | Marks available |     |     |       |       |
|------------------|-----|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|                  |     |  |                                                                                                                                                                                                                                                                                                            | AO1             | AO2 | AO3 | Total | Maths |
| 4                | (a) |  | $Gain = -\frac{R_F}{R_{IN}}$ ----- (1 – Formula)<br><br>$Gain = -\frac{240k}{10k}$ ----- (1 – Substitution & Multipliers)<br><br>$Gain = -24$ ----- (1 – Answer)                                                                                                                                           | 1               | 2   | 0   | 3     | 2     |
|                  | (b) |  | <div>  <p>           Inverted Output – 1 mark<br/>           Same Frequency – 1 mark<br/>           Amplitude clipped at 10V – 1 mark         </p> <p style="text-align: right;"><b>ecf</b> on gain from (a)</p> </div> | 2               | 1   | 0   | 3     | 2     |
| Question 4 Total |     |  |                                                                                                                                                                                                                                                                                                            | 3               | 3   | 0   | 6     | 4     |

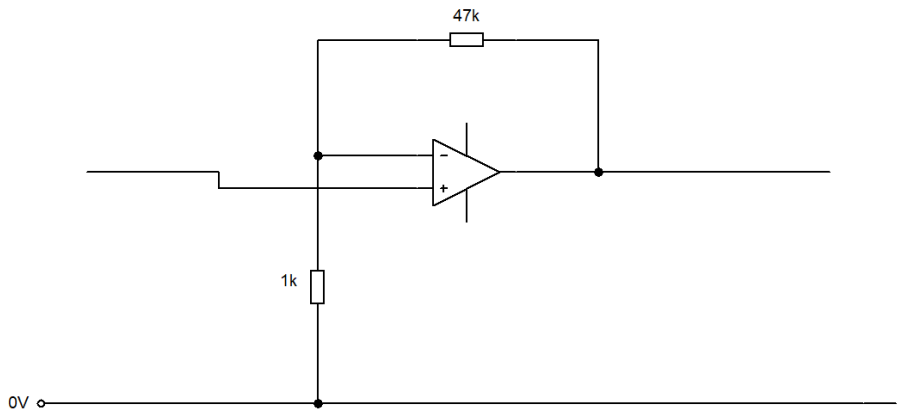
| Question |     |  | Marking details                                                           |        |        |     |        | Marks available |     |     |       |       |  |  |  |  |  |
|----------|-----|--|---------------------------------------------------------------------------|--------|--------|-----|--------|-----------------|-----|-----|-------|-------|--|--|--|--|--|
|          |     |  |                                                                           |        |        |     |        | AO1             | AO2 | AO3 | Total | Maths |  |  |  |  |  |
| 5        | (a) |  | Clock Pulse                                                               | Orange | Purple | Red | Yellow | 2               | 4   | 0   | 6     | 0     |  |  |  |  |  |
|          |     |  | 0                                                                         | On     | On     | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 1                                                                         | Off    | On     | On  | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 2                                                                         | On     | On     | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 3                                                                         | Off    | Off    | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 4                                                                         | Off    | On     | On  | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 5                                                                         | Off    | On     | Off | On     |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 6                                                                         | On     | On     | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 7                                                                         | On     | On     | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 8                                                                         | Off    | On     | On  | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 9                                                                         | On     | On     | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 10                                                                        | Off    | Off    | Off | Off    |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 1 mark for each correct column for pulses 0-6 (Max 4 marks)               |        |        |     |        |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 1 mark for correct reset                                                  |        |        |     |        |                 |     |     |       |       |  |  |  |  |  |
|          |     |  | 1 mark for correct for pulses 7-10.<br>(ecf if rows 7-10 repeat rows 0-3) |        |        |     |        |                 |     |     |       |       |  |  |  |  |  |

| Question |      |                                                                                                                           | Marking details                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Marks available |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------|------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------|--------------|-------------|-------|---|---|------------|--------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|          |      |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AO1             | AO2        | AO3          | Total       | Maths |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5        | (b)  | (i)                                                                                                                       | <table><tr><th colspan="2">Inputs</th><th colspan="3">Outputs</th></tr><tr><th>B</th><th>A</th><th>R<br/>(Red)</th><th>G<br/>(Green)</th><th>B<br/>(Blue)</th></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr></table> <p>1 Mark for each correct row of truth table</p> | Inputs          |            | Outputs      |             |       | B | A | R<br>(Red) | G<br>(Green) | B<br>(Blue) | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 3 | 0 | 0 | 3 | 0 |
|          |      |                                                                                                                           | Inputs                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | Outputs    |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | A               | R<br>(Red) | G<br>(Green) | B<br>(Blue) |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0               | 1          | 1            | 1           |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1               | 0          | 1            | 0           |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1        | 0    | 1                                                                                                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0               |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1        | 1    | 0                                                                                                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1               |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |            |              |             |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          | (ii) | I. NOT gate                                                                                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0               | 0          | 1            | 0           |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      | II. $Green = \bar{B}$ (accept NOT B)                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0               | 0          | 1            | 1           |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|          |      | III. $Blue = \bar{A}.\bar{B} + A.B$ or $\overline{A+B} + A.B$<br><br>1 mark for each term / 1 mark for linking with an OR | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2               | 0          | 3            | 2           |       |   |   |            |              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

| Question         |  |       | Marking details                                                                                                                                        | Marks available |     |     |       |       |
|------------------|--|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|                  |  |       |                                                                                                                                                        | AO1             | AO2 | AO3 | Total | Maths |
|                  |  | (iii) | <p>1 Mark for each logic gate correctly connected<br/>(Do not penalise additional NOT gates for Blue output)<br/>ecf for correct circuit from (ii)</p> | 0               | 1   | 4   | 5     | 0     |
| Question 5 Total |  |       |                                                                                                                                                        | 8               | 7   | 4   | 19    | 3     |

| Question |                                                                                                                               |             | Marking details                                                                                                                                                                                                                                                                                          |                  |   | Marks available |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
|----------|-------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---|-----------------|------------------|------------------|-------|-------|-----|---|----|-----|---|-----|----|---|----|----|---|---|---|---|---|
|          |                                                                                                                               |             |                                                                                                                                                                                                                                                                                                          |                  |   | AO1             | AO2              | AO3              | Total | Maths |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
| 6        | (a)                                                                                                                           | (i)         | <table><tr><td>Clock Pulse</td><td>LED<sub>1</sub></td><td>LED<sub>2</sub></td></tr><tr><td>0</td><td>Off</td><td>Off</td></tr><tr><td>1</td><td>On</td><td>Off</td></tr><tr><td>2</td><td>Off</td><td>On</td></tr><tr><td>3</td><td>On</td><td>On</td></tr></table> <p>1 mark for each correct row.</p> |                  |   | Clock Pulse     | LED <sub>1</sub> | LED <sub>2</sub> | 0     | Off   | Off | 1 | On | Off | 2 | Off | On | 3 | On | On | 0 | 3 | 0 | 3 | 0 |
|          |                                                                                                                               | Clock Pulse | LED <sub>1</sub>                                                                                                                                                                                                                                                                                         | LED <sub>2</sub> |   |                 |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
|          | 0                                                                                                                             | Off         | Off                                                                                                                                                                                                                                                                                                      |                  |   |                 |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
|          | 1                                                                                                                             | On          | Off                                                                                                                                                                                                                                                                                                      |                  |   |                 |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
| 2        | Off                                                                                                                           | On          |                                                                                                                                                                                                                                                                                                          |                  |   |                 |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
| 3        | On                                                                                                                            | On          |                                                                                                                                                                                                                                                                                                          |                  |   |                 |                  |                  |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
| (ii)     | LED <sub>1</sub> Pulses at 10Hz – 1 Mark<br>LED <sub>2</sub> Pulses at 5Hz – 1 Mark (ecf – half of freq of LED <sub>1</sub> ) |             |                                                                                                                                                                                                                                                                                                          | 2                | 0 | 0               | 2                | 2                |       |       |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
|          | (b)                                                                                                                           | (i)         | 2, 5                                                                                                                                                                                                                                                                                                     |                  |   | 1               | 0                | 0                | 1     | 0     |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |
|          |                                                                                                                               | (ii)        | 3, 4, 1 – 1 Mark for each correct digit in correct order                                                                                                                                                                                                                                                 |                  |   | 0               | 3                | 0                | 3     | 0     |     |   |    |     |   |     |    |   |    |    |   |   |   |   |   |



| Question |     |  | Marking details                                                                                                                                                                                                                                                                                                                                                                            | Marks available |     |     |       |       |
|----------|-----|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |     |  |                                                                                                                                                                                                                                                                                                                                                                                            | AO1             | AO2 | AO3 | Total | Maths |
| 7        | (a) |  |  <p>Feedback resistor from Output to inverting input – 1 Mark<br/>Resistor from inverting input to 0V – 1 Mark<br/>Input to non-inverting input, and output to output – 1 Mark</p>                                                                                                                       | 0               | 0   | 3   | 3     | 0     |
|          | (b) |  | <p><math>Gain = 1 + \frac{R_F}{R_1}</math></p> <p><math>40 = 1 + \frac{R_F}{R_1}</math> (Formula &amp; substitution – 1)</p> <p><math>40 - 1 = \frac{R_F}{R_1}</math></p> <p><math>R_F = 39R_1</math> (Rearrange and correct ratio – 1)</p> <p><math>R_1 = 1k\Omega</math>, <math>R_F = 39k\Omega</math> (Correct values min. 1k – 1)</p> <p>Allow other R values giving correct gain.</p> | 1               | 0   | 2   | 3     | 3     |

| Question |     |  | Marking details                                                                                                                                                   | Marks available |          |          |          |          |
|----------|-----|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|----------|----------|----------|
|          |     |  |                                                                                                                                                                   | AO1             | AO2      | AO3      | Total    | Maths    |
|          | (c) |  | Calculation of $0.7 \times \text{Max gain} = 0.7 \times 40 = 28$ – 1 Mark<br>Line drawn at gain of 28 – 1 Mark<br>Intercept with frequency axis at 24kHz – 1 Mark | 1               | 2        | 0        | 3        | 2        |
|          |     |  | <b>Question 7 Total</b>                                                                                                                                           | <b>2</b>        | <b>2</b> | <b>5</b> | <b>9</b> | <b>5</b> |

| Question |  |  | Marking details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Marks available |     |     |       |       |
|----------|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-------|-------|
|          |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | AO1             | AO2 | AO3 | Total | Maths |
| 8        |  |  | <p><b>Indicative Content:</b><br/>The program as it stands does not meet the specification.</p> <p>The issues are as follows:<br/>The first delay of 100s should be 200s in order to dispense the correct amount of shampoo base mix.<br/>The correct amount of colour 2 is dispensed and 13ml of colour 1 dispensed in the next section of the program.<br/>Colour 1 valve is then opened to dispense the remainder of the colour required with the correct 13s delay. However the colour 1 valve is not closed, colour valve 2 is closed which is already closed so this should be close colour valve 1.</p> <p>The perfume is dispensed correctly, but the bottle needs to be sealed before sending to packaging.</p> <p><b>5-6 marks</b></p> <p>Candidates have evaluated the specification fully e.g. all parts of the specification considered against the given flowchart, justifying the instructions in the flowchart and given a comprehensive description of changes that should be made.<br/>Description has a logical thought process and presentation.</p> <p><i>There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant to the argument.</i></p> | 3               | 2   | 1   | 6     | 0     |

| Question |  |  | Marking details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks available |           |           |           |           |
|----------|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------|-----------|-----------|-----------|
|          |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | AO1             | AO2       | AO3       | Total     | Maths     |
| 8        |  |  | <p><b>3-4 marks</b></p> <p>Candidates have evaluated most of the specification e.g. two or three parts of the specification considered against the given flowchart, though justification of the instructions in the flowchart may be less clear and given a brief description of changes that should be made. Description has a reasonable thought process and presentation.</p> <p><i>There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included in the response but there may be some minor errors or the inclusion of some information not relevant to the argument.</i></p> <p><b>1-2 marks</b></p> <p>Candidates have evaluated little of the specification e.g. one or two parts of the specification considered against the given flowchart. Justification of the instructions in the flowchart will be less clear and only limited description of changes that should be made. Description has a random presentation.</p> <p><i>There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of information not relevant to the argument.</i></p> <p><b>0 marks</b></p> <p>No evaluation of circuit against specification or any statement of value.<br/> <i>Response not creditworthy or not attempted.</i></p> |                 |           |           |           |           |
|          |  |  | <b>Question 8 total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>3</b>        | <b>2</b>  | <b>1</b>  | <b>6</b>  | <b>0</b>  |
|          |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |           |           |           |           |
|          |  |  | <b>Paper Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>35</b>       | <b>35</b> | <b>10</b> | <b>80</b> | <b>30</b> |

### Summary of marks allocated to assessment objectives

| Question     | AO1       | AO2       | AO3       | Total     | Maths     |
|--------------|-----------|-----------|-----------|-----------|-----------|
| 1            | 4         | 3         | 0         | 7         | 5         |
| 2            | 3         | 5         | 0         | 8         | 5         |
| 3            | 6         | 7         | 0         | 13        | 6         |
| 4            | 3         | 3         | 0         | 6         | 4         |
| 5            | 8         | 7         | 4         | 19        | 3         |
| 6            | 6         | 6         | 0         | 12        | 2         |
| 7            | 2         | 2         | 5         | 9         | 5         |
| 8            | 3         | 2         | 1         | 6         | 0         |
| <b>TOTAL</b> | <b>35</b> | <b>35</b> | <b>10</b> | <b>80</b> | <b>30</b> |