

GCE 2004

June Series



Mark Scheme

Electronics

5431/6431 (ELE1)

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from:

Publications Department, Aldon House, 39, Heald Grove, Rusholme, Manchester, M14 4NA
Tel: 0161 953 1170

or

download from the AQA website: www.aqa.org.uk

Copyright © 2004 AQA and its licensors

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

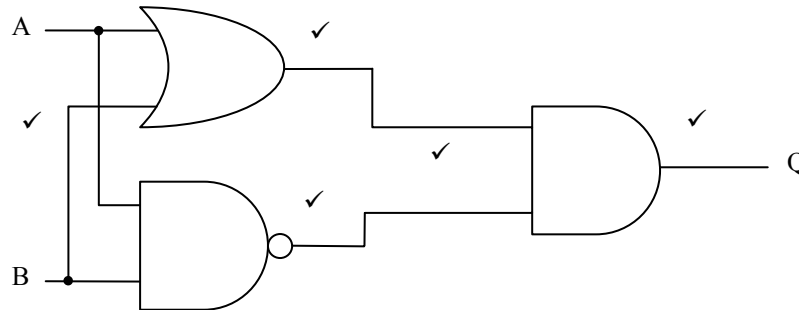
Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester. M15 6EX. *Dr Michael Cresswell Director General*

ELE1 – Foundation Electronics

1

(a)



(5 marks)

(b)

A	B	C	D	Q	
0	0	0	1	0	✓
0	1	1	1	1	✓ (C and D could be reversed)
1	0	1	1	1	✓
1	1	1	0	0	✓

(4 marks)

(c) EXOR ✓

(1 mark)

(Total 10)

2

(a) resistor in series ✓ LED symbol ✓ to 0V ✓

(3 marks)

(b) (i) $12 - 3.6 = 8.4 \text{ V}$ ✓

(ii) limits current ✓

(iii) $8.4 \div 0.02 = 420 \Omega$ ✓

(iv) 430Ω ✓

(v) yellow orange brown gold ✓✓

(vi) $8.4 \times 0.02 = 168 \text{ mW}$ ✓

(vii) $\frac{1}{4} \text{ W}$ ✓

(10 marks)

(Total 13)

3

- (a) (i) breaks down✓ at a specified voltage✓ in reverse bias✓
(ii) to maintain reverse breakdown voltage✓ (4 marks)
- (b) (i) $250 + 10$ ✓ = 260 mA✓
(ii) $14.4 - 9.1$ ✓ = 5.3 V✓
(iii) $5.3 / 0.26$ ✓ = 20.4 Ω ✓ (6 marks)
- (c) (i) 260 mA✓
(ii) 9.1×0.26 ✓ = 2.4 W✓ (3 marks)

(Total 13)**4**

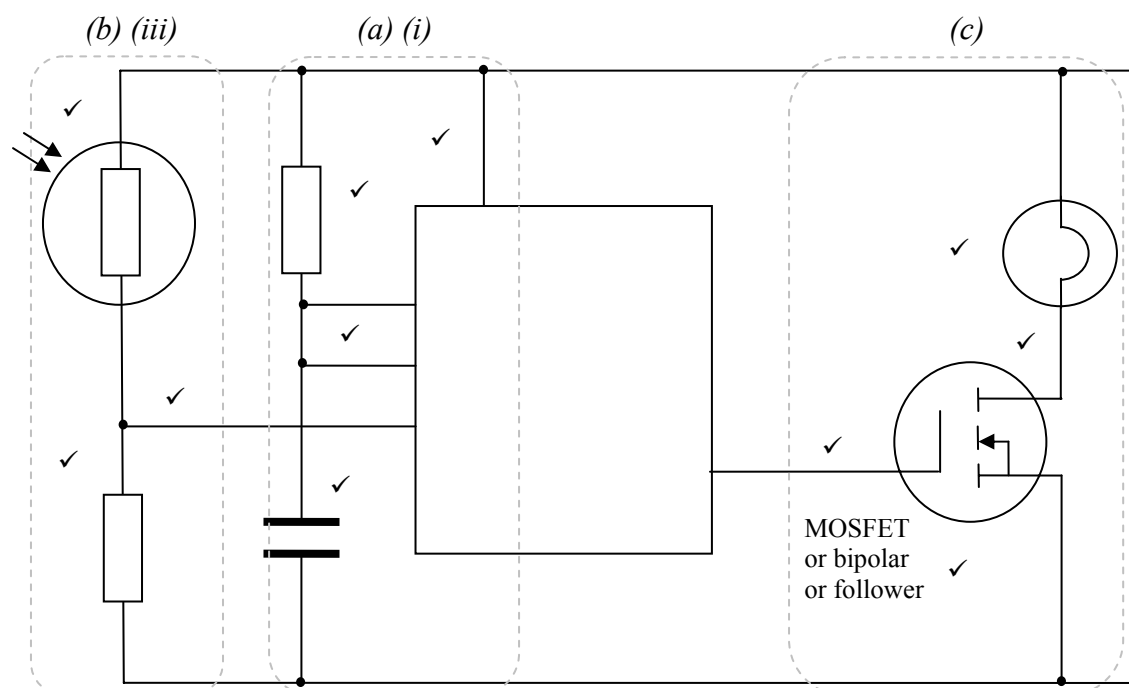
- (a) $470 \times 10^{-6} \times 10^4$ ✓ = 4.7 s✓ (2 marks)
- (b) 0.69×4.7 ✓ = 3.2 s✓ (2 marks)
- (c) 5×4.7 ✓ = 23.5 s✓ (2 marks)

(Total 6)**5**

- (a) prevents back emf from the coil damaging circuit✓
- (b) normally closed✓
- (c) normally open✓
- (d) common goes from NC contact✓ to NO contact✓ **(Total 5)**

6

(a) (i)



(ii) $2.2 \times 470 \times 1.1 \checkmark = 1137 \text{ s} \checkmark$

(b) (i) the monostable triggers when the trigger voltage drops \checkmark

(ii) increases \checkmark

(iii) on diagram above

(iv) $R = 1/3$ total resistance \checkmark LDR = $2/3$ total resistance \checkmark
 $R = 100 \text{ k}\Omega \checkmark$

(c) on diagram above

(Total 18)

7

(a) (i) - \checkmark 12 V \checkmark

(ii) + \checkmark 12 V \checkmark

(iii) saturation \checkmark

(5 marks)

(b) amplifies differences between inputs by a large amount \checkmark
 leading to saturation of output, indicating which input is larger \checkmark

(2 marks)

(Total 7)

(Paper Total 72)