



General Certificate of Education

Electronics 5431/6431

ELE1 Foundation Electronics

Mark Scheme

2008 examination – June series

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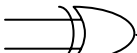
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- 1 (a) $C = \overline{A + B}$ ✓ $D = A \cdot B$ ✓
- (b) (i) $Q = \overline{C + D}$ ✓
- (ii) $A \oplus B$ or $\overline{(\overline{A + B}) + (A \cdot B)}$ ✓✓
- (c)

A	B	C	D	Q	
0	0	1	0	0	✓
0	1	0	0	1	✓
1	0	0	0	1	✓
1	1	0	1	0	✓

- (d) $\begin{matrix} A \\ B \end{matrix}$  Q symbol ✓ labels ✓

Total – 11

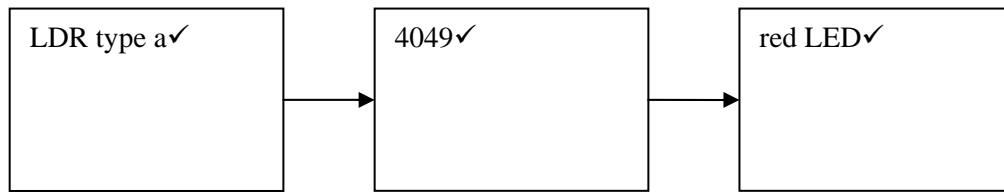
- 2 (a) (i) $9 \div 330$ ✓ = 27mA ✓
- (ii) 9×0.027 ✓ = 0.25W ✓
- (b) (i) 155×10^{-3} ✓ = 0.155s ✓
- (ii) $5RC = 0.78s$ ✓
- (iii) $T = 10^4 \times 0.47 \times 10^{-3}$ ✓ = 4.7s ✓ $5RC = 23.5s$ ✓

Total – 10

- 3 (a) (i) npn transistor symbol ✓ collector ✓ base ✓ emitter ✓
- (ii) diode symbol ✓ effectiveness in circuit position ✓
- (b) (i) $12 \div 240 = 0.05A$ or 50mA ✓
- (ii) $50 \div 50 = 1mA$ ✓
- (iii) $4.7 - 0.7 = 4.0V$ ✓ $4.0 \div 0.001 = 4000\Omega$ ✓
- (iv) 3.9kΩ ✓

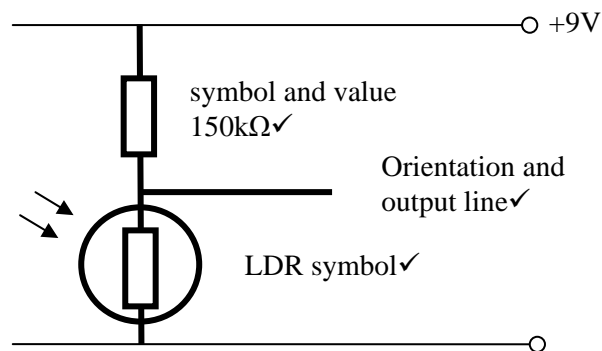
Total – 11

4 (a)



(b) LED switches on in the dark✓
so least current is used when monitoring✓

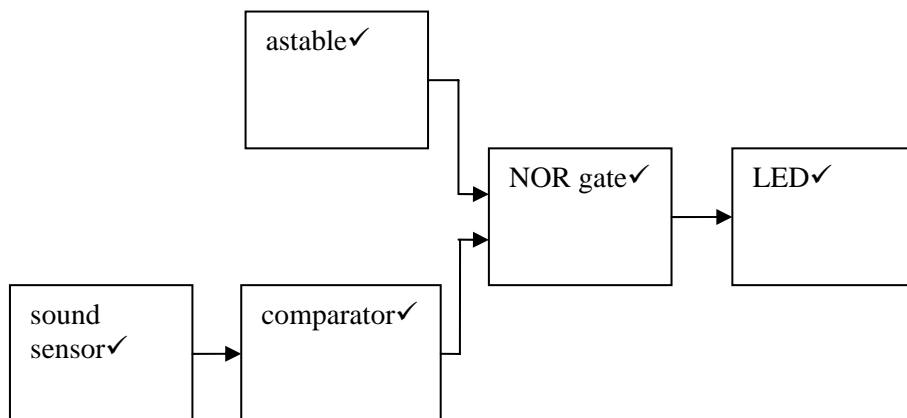
(c)



(d) $7.3 - 1.9 = 5.4\text{V}$ ✓ $5.4 \div 0.003 = 1800\Omega$ ✓

Total – 10

5 (a)



(b) (i) comparator✓

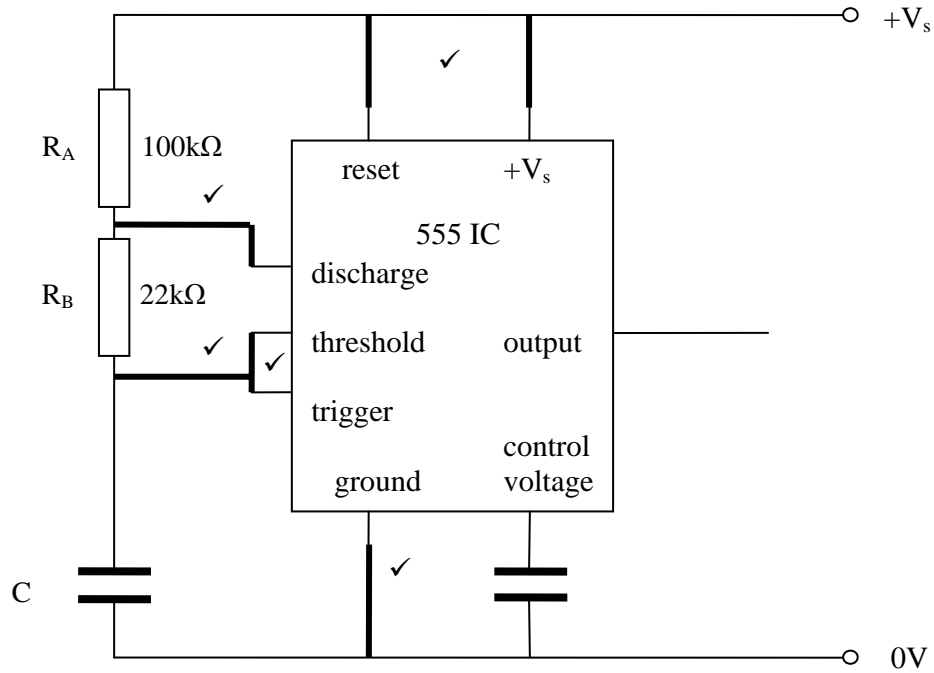
(ii) astable✓

(c) (i) $(1 \div 1501) \times 9\text{V}$ ✓ = 6mV✓

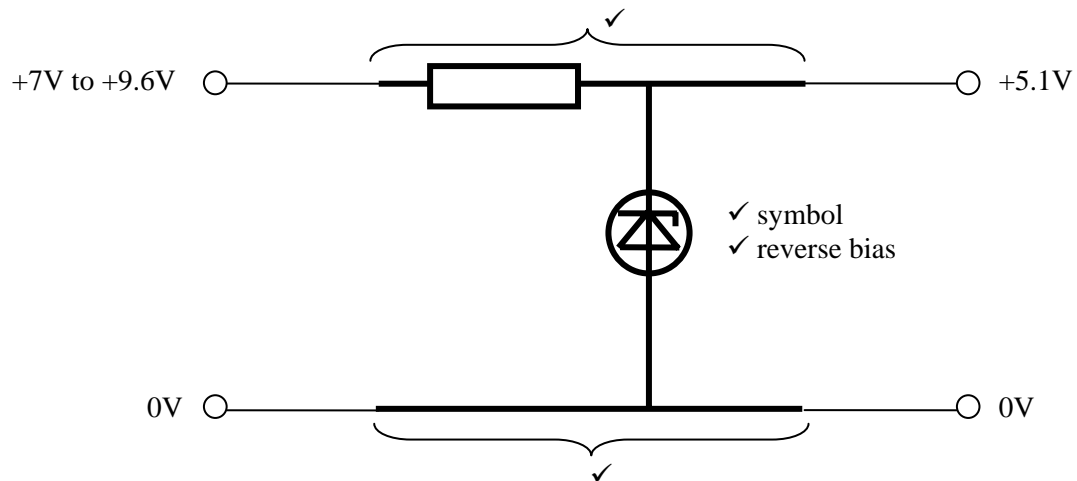
(ii) 9V or high✓

(iii) 0V or low✓

(d) (i)



(ii) $C = 1.44 \div 1.44 \times 10^5 \times 2\text{Hz} = 5\mu\text{F}$

Total – 18**6** (a)

- (b) (i) $7 - 5.1 = 1.9\text{V}$ ✓
(ii) $60 + 5 = 65\text{mA}$ ✓
(iii) $1.9 \div 0.065$ ✓ = 29Ω ✓
(iv) 27Ω ✓
(v) $9.6 - 5.1 = 4.5\text{V}$ $4.5^2 \div 27 = 0.75\text{W}$ ✓✓
(vi) $\frac{1}{4}\text{ W is } < 0.75\text{W}$ ✓

Total – 12

Paper Total – 72