AQA

Mark scheme

June 2003

GCE

Electronics

Unit ELE1

1 **(a)**
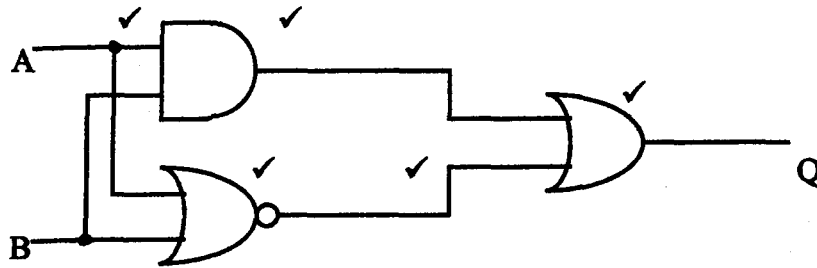
(5 marks)

(b)

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

(4 marks)

(c) EXNOR ✓ (1 mark)

(total 10)

2 **(a)** (i) resistor in series✓
(ii) $9 - 6 =$✓   3V✓
(iii) 0.06A✓
(iv) $3 \div 0.06 =$✓   50Ω✓
(v) $3 \times 0.06 =$✓   0.18W✓ (6 marks)

(b) (i) 100Ω and 100Ω✓   OR   20Ω and 30Ω✓
(ii) in parallel✓   in series✓
(iii) 51Ω✓
(iv) green brown✓ black✓ gold✓   (8 marks)

(total 14)

3 **(a)** $100 \times 10^3 \times 100 \times 10^{-6} =$ ✓   10s✓ (2 marks)

(b) (i) 0.69RC✓ $= 6.9$s✓
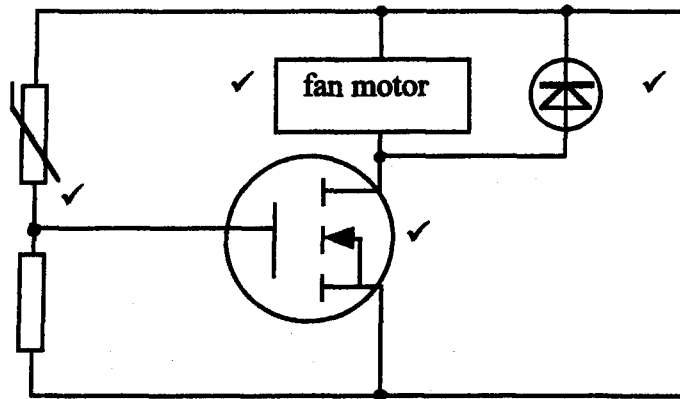(ii) 5RC $= 50$s✓
(iii) 0.63V_s in 1RC,✓ $= 10$s✓ (5 marks)

(total 7)

4 **(a)** (i) $9 \div 2 =$ ✓   4.5V✓
(ii) ohms law calc or ratio✓   20kΩ✓
(iii) 10°C✓   (5 marks)

(b) **(i)**

(ii) fan motor is an inductive load which will create a back emf,
diode protects MOSFET from this.✓   **(5 marks)**

                                                                  (total 10)

5   **(a)**   comparator✓   **(1 mark)**

    (b) $(20 / 30) \times 12 =$✓   8V✓   **(2 marks)**

    (c)   total res = 12V/ 0.01A = 1.2kΩ✓
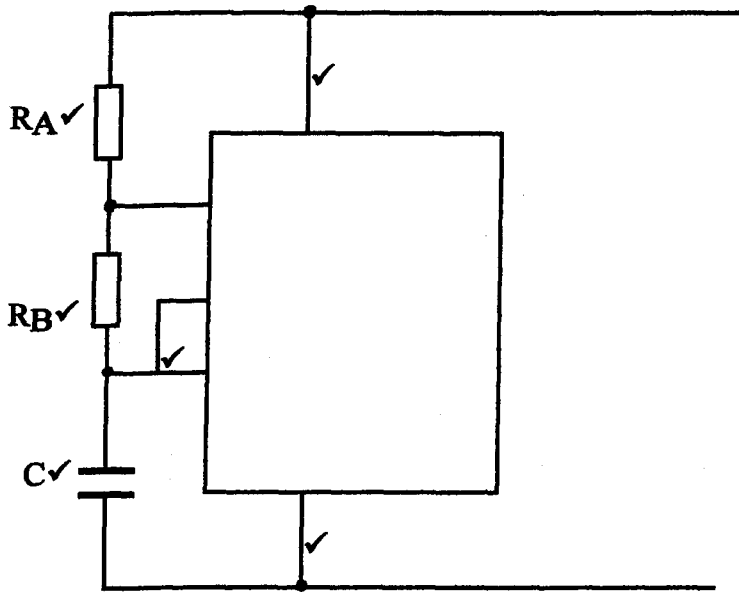   if LDR goes to 0Ω, R = 1.2kΩ✓   **(2 marks)**

    (d)   in dark $V_B < V_A$,✓   o/p low✓
              in light $V_B > V_A$,✓   o/p high✓   **(4 marks)**
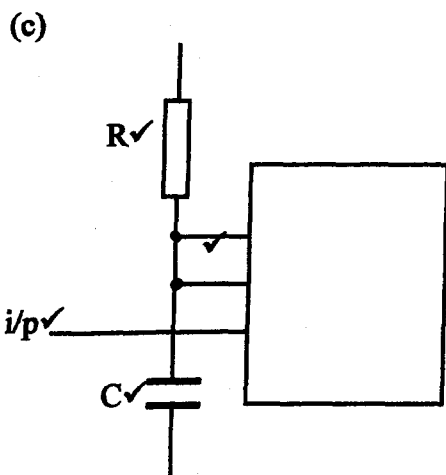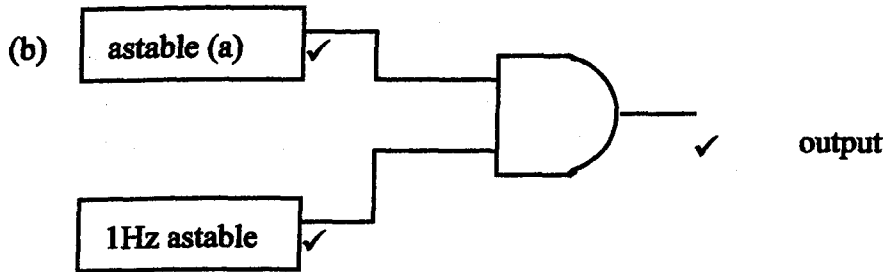
    (e)   on diagram, resistor plus ✓
              either 2 LEDs in series ✓✓   OR 1 LED and 2 Si diodes in series✓✓
              numerical reasoning why > 3V is required✓   **(4 marks)**

                                                                        (total 13)

6 (a) (i)

(ii) $\quad f = \dfrac{1.44}{201 \times 10^3 \times 10^{-8}} = \dfrac{1.44}{2.01 \times 10^{-3}}$ ✓ $= 716\text{Hz}$✓

(8 marks)

(b)

(3 marks)

(c)

(4 marks)

(d) $\quad \bar{A}.B.C +$✓ $\quad A.\bar{B}.C +$ ✓ $\quad A.B.\bar{C}$ ✓

(3 marks)
(total 18)

(Paper total 72 marks)