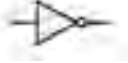


Question	Answer	Mark																		
1(a)(i)	<u>Light emitting</u> diode OR LED	B1																		
(a)(ii)		B1																		
(b)	<table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">column C</th> <th style="text-align: center;">column E</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr><td style="text-align: center;">0</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">1</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">1</td><td style="text-align: center;">1</td></tr> </tbody> </table>	column C	column E	0	0	0	1	0	0	0	1	0	0	0	1	1	1	1	1	B3
column C	column E																			
0	0																			
0	1																			
0	0																			
0	1																			
0	0																			
0	1																			
1	1																			
1	1																			
(c)	Replace the OR gate with an AND gate	B1																		
		Total: 6																		

2 (a) AND (gate)

B1

(b) 0 0 1
1 0 0
0 1 0
1 1 0

B2

(c)

A	B				F
1	1				

B3

[Total: 6]

3 (a) output of A: 1, 1, 0, 0 c.a.o.
output of B: 0, 1, 0, 0 e.c.f. from candidate's output of A

[1]


[1]

(b) dark AND hot owtte
note: must be consistent with answer to (a)

[1]

(c) B cannot provide enough power / current for lamp, or equivalent
OR allows remote lamp
note: statement of function of a relay without reference to context gains 1 mark

[2]

- 4 (a) (i) OR (gate) B1
- (ii) 1 input and 1 output labelled with words B1
- (iii) correct symbol
- 
- B1
- (b) (i) needle not deflected B1
- (ii) needle not deflected B1
- (iii) needle deflected either way B1
- [Total: 6]**

- 5 (a) (i) NAND B1
- (ii) output and one input correctly labelled B1
- (b) rectangle with longitudinal line in middle third, no input or output wire required B1
- (c) (i) temperature (decreases) B1
- (ii) correctly relates change of resistance to change of temperature B1
 voltage of mid-point (of potential divider)/left of LED increases OR higher V across thermistor B1
 current flows through/enough V to light LED B1
- (d) $1/R_p = 1/R_1 + 1/R_2$ or $(R_p) = R_1R_2/(R_1 + R_2)$ C1
 $(R = 1/(1/4 - 1/6) =) 12 \Omega$ A1
- [Total: 9]**

- 6 (a) row 1 0 0 accept low/off B1
 row 2 0 1 accept low/off and high/on B1
 row 3 1 1 accept high/on B1

(b) 2 wires to flat (input) side, 1 wire from curved (output) side
 do not accept pointed curved side or small circle B1

(c) NOT gate connected to output of AND gate
 accept labelled boxes for gates
 do not allow any extra gates or inputs M1

NOT gate correct way round A1

[Total: 6]

7 (a) in order downwards: 1 1 1 0 c.a.o. B1

(b) 1 AND 0 (e.c.f. from (b)(i)) B

(ii) NOT (gate) (allow NOR (gate)) B1

(c) $R = 1$ AND $S = 0$ (e.c.f. from (b)(i)) B
 $T = 1$ B1 [5]

- 8 (a) (i) AND gate B1
- (ii) correct symbol must have 2 inputs, 1 output
concave input side, somewhat pointed on output side with small circle B1 [2]
- (b) (i) HIGH/1 B
- (ii) HIGH/1 B [2]
- (c) transistor circled B1 [1]
- [Total: 5]**