Version : 1.0

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Electronics 3432

Higher Tier

Mark Scheme

2005 examination – June series

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.

Higher Tier

1 (a) aerial(antenna)✓, demodulator✓ (2 marks)

(b) (i) frequency(modulation)✓

(ii) amplitude/digital✓ (2 marks)

(c) (i) selectivity

(ii) sensitivity (2 marks)

(d) (i) LM386 ✓

(ii) 0.5 W ✓

(iii) 20 Hz – 20 kHz ✓

(iv) 8 Ω ✓ (4 marks)

Total 10 marks

2 (a) (i) T=1/f or T=1/50✓ = 0.02 s✓

(ii) 20 (ms)✓

(iii) 2.5 cycles shown✓, correct amplitude (2.4 divisions)✓ sinusoidal✓

(iv) $V_p = 1.4 \quad V_{rms}$, $V_{rms} = V_p / 1.4$ or 12/1.4✓, = 8.5 V (8.6 V)✓
(-1 no unit) (8 marks)

(b) (i) (left to right) fuse✓, diode✓, capacitor✓, (3 terminal) regulator✓

(ii) P = V I ✓, I = P/V or I = 80/230✓, = 0.348 A(0.35 A)✓

(iii) 1A ✓ (7 marks)

(c) earth
green/yellow ✓

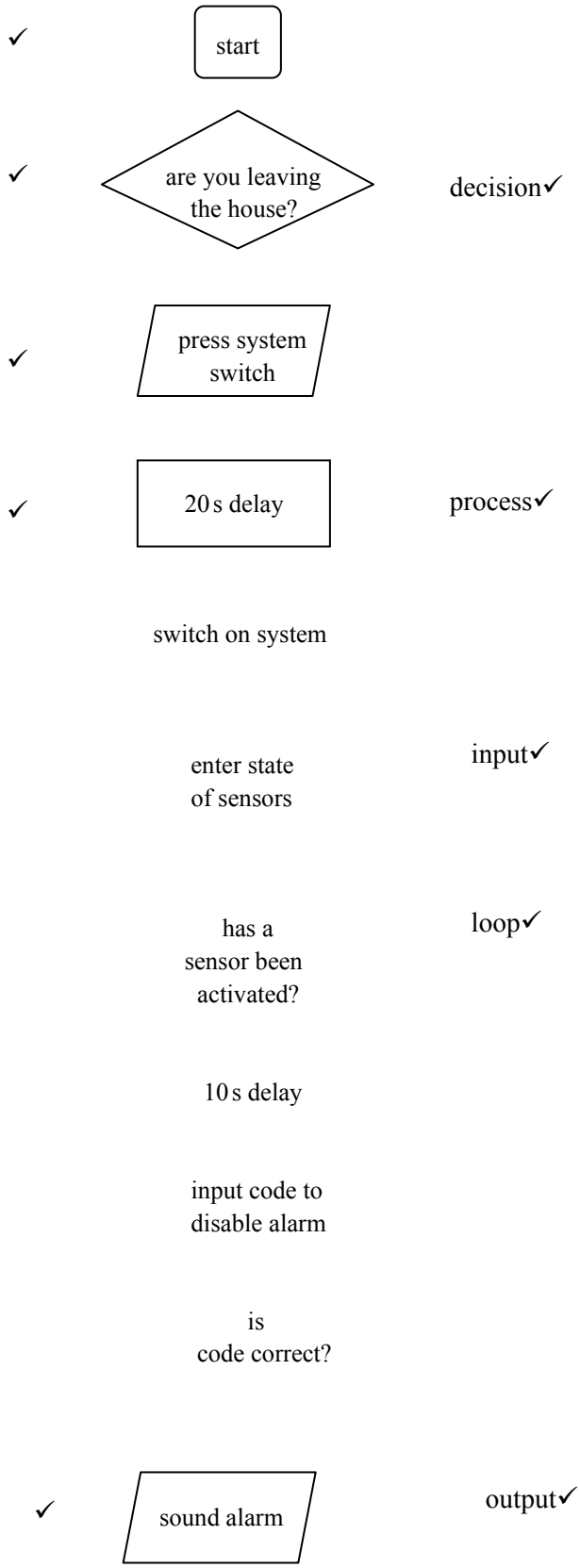
live
brown ✓

neutral
blue ✓

(3 marks)

Total 18 marks

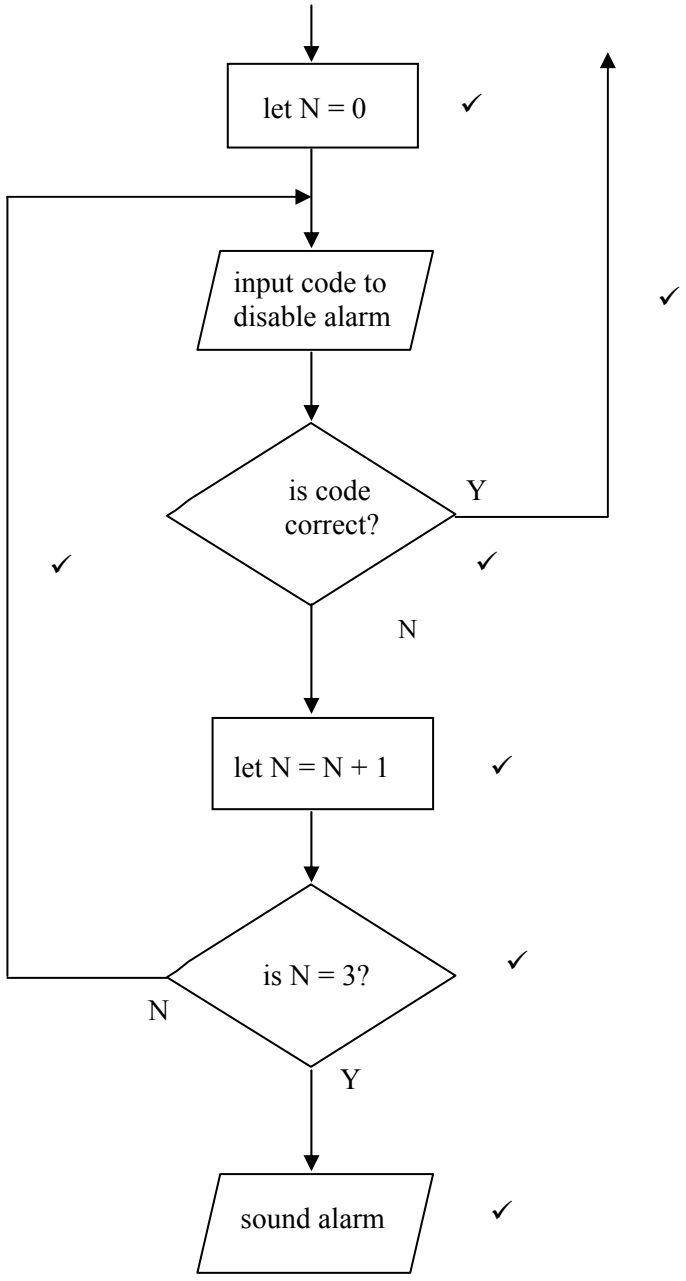
3 (a) and (b)



(10 marks)

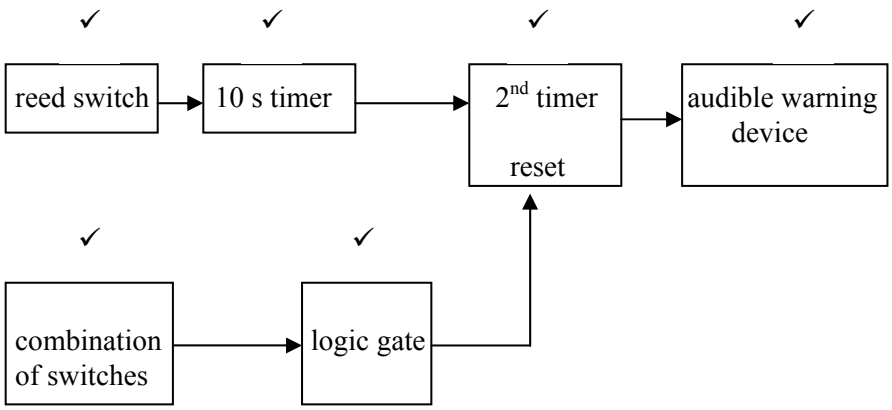
3 (c) state entered into system✓
system detects activated sensor✓
delay 10 seconds✓
no correct code entered✓
alarm is sounded✓ (5 marks)

(d) example answer, others possible



(5 marks)
Total 20 marks

4 (a)

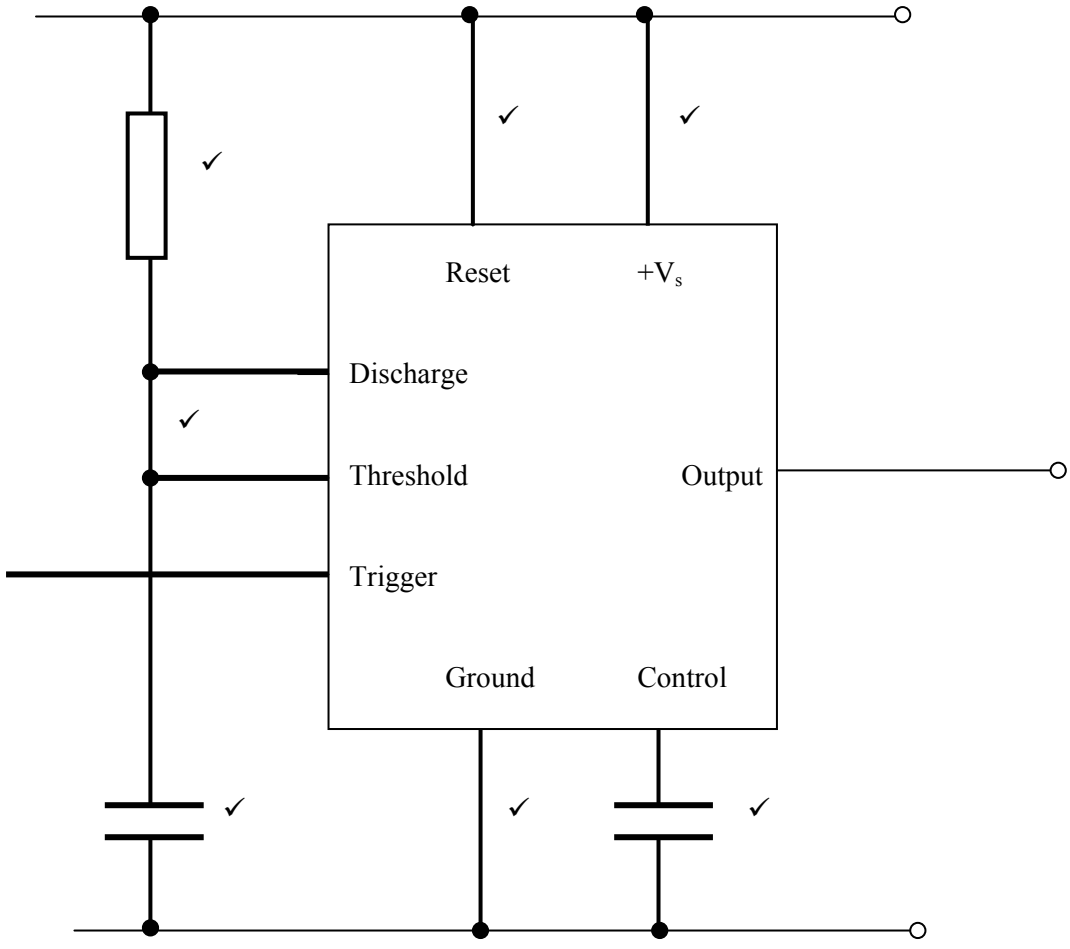


(6 marks)

(b) (i) 12 V✓
0 V✓

(ii) 12 V/ 10 kΩ = ✓ 1.2 mA✓ (4 marks)

(c)



label ✓

(8 marks)

(d) (i) door opens, output from circuit goes low✓
m/s needs input voltage to drop✓
below a certain level ✓
to trigger✓

(ii) 0 V✓

V_s ✓ (6 marks)

(e) (i) S_1 open✓
S_2 closed✓

(ii) 0✓

(iii) NAND gate requires logic 1 at both inputs✓
to give out logic 0 ✓
and reset 2nd timer✓ (6 marks)

Total 30 marks

5 (a) (i) 5 kΩ✓

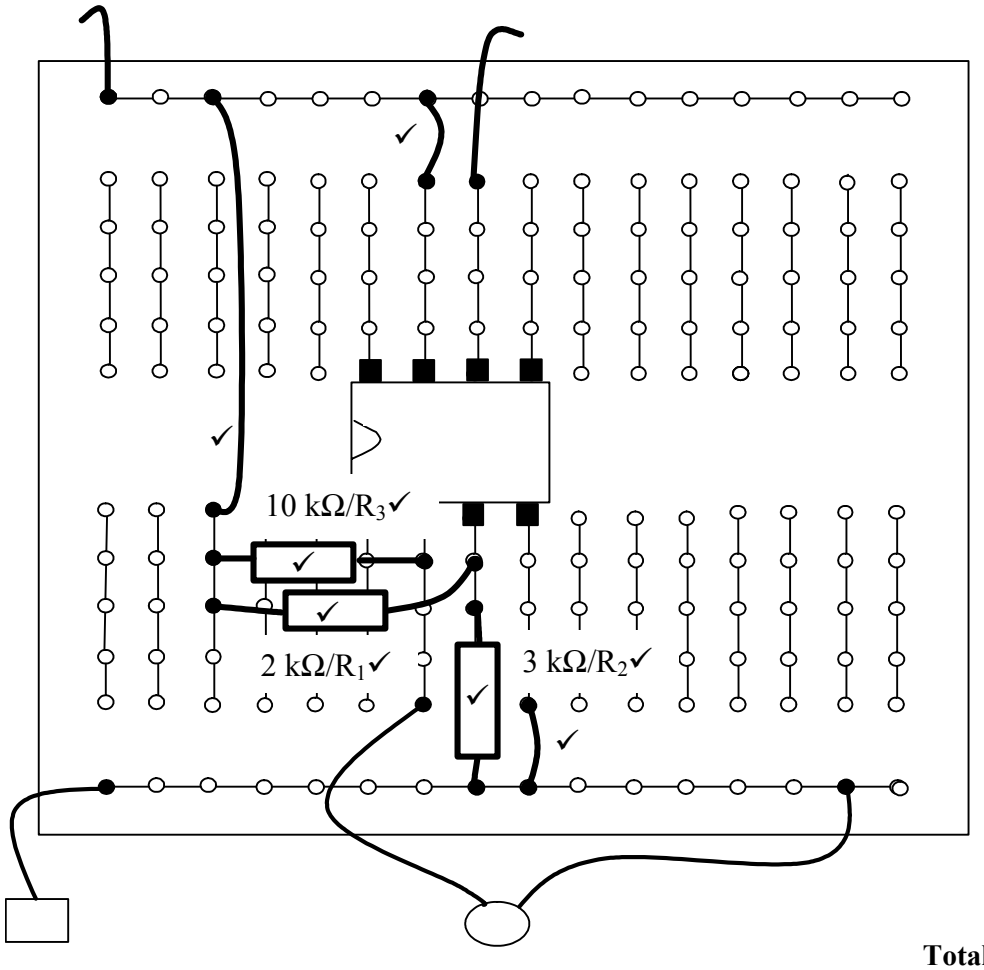
(ii) V = 10 (3/(2 + 3))✓ = 6 V✓

(iii) 6 V✓(allow 5.99–6.01V)

(iv) 15 kΩ✓(–1 no unit)

(v) goes high(10 V)✓ (6 marks)

(b)



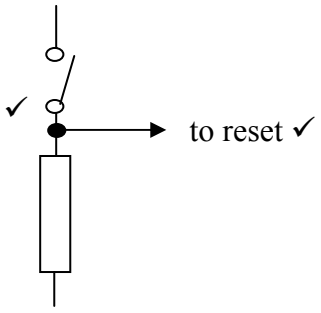
(9 marks)
Total 15 marks

6 (a) (i) 0V✓

(ii) 9V✓

(iii) Q goes high✓ bar Q goes low✓ (4 marks)

(b)

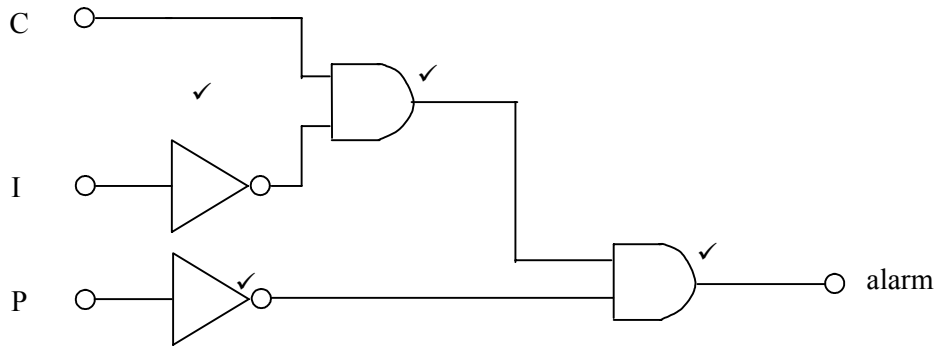


(2 marks)

(c) base resistor✓, correct symbol✓✓ (3 marks)

(d) CK input goes high✓ high at D is transferred to Q✓ (2 marks)
Total 11 marks

7 (a)



(4 marks)

(b) (i)

S
1
0
0
0

✓

(ii)

X	Y	Z	Output
1	1	0	0
1	0	1	0
1	0	1	0
1	0	1	0
0	1	0	1
0	0	1	0
0	0	1	0
0	0	1	0
✓	✓	✓	✓

(iii) All 4 gates on same chip✓ therefore cheaper/simpler✓
(or any gate can be made from NOR gates✓) (7 marks)

(c) (i) the set✓ of instructions✓(=programme) to the computer✓ (2 max)

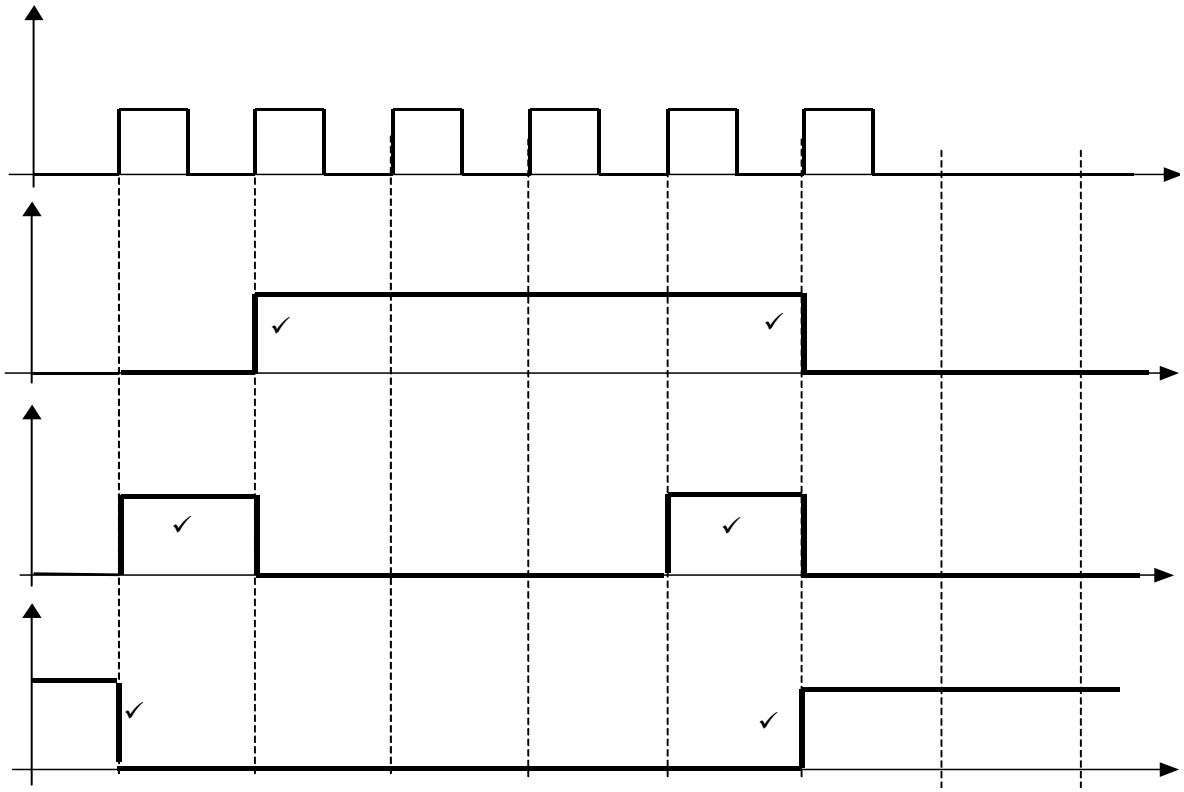
(ii) more versatile✓ can be changed easily✓ for different printers✓
(2 max) (4 marks)

Total 15 marks

8 (a) (i) X to Red✓, Y to Amber✓, Z to Green✓

(ii) 15 s✓ (4 marks)

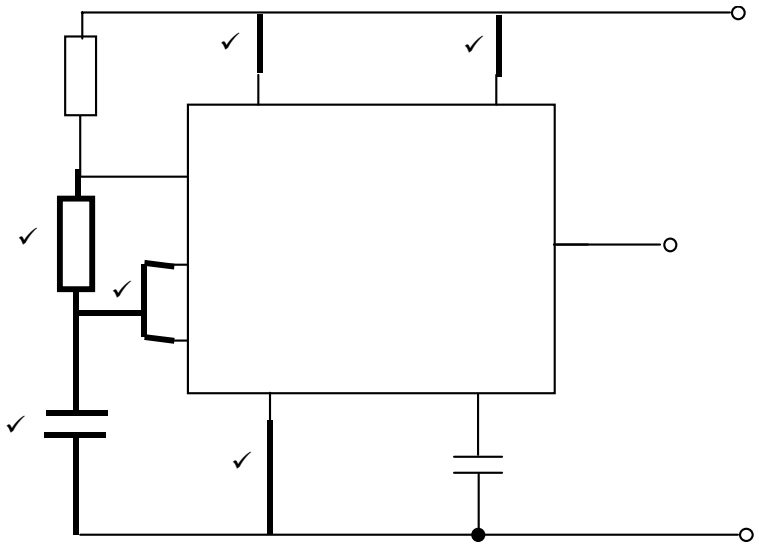
(b) (i)



(ii) Connect outputs 6 and 7 to a new OR gate✓
and then connect output to another OR gate with X ✓
Move the amber connection (from output 5) to 7 ✓
Move reset (from output 6) to pin 8 ✓ (2 max) (8 marks)

(c) (i) AND✓

(ii)



(iii) $T=1.1RC$✓, $= 1.1\times620\times10^{3}\times47\times10^{-6}$✓$= 32s$✓(– 1 no unit) (10 marks)

(d) (i) to protect the LED ✓, from too much current✓/to drop some of the voltage✓ prevent burning out✓(not blowing up)

(ii) $V = 9 – 2 = 7$ V✓

(iii) $I=V/R =7/680$✓ $= 0.010$ A (10 mA)✓

(iv) Blue✓ Grey✓ Brown✓ Gold✓ (9 marks)

Total 31 marks

Paper Total 150