



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme

## June 2003

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# GCSE

## Electronics

3432

Higher

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**Higher Tier**

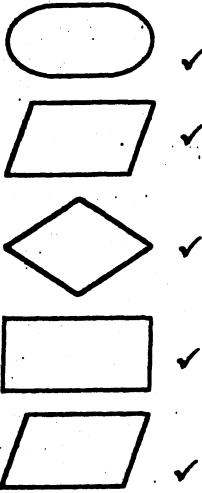
1

- a) transformer✓      b) thermistor✓      c) high✓      d) resistance✓  
e) capacitor✓      f) voltage/potential difference✓      g) rectification✓  
h) process/ing✓      i) loudspeaker✓      j) signal generator/oscillator✓

**total (10)**

2

(a)(i)



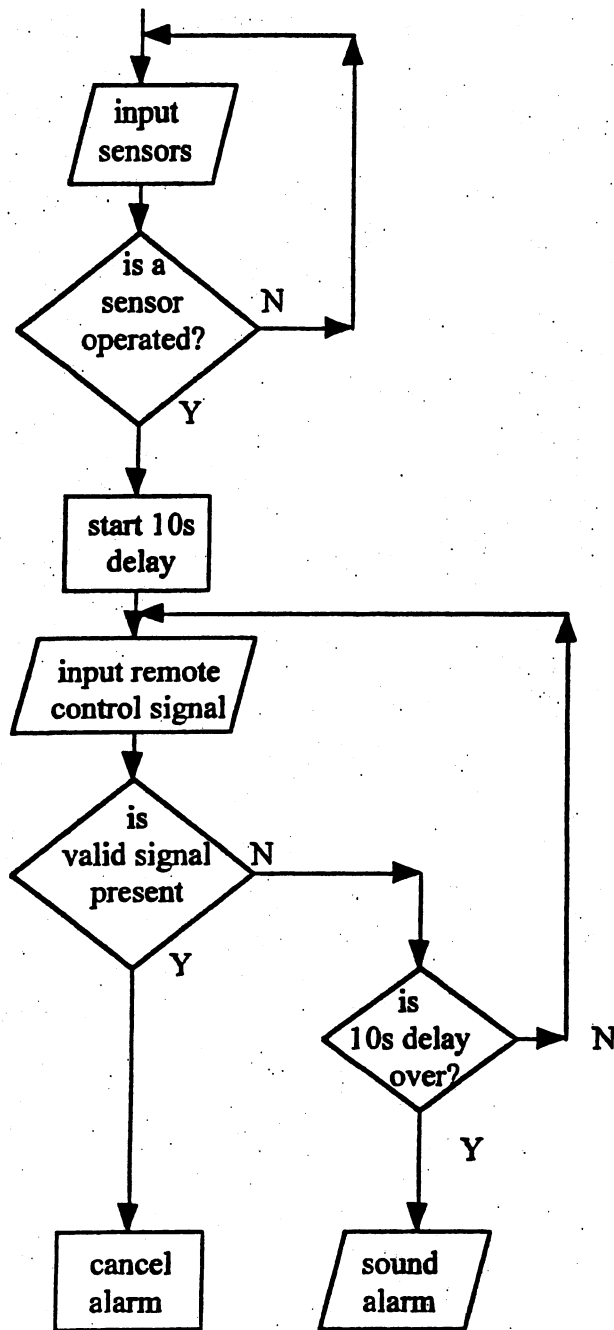
- (ii)      decision, diamond✓      input, parallelogram✓  
loop, return to earlier point✓      output, parallelogram✓  
process, rectangle✓

**(10)**

- (b)      30 secs delay starts✓  
no remote control signal present, delay completes✓  
sidelights flash and one bleep✓  
system loops back to start another delay✓  
repeats above sequence✓  
reminder to set alarm✓      (max 5)

**(5)**

(c) example answer only



(max 5 marks)

(5)

total (20)

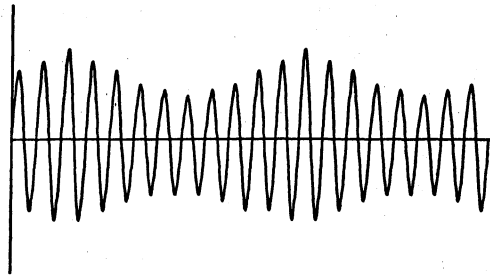
3

(a)(i) tuned circuit✓ selects✓ (one) frequency✓  
(ii) demodulator✓ separates✓ the signal from the carrier wave✓ (6)

(b)(i) can pick up/can detect✓ weak signals✓  
(ii) can distinguish signals✓ which have frequencies close to each other✓ (4)

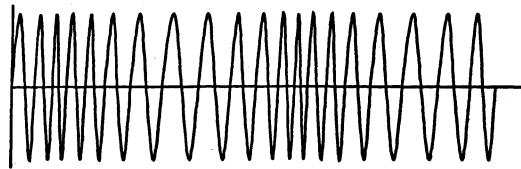
(c)(i) frequency modulation✓  
(ii) amplitude modulation✓ (2)

(d)(i)



correct shape✓ approx. in phase with audio✓

(ii)

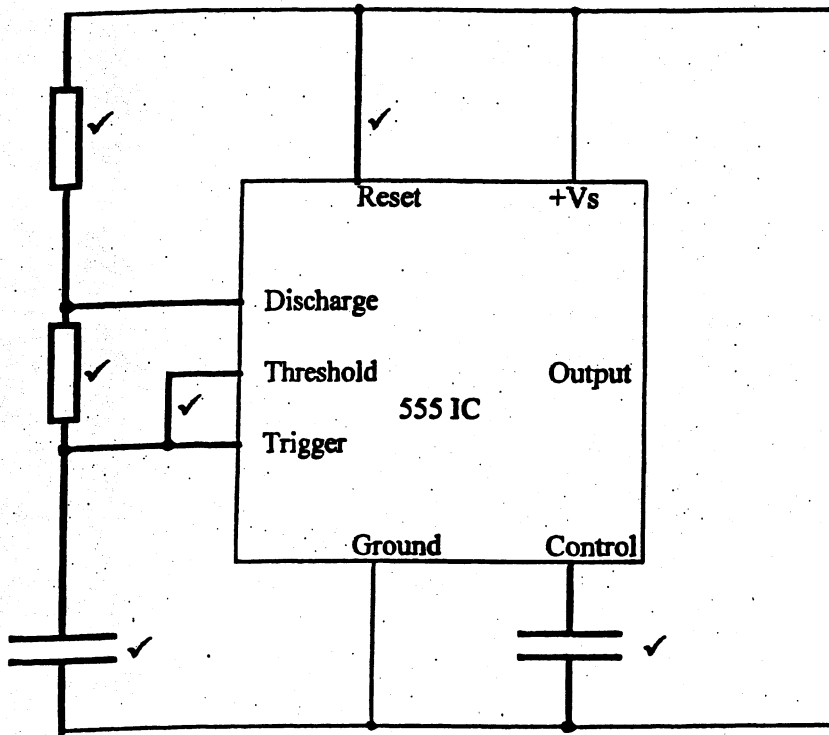


correct shape✓ approx. in phase with audio✓

(4)

**total (16)**

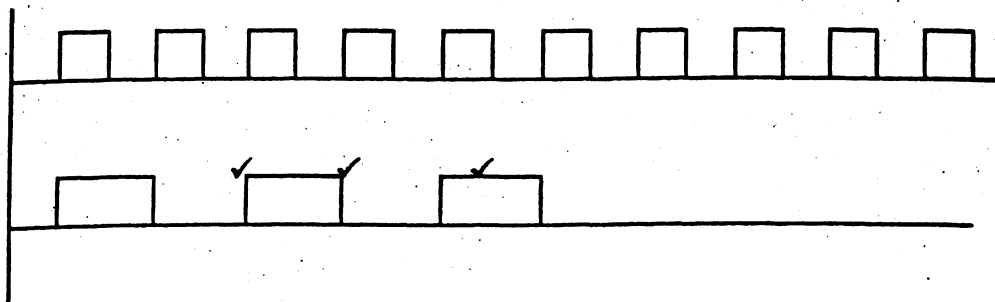
(a)



(6 marks)

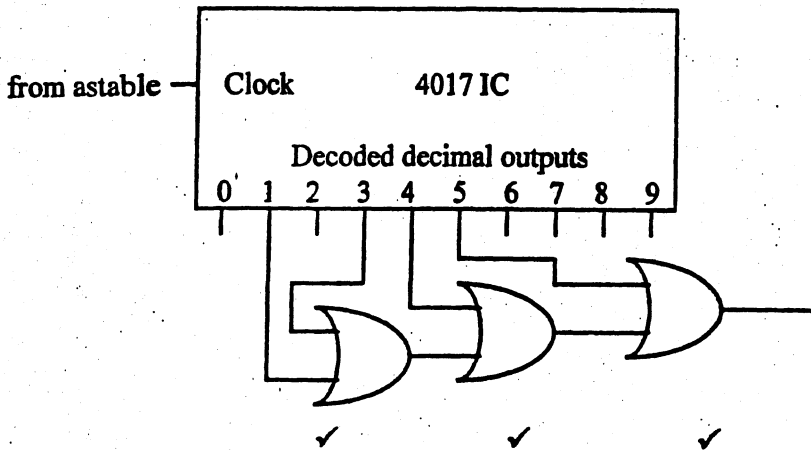
(b) (i) only one of the decoded outputs is high at any one time ✓  
 the others are all low ✓  
 in sequence ✓

(ii)



(iii) Three short buzzes ✓  
 a long gap ✓  
 repetitively ✓

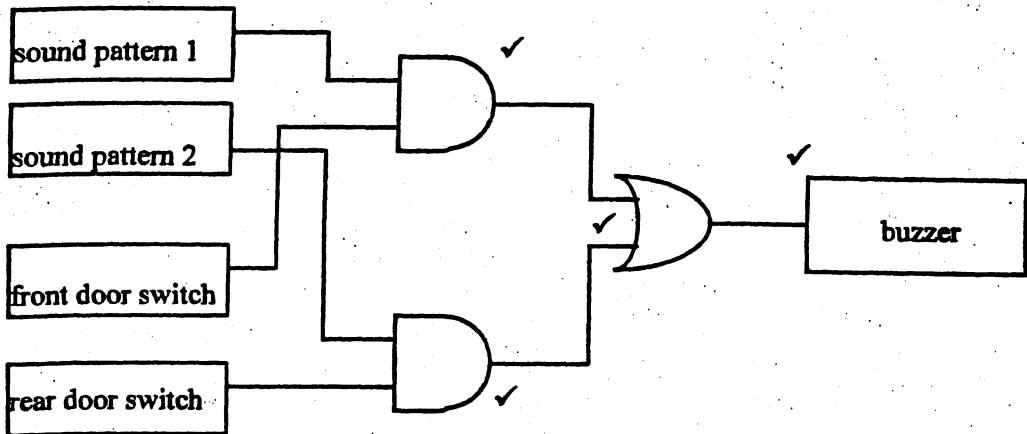
(iv)



(12 marks)

(c)

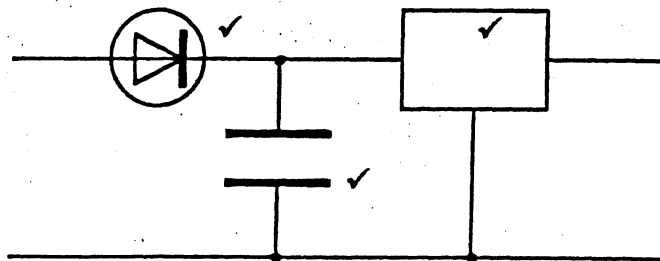
(i)



(ii) 4017 may be on a silent part of sequence when switch pressed ✓  
push switch to activate a monostable before AND gate ✓

(6 marks)

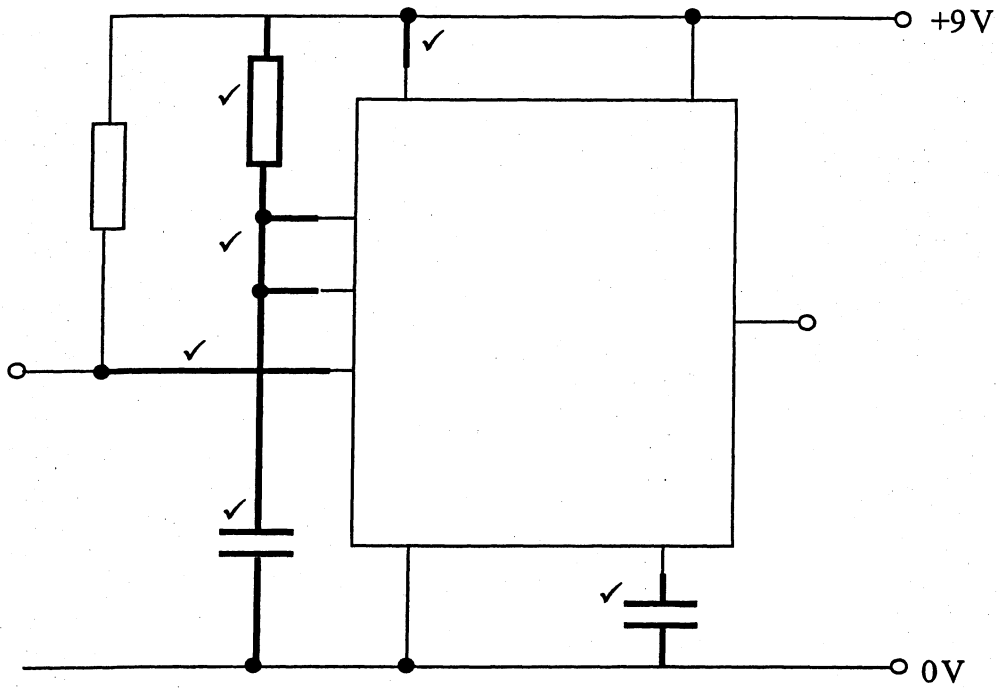
(d) diode or bridge rectifier symbol, ✓  
capacitor symbol, ✓  
3 terminal regulator symbol, ✓



(6 marks)

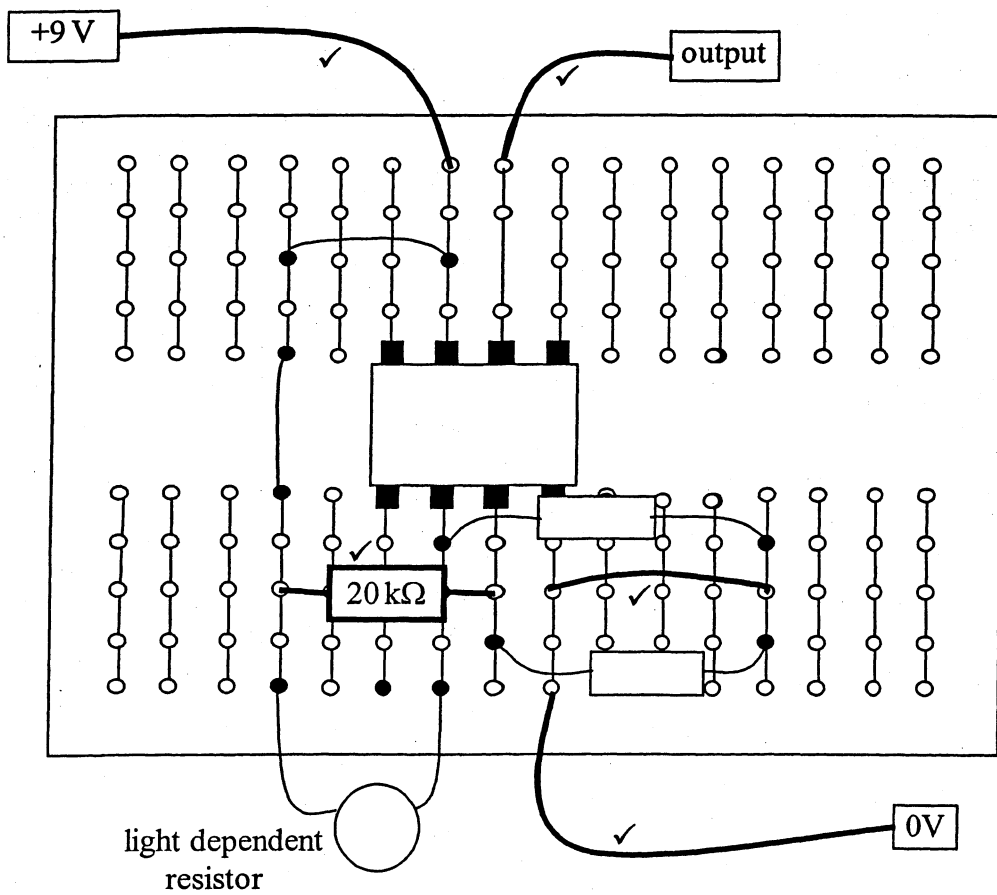
total (30 marks)

5  
(a)(i)



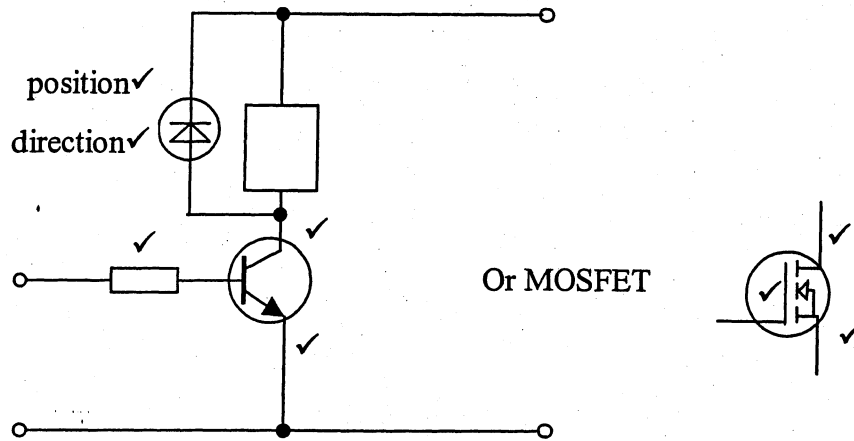
(ii)  $T = 1.1 RC \checkmark = 1.1 \times 100 \times 10^{-6} \times 270\,000 \checkmark = 30 \text{ (29.7) s} \checkmark$  (9)

(b)(i) comparator  $\checkmark$   
(ii)



(6)

- (c)(i) AND ✓  
(ii) and (iii)



(6)

total (21)

6

- (a)(i) the electronic systems ✓ e.g. the CPU/memory/input/output devices ✓  
(ii) the programme ✓ i.e. series of instructions ✓

(4)

- (b)(i) 13 ✓  
(ii) 1001 ✓

(2)

(c)(i)

A	B	out
		0
		0
		0
		1

✓

A	B	out
		0
		1
		1
		1

✓

(ii)

X	Y	Z	C	D	E	P
			1	0	0	0
			1	1	0	1
			1	0	0	0
			1	1	0	1
			0	0	0	0
			0	0	0	0
			0	0	1	1
			0	0	1	1

✓ ✓ ✓ ✓

- (iii) When control signal is low ✓ Z is connected to the printer ✓  
When control signal is high ✓ Y is connected to the printer ✓

(10)

total (16)



7

- (a)(i) frequencies for which power $\checkmark$  is at least half of max.  $\checkmark$
- (ii) at 100 kHz power = half max = 1 W $\checkmark$
- (iii) the signal for speech or music $\checkmark$  does not contain frequencies as high as this $\checkmark$  (5)
- (b)(i)  $T = 1/f = 1/200\checkmark = 5 \text{ ms}\checkmark$
- (ii)  $P = V^2/R = 2.5^2/4\checkmark = 1.56 \text{ W}\checkmark$
- (iii)  $V_{\text{RMS}} = V_p/1.4 = 2.5/1.4\checkmark = 1.78 \text{ V}\checkmark$
- (iv) sine wave $\checkmark$  two complete cycles shown $\checkmark$  amplitude 2.5 divisions $\checkmark$
- (v) gain =  $2.5/0.2\checkmark = 12.5 \checkmark$  (11)
- (c) screened/fibre optic/twisted pair $\checkmark$  to reduce noise $\checkmark$  (2)

**total (18)**

8

- (a) resistor from reset switch to 0 V $\checkmark$  link to reset of both flip-flops $\checkmark$  (2)
- (b)(i) 9V  $\checkmark$
- (ii) the clock input goes high $\checkmark$  this transfers the high state of D to Q $\checkmark$  (3)
- (c)(i) correct symbol $\checkmark$  correct position $\checkmark$
- (ii) 0.02 A $\checkmark$
- (iii) 7 V $\checkmark$
- (iv)  $R = V/I = 7/0.02\checkmark = 350 \Omega\checkmark$
- (v) grey $\checkmark$  red $\checkmark$  brown $\checkmark$  gold $\checkmark$
- (vi)  $1/R = 1/620 + 1/820\checkmark = 2.8 \times 10^{-3}\checkmark \therefore R = 353 \Omega\checkmark$
- (vii) This is close to required value/resistance reduced/current increased $\checkmark$  (14)

**total (19)**

**(Paper Total 150)**