Version 1.1

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Electronics 3432

Higher Tier

Mark Scheme

2006 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.

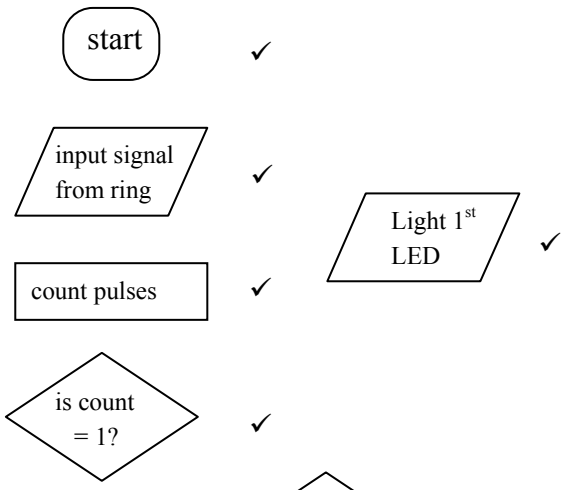
Higher Tier

1 (a) (i) yellow✓ green✓
(ii) (miniature)circuit breaker✓
(iii) capacitor ✓
(iv) lowers resistance✓

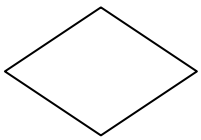
(b) (i) hardware ✓
(ii) instructions(stored in memory)/programme ✓
(iii) 1001✓
(iv) 13 ✓
(v) coaxial cable/twisted pair ✓

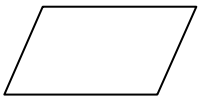
(10 marks)

2 (a)



✓ ✓ ✓ ✓ ✓

(b) decision box  ✓

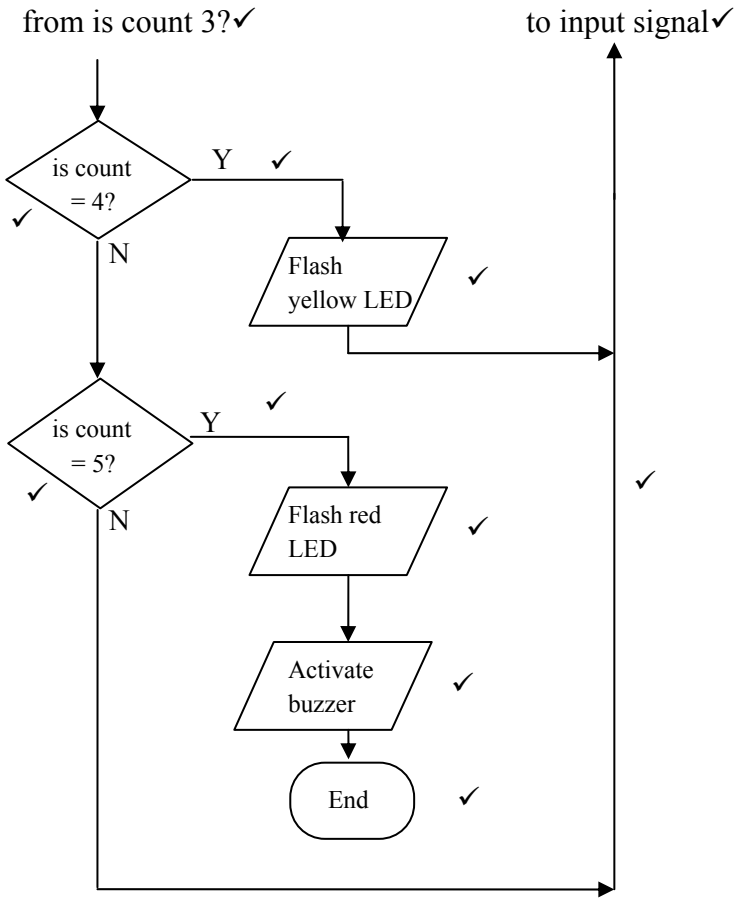
input box  ✓

a loop - any line that returns to a point earlier in the flow chart✓

output box  ✓

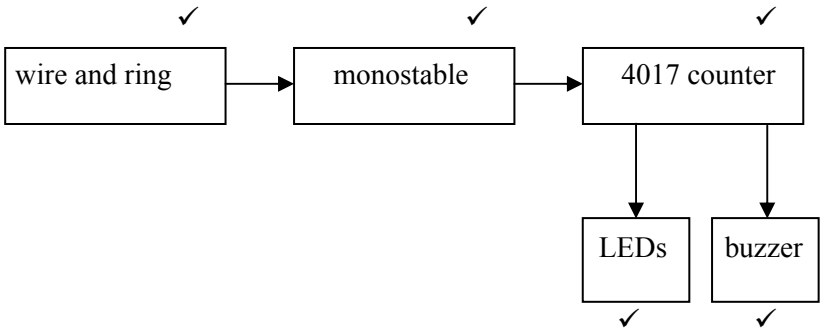
process box  ✓

(c) Example only, other answers possible

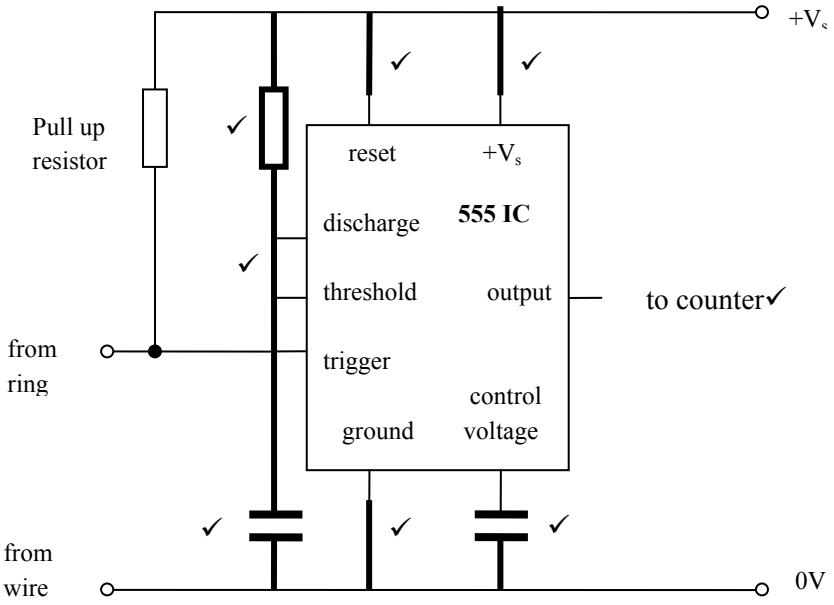


(20 marks)

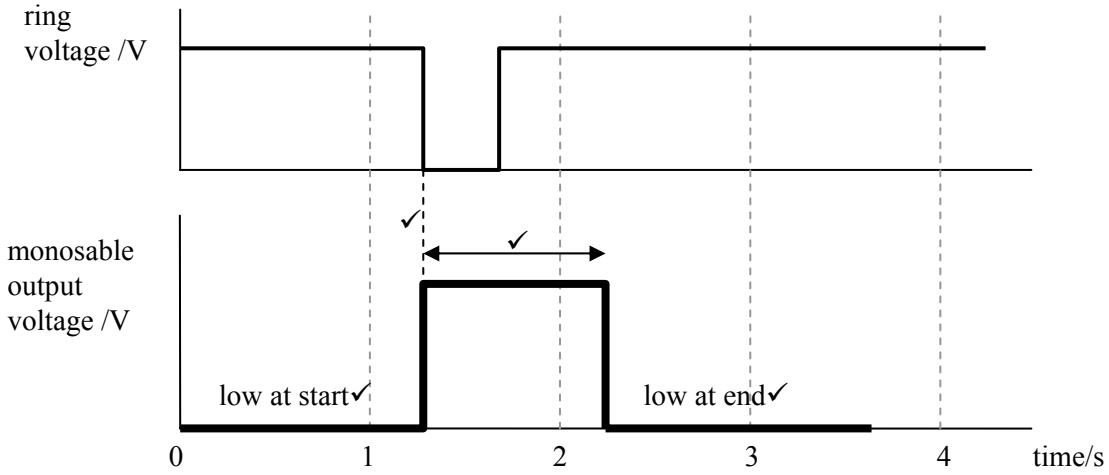
3 (a)



(b)



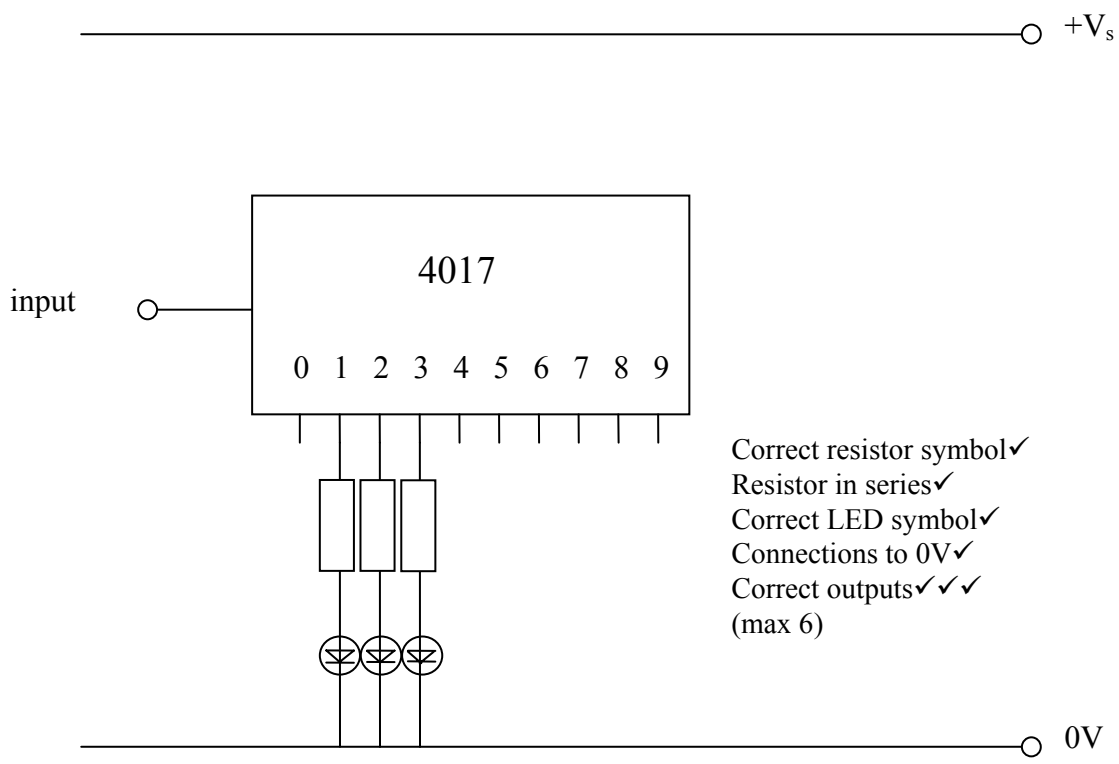
(c) (i)



(ii) P✓

(iii) ring touching bent wire✓

(d)



Correct resistor symbol✓
Resistor in series✓
Correct LED symbol✓
Connections to 0V✓
Correct outputs✓✓✓
(max 6)

(e) astable✓

(f) (i) 9 – 2 = 7V✓
(ii) R = 7 / 0.01✓ = 700Ω✓
(iii) 750Ω✓

(30 marks)

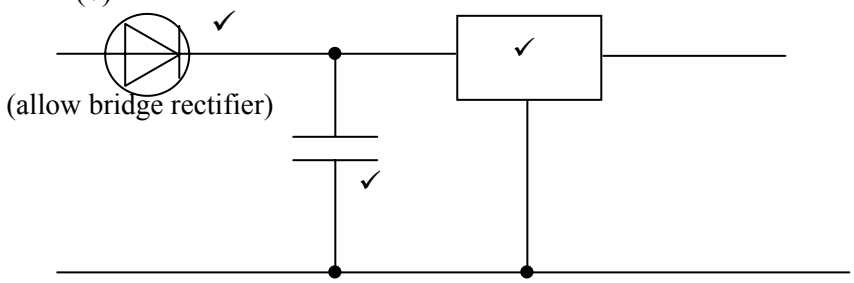
4 (a) (i) V_{rms} = 9 / 1.4✓ = 6.4 ✓ V✓ (2 max)

(ii) diode✓(allow bridge rectifier)

(iii) capacitor✓

(iv) (3 terminal) regulator/zener diode✓

(v)



(b) P = VI or 5×0.6✓ = 3 W ✓✓ (2 Max)

(10 marks)

5 (a) antenna/aerial ✓ (audio) amplifier✓

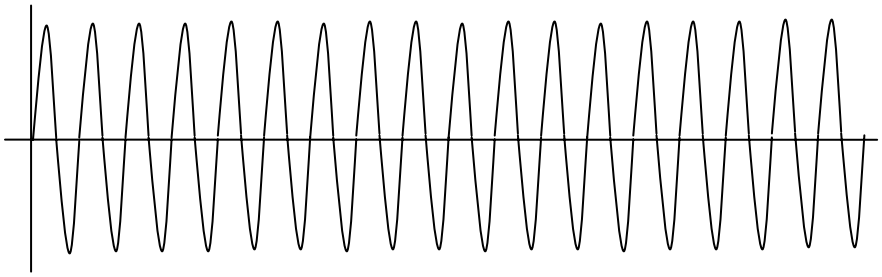
(b) to select✓ one station/frequency ✓

(c) to recover✓ the audio signal✓

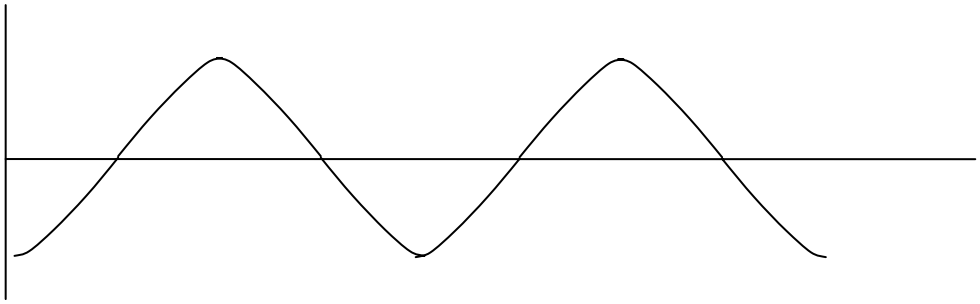
(d) (i)

(ii) less noise✓ larger bandwidth ✓no fading✓
allows stereo✓ better quality✓ (Max 2)

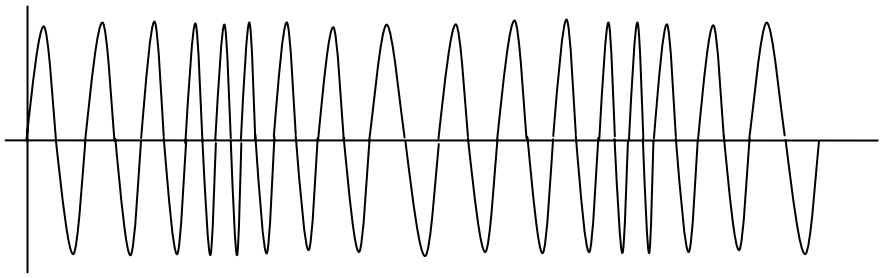
(e) constant period approx. same as modulated signal✓
constant amplitude ✓



audio signal
period consistent with modulated wave✓
phase relationship consistent with modulated wave✓



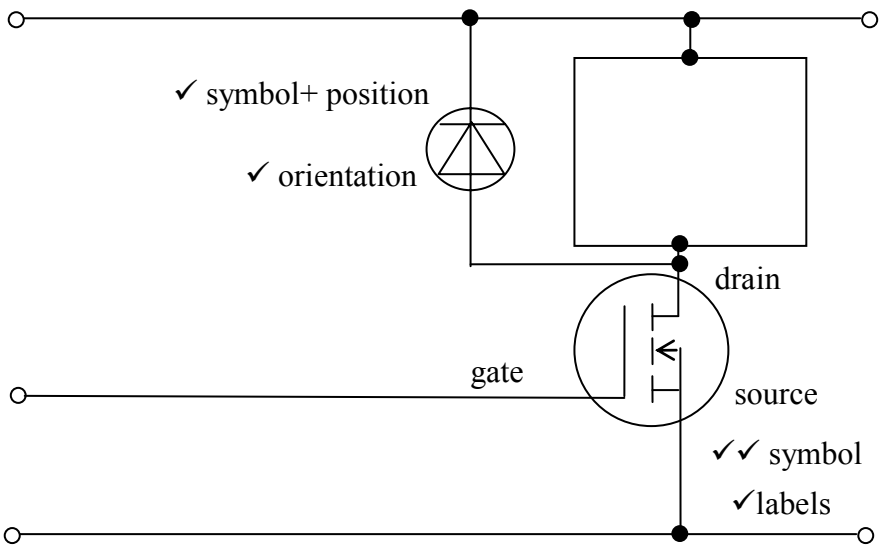
(f) FM signal
constant amplitude✓
frequency change consistent with audio signal✓



(14 marks)

6 (a) (S_2 gives a high output) Q goes high ✓
Valve opens/tank fills ✓
Continues to fill even though S_2 is wet ✓
Until S_1 is covered ✓
Q goes low/valve closes ✓ (4 max)

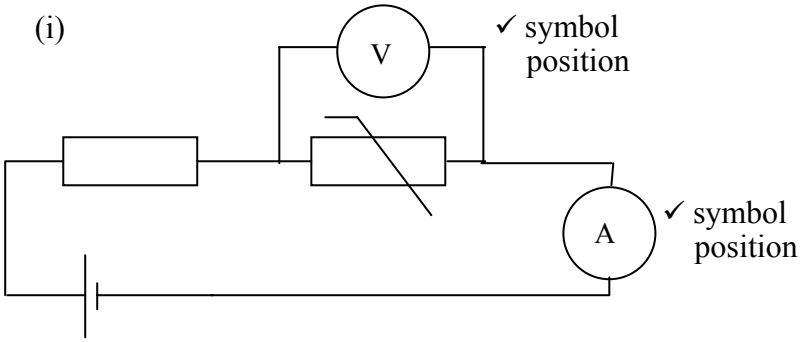
(b) (i) & (ii)



(iii) to protect the MOSFET ✓
from high voltages ✓
(induced) when the motor is switched off ✓

(8 marks)

(c) (i)



✓ symbol position

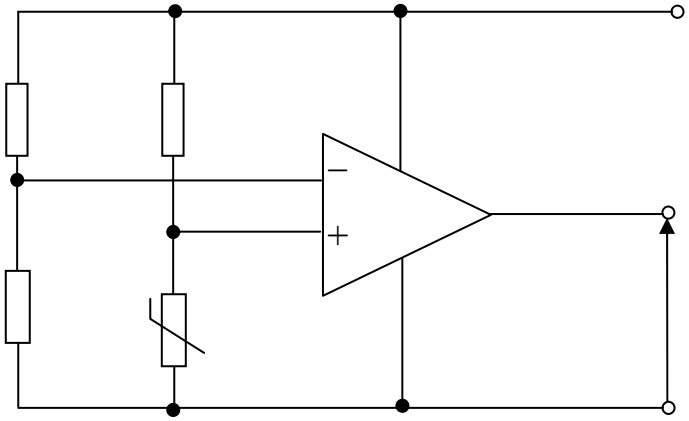
✓ symbol position

(ii) brown✓ grey✓ red✓ gold✓

(iii) 0,0005 A✓

(iv) R = V/I = 0.4/.0005 ✓ = 800 Ω✓✓ (2 max)

(v)



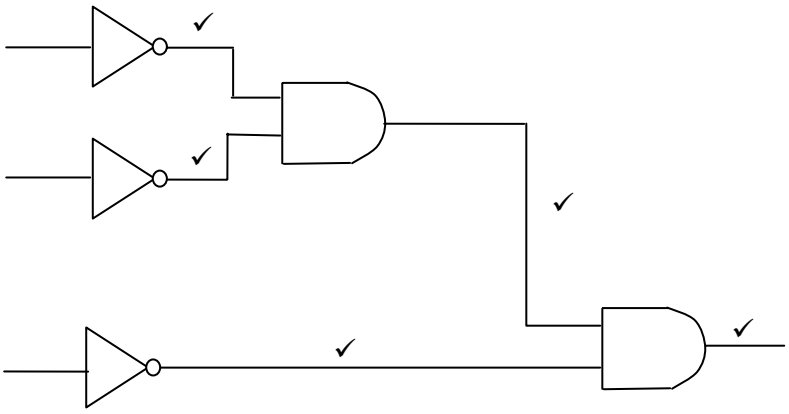
potential divider to non-inverting input✓
thermistor in correct position ✓

(vi) 1600 Ω✓✓

(15 marks)

(25 marks)

7 (a)



(b) (i)

		1
		0
		0
		0

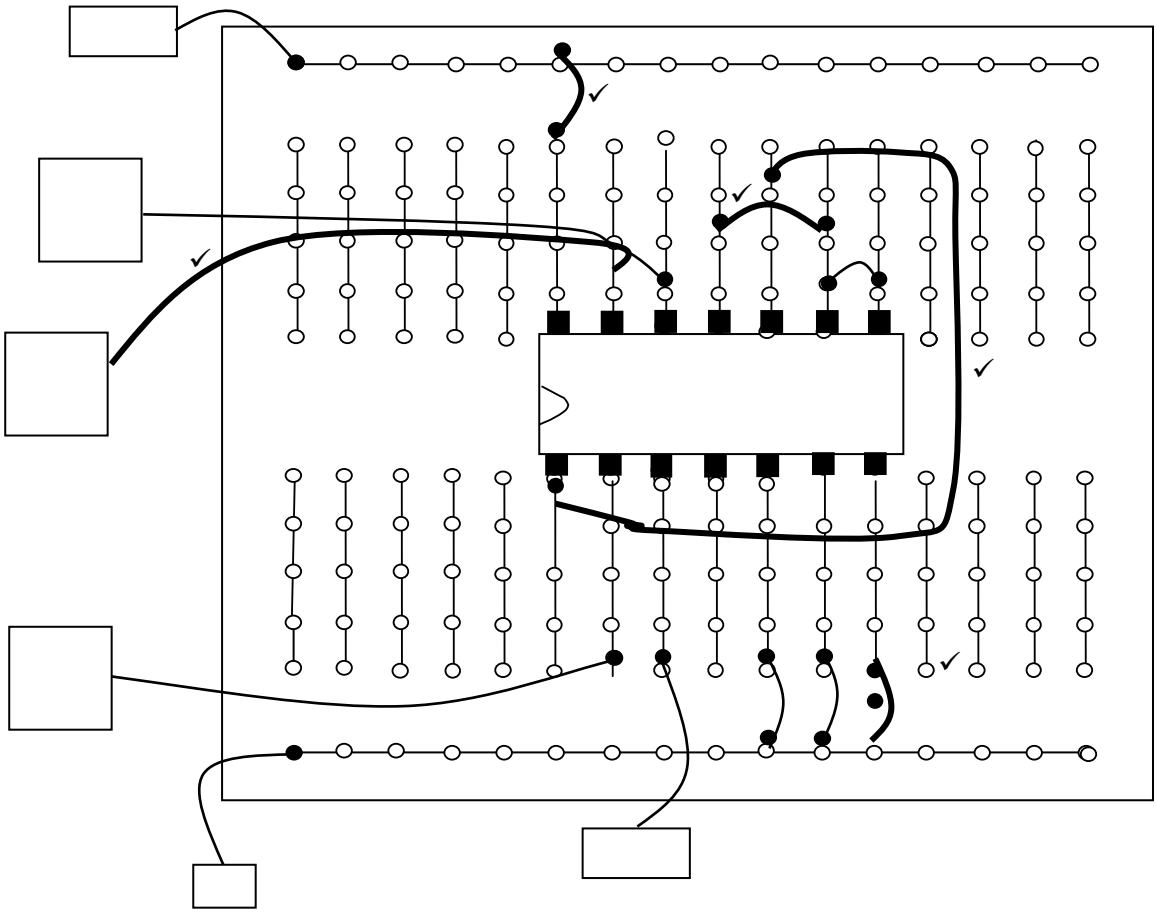
✓

(ii)

			1	0	1
			1	0	0
			0	1	0
			0	1	0
			0	1	0
			0	1	0
			0	1	0
			0	1	0

✓ ✓ ✓

(c)



(d) (i)

		1
		1
		1
		0

✓

(ii)

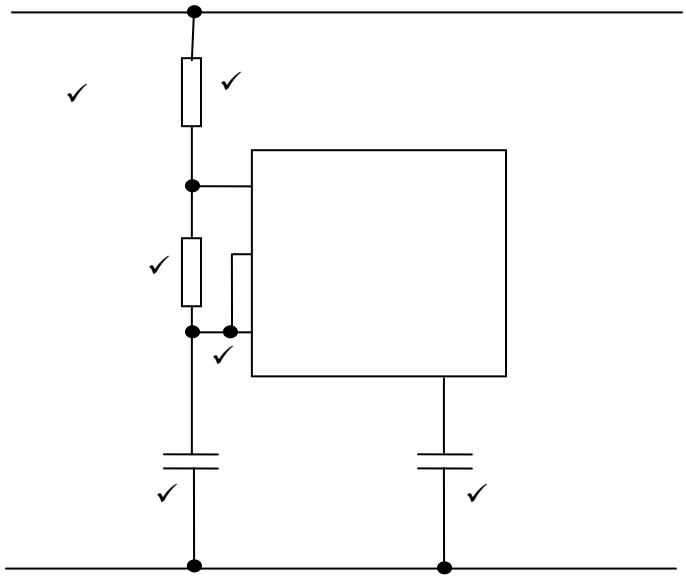
		1	1	0
		1	0	1
		0	1	1
		0	0	1

✓ ✓ ✓

(iii) OR✓

(19 marks)

8 (a) (i)



(ii) $T = (R_1 + 2R_2)C/1.44$✓ $= 40 \times 10^3 \times 0.1 \times 10^{-6} / 1.44$✓ $= 0.00278$✓s✓ (3 max)

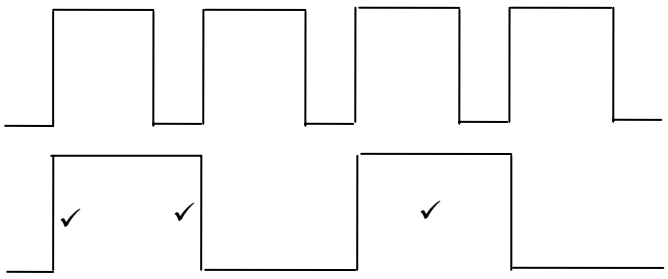
(iii) $f = 1/T$ or $1/0.00278$✓ = 360Hz✓✓ (2 max)

(b) (i) 3 × 1✓ = 3 ms✓✓ (2 max)

(ii) resistor tolerance/capacitor tolerance/calibration of timebase not accurate✓

(iii) 9✓V✓

(c) (i)



(ii) yes ✓ high/low times are equal✓were unequal✓

(22 marks)

(150 Total Marks)