

Questions on the 555 chip

Q1

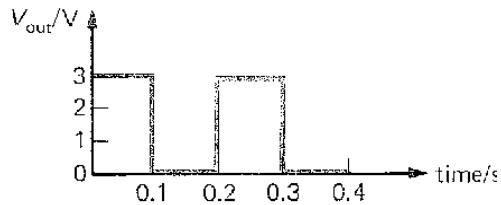
- (a) What is meant by saying that a multivibrator has stable states?
 (b) How many stable states have (i) a monostable, (ii) an astable, and (iii) a bistable?

Q2

Draw two circuits to show how you would connect an LED to the output and power supply of a monostable so that the LED lights when the output is (a) 'high', (b) 'low'.

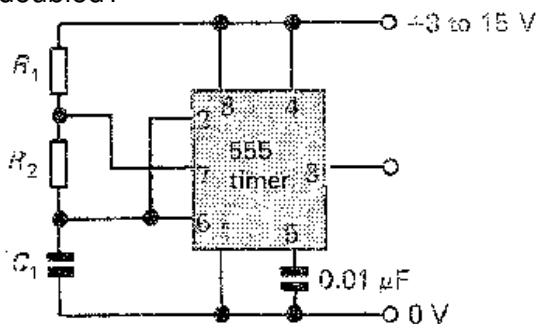
Q3

The graph below shows how the output voltage from an astable varies with time.
 (a) What is the period of the output?
 (b) What is the frequency of the output?
 (c) What is the value of the duty cycle?

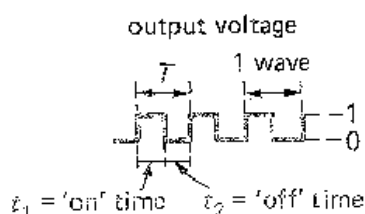


Q4

The astable output in the diagram below has a frequency of 1 Hz and has a LED with a suitable series resistor connected between it and the 0 V line. R₂ is much greater than R₁. (a) What would you see the LED doing? (b) What happens to the LED if the value of R₂ is halved? (c) What happens to the LED if the value of C₁ is doubled?

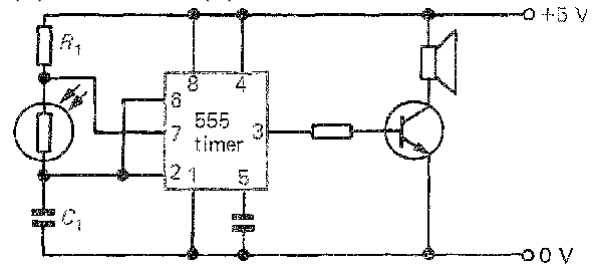


(a)



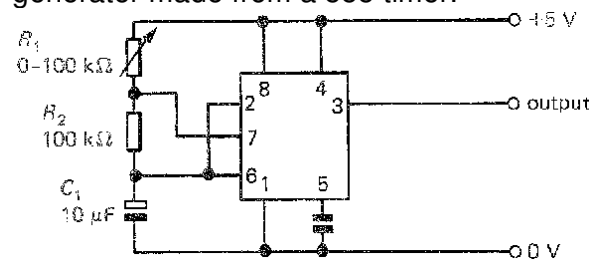
Q5

What happens to the pitch of the note from the loudspeaker in the astable circuit below when the amount of light falling on the LDR (a) increases, (b) decreases?



Q6

The circuit below shows an astable pulse generator made from a 555 timer.



R₁ is a variable resistor. C₁ charges through R₁ and R₂ in series and during this time t₁, the output is 'high'. C₁ discharges through R₂ only and for this time t₂, the output is 'low'. t₁ and t₂ are given in seconds by

$$t_1 = 0.7 \times (R_1 + R_2) \times C_1, \text{ and } t_2 = 0.7 \times R_2 \times C_1$$

where R₁, and R₂ are in M (or k) and C₁ is in μF (or F)

(a) Copy and complete the table below when R₁ has values of 0, 50 k and 100 k. T = t₁ + t₂.

R ₁ (k)	R ₂ (k)	t ₁ (s)	t ₂ (s)	T (s)	t ₁ /t ₂
0	100				
50	100				
100	100				

(b) What is T called?

(c) What is t₁/t₂ called?

(d) Which value of t₁/t₂ gives *true* square waves?

(e) Draw a graph of output voltage against time when R₁=R₂=100 k; label both axes in the correct units.