



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



19EET202 / ANALOG ELECTRONICS

II YEAR / III SEMESTER

UNIT-4: AMPLIFIERS AND SWITCHING CIRCUITS

10/21/2023

1

MULTIVIBRATORS



What We'll Discuss



TOPIC OUTLINE

Introduction
Classification of multivibrator
Working
Applications

10/21/2023

2



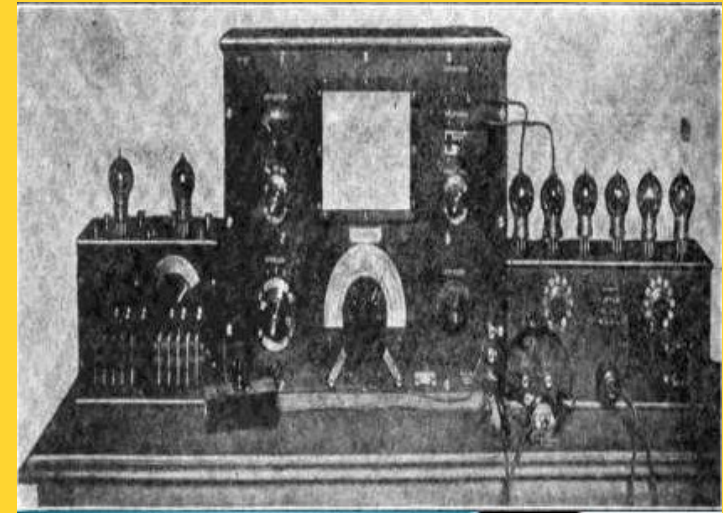
Introduction

A multivibrator is an electronic circuit that is used to implement two state systems like oscillators, timers and flip-flops. •It is characterized by two amplifying devices (transistors or other devices) crosscoupled by resistors or capacitors

Invention of Multivibrator

A vacuum tube Abraham-Bloch multivibrator oscillator, France, 1920.

Henri Abraham and Eugene Bloch described the first multivibrator circuit in 1920, also called a plate-coupled multivibrator. It was made from vacuum tubes and its harmonics are being used to calibrate a wavemeter .





Classification of Multivibrator

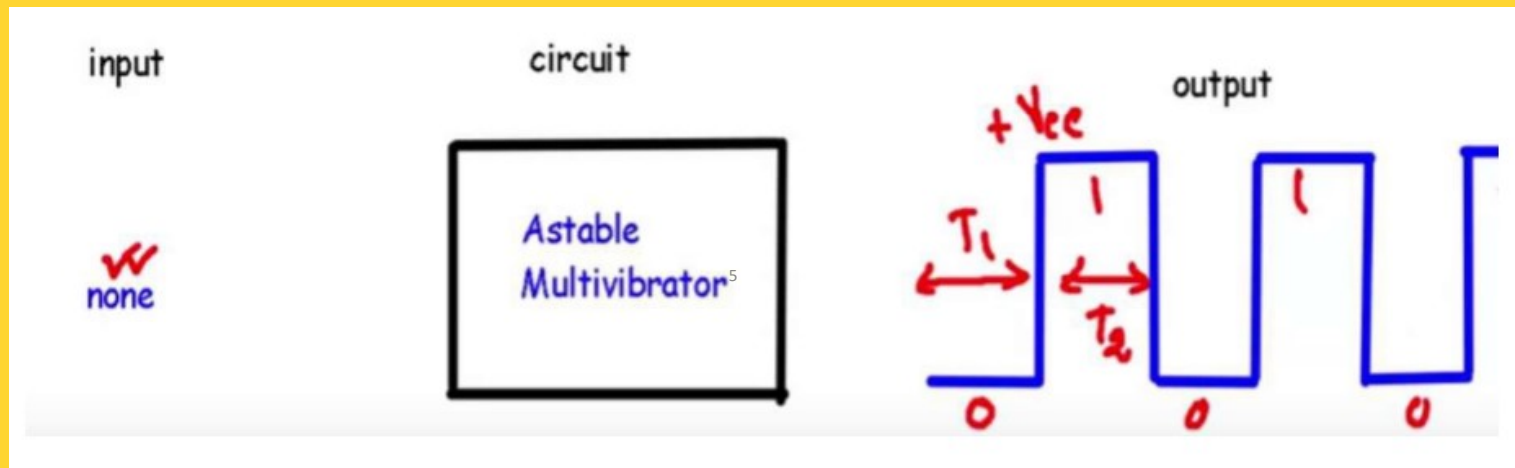


- There are three types of multivibrator circuits depending on the circuit operation:
- Astable – neither state is stable.
- Monostable - one of the states is stable, but the other is not.
- Bistable – it remains in either state indefinitely



Astable Multivibrator

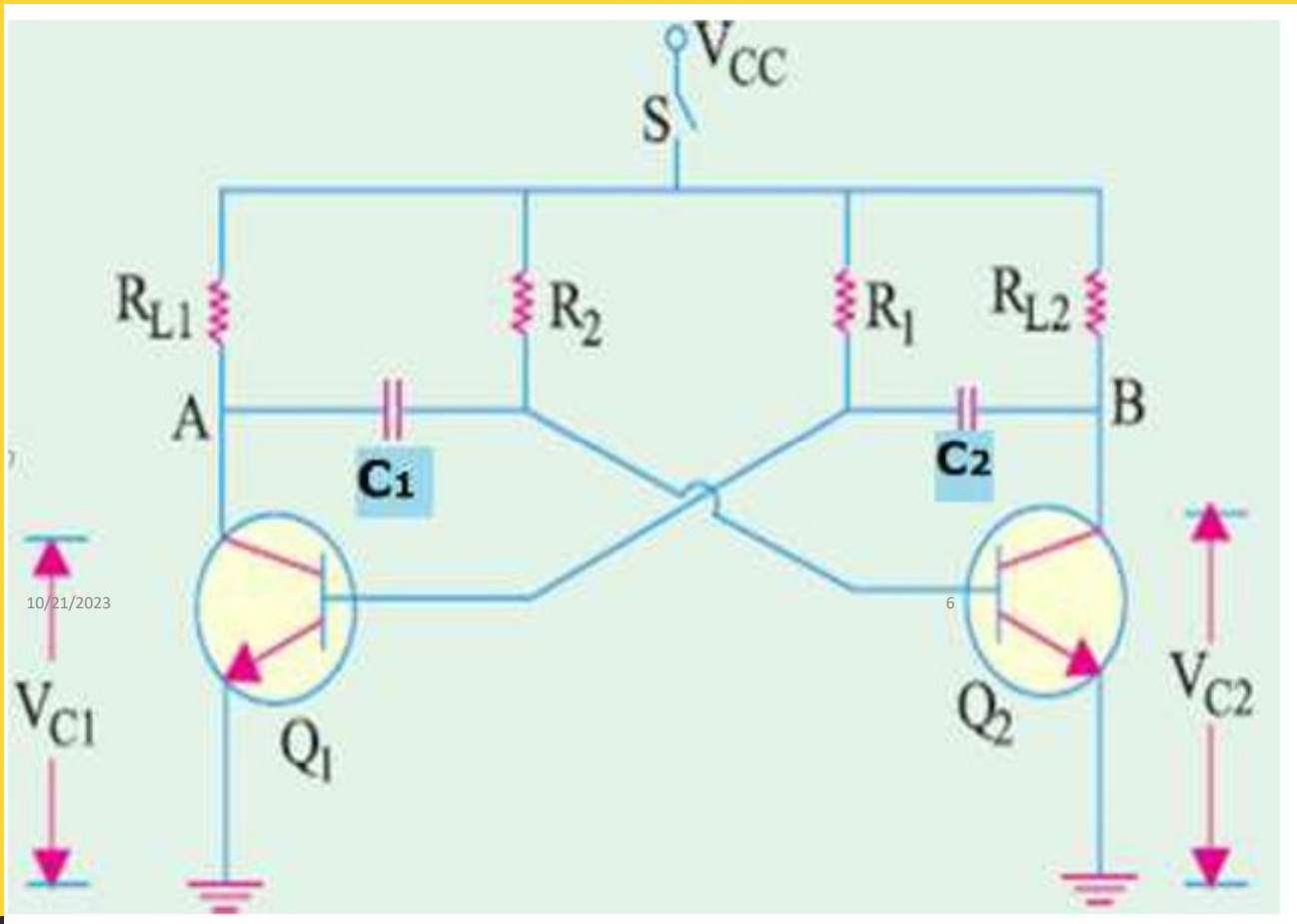
A Multivibrator that generates square waveform **without** using external triggering pulse is known as Astable multivibrator. It also known as Free-running Multivibrator .



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Circuit diagram of Astable Multivibrator

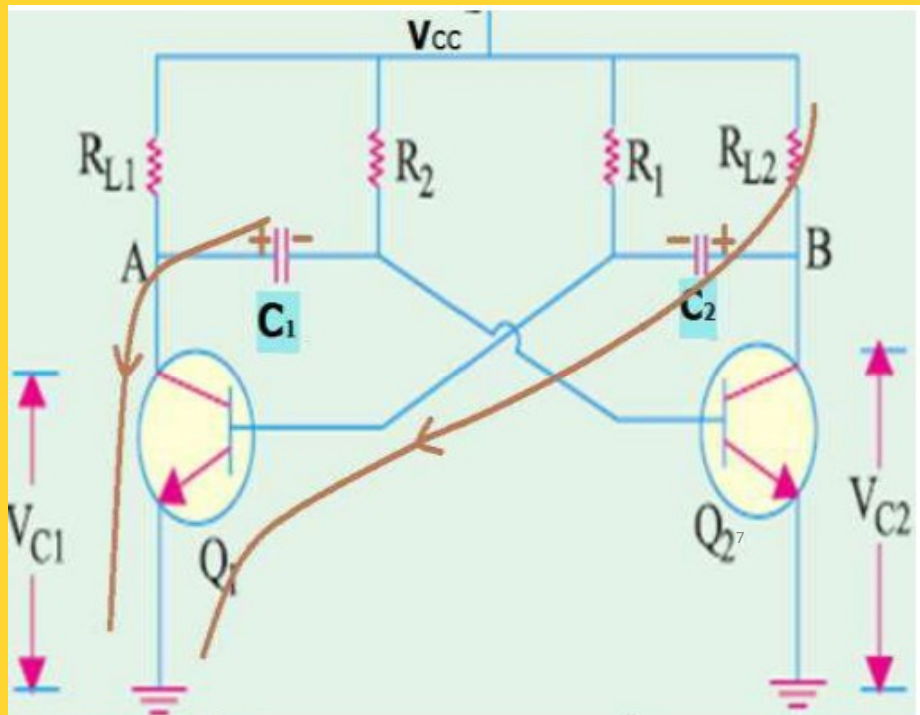


- This astable circuit consists of two transistors, a cross coupled Feedback network, and two capacitors and four resistors.



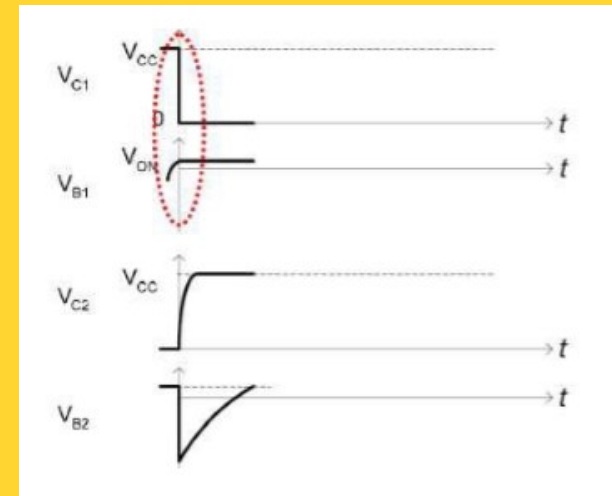


Common Cathode (CC) Seven Segment Display



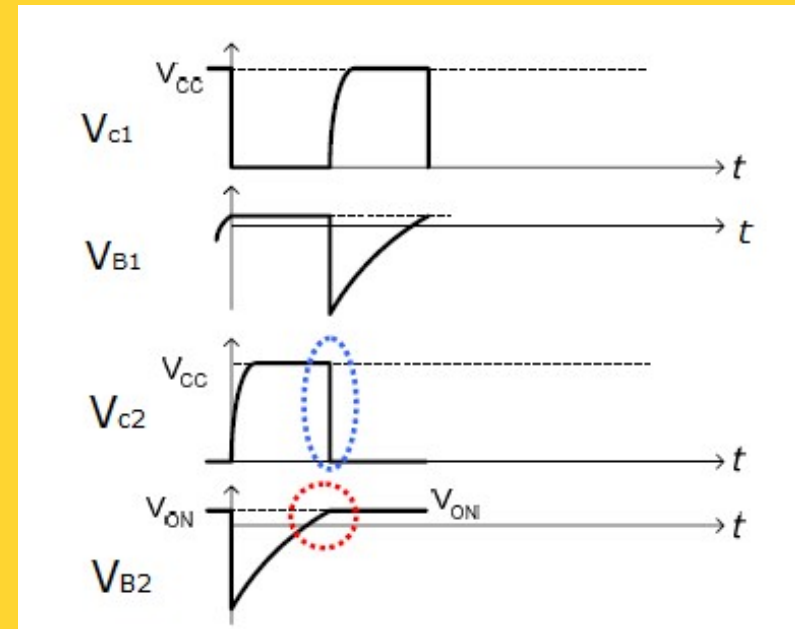
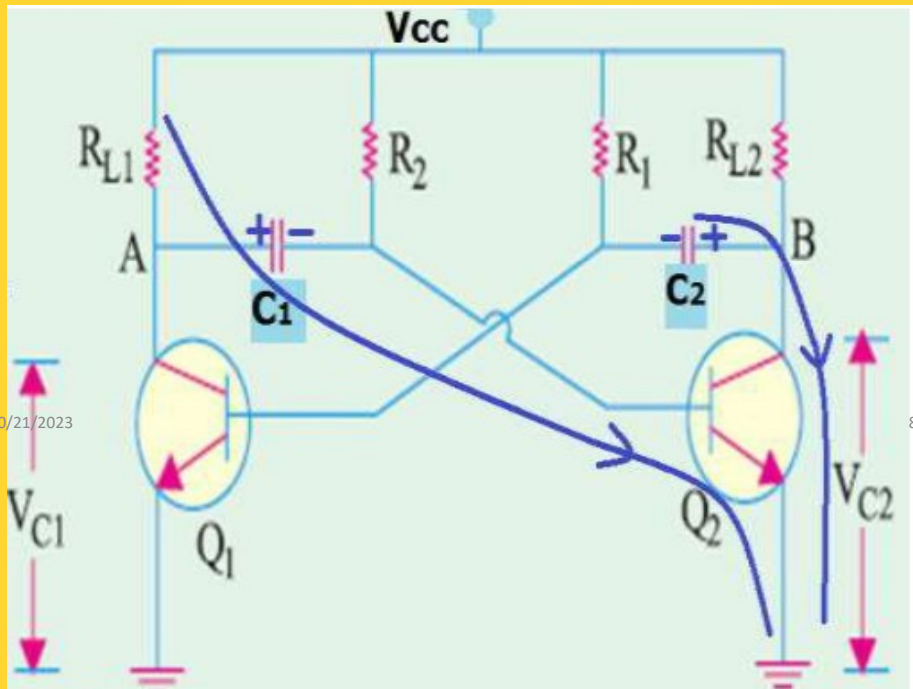
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- Consider Q1 is ON and Q2 is OFF: VCC drops across RL 1. Hence, VC1 = 0 and point A is at ground potential and VC2=Vcc. C1 discharging and C2 charging.



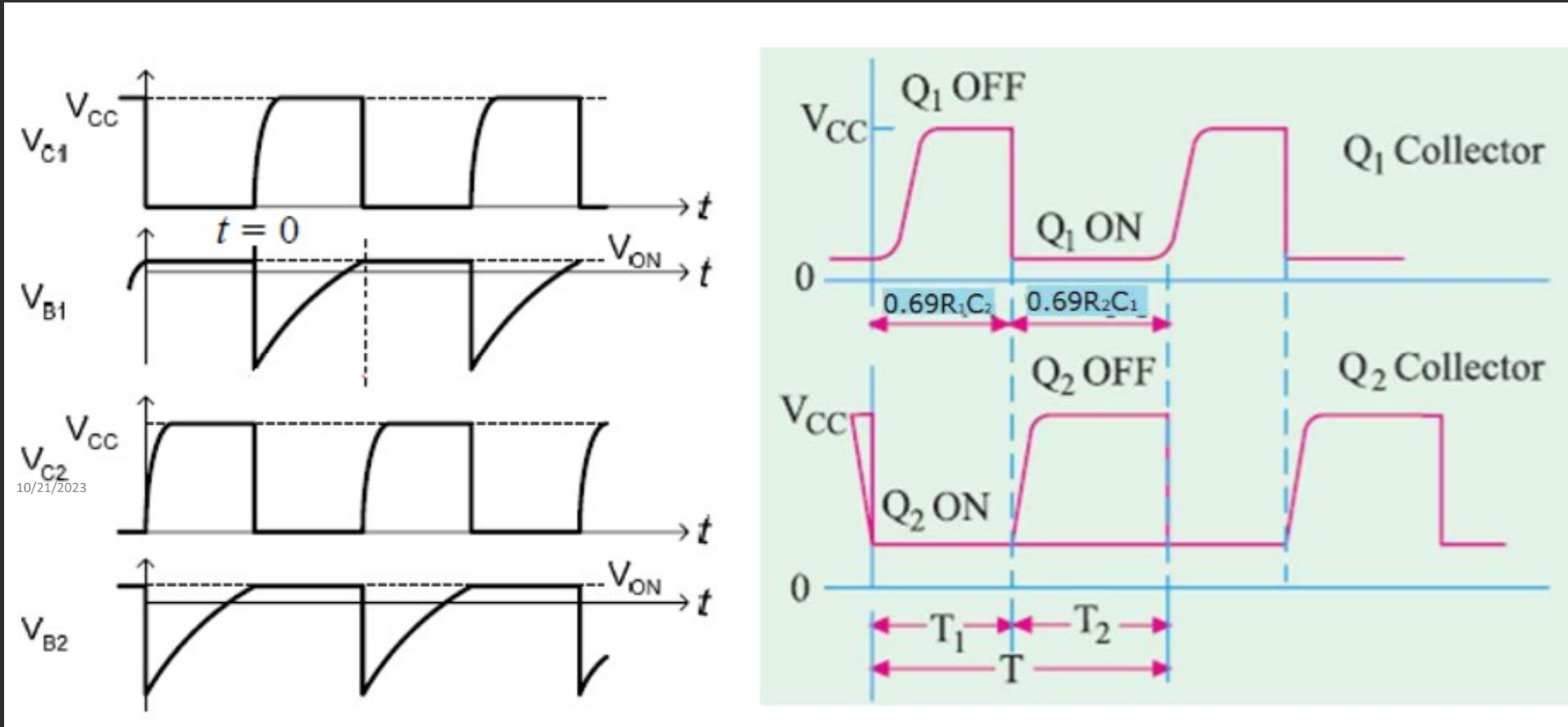


Consider Q2 is ON and Q1 is OFF: VCC drops across RL 2. Hence, VC2 = 0 and point B is at ground potential and Vc1=Vcc. C2 discharging and C1 charging.





Astable Multivibrator





Frequency of Oscillation

- It can be proved that off-time for Q 1 is $T_1 = 0.69 R_1 C_2$ and that for Q 2 is $T_2 = 0.69 R_2 C_1$. Hence, total time-period of the wave is $T = T_1 + T_2 = 0.69 (R_1 C_2 + R_2 C_1)$. If $R_1 = R_2 = R$ and $C_1 = C_2 = C$ i.e. the two stages are symmetrical, then $T = 1.38 RC$. It is given by the reciprocal of time period,

$$f = \frac{1}{T} = \frac{1}{1.38 RC} = \frac{0.7}{RC}$$



Application



- Used in applications where low clock frequency clock pulse train is required. Relaxation oscillators, which are parts of vehicle indicator lights, early oscilloscopes and television receivers. Timing signals



Working of Astable Multivibrator



- It is clear that when Q2 is ON, the falling voltage VC2 permits the discharging of the capacitor C2 which drives Q1 into cut-off.
- The rising voltage of VC1 feeds back to the base of Q2 tending to turn it ON.
- This process is said to be regenerative.



10/21/2023

13

THANK YOU

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13/13