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Lecture for M.Sc. Physics, II Semester Students
M.Sc. II Semester (Electronics Device)
Paper - IV, Unit – III, Oscillators and **Multivibrator**

3 May 2020

Summary of the Multivibrators

Astable Multivibrator

Behavior of Astable Multivibrator:-

- The astable multivibrator is simply an oscillator. The astable multivibrator generates continuous stream of rectangular off-on pulse that switch between two voltage level.
- The frequency of the pulses and their duty cycle are dependent upon the RC network values.
- The capacitor C charges through the series resistors R_1 and R_2 with a time constant $(R_1 + R_2) C$.
- The capacitor discharge through R_2 with a time constant of $R_2 C$.

Uses: -

- Flashing LED's
- Pulse with modulation
- Pulse position modulation
- Periodic timers
- Uses include LED's, pulse generation, logic clocks security alarms, and so on.

Advantages: -

1. Astable multivibrators continuously switch between one state to another.
2. This allows astable multivibrator to power themselves and perform work at consistent

rate without influence from any outside forces or events.

3. Astable multivibrators are inexpensive to produce, are relatively simple in design, and can remain functional for extraordinary amounts of time.

Disadvantage: -

1. Astable multivibrators do not transfer the entire output signal to the input.
2. This is due to resistance within the circuit, lack of a completely closed loop at the output terminals, and the tendency for one capacitor or transistor to absorb energy at a slightly different rate than the other.
3. The amplifier restores the lost energy when it amplifies the signal, the signal will eventually be too small to be of any use.

Monostable Multivibrator:-

Advantages: -

- 1) A Monostable multivibrator generates output signals at timed intervals in the form of square waves.
- 2) They are half the size of astable multivibrators therefore be used in more diverse situations.
- 3) Monostable multivibrators can be connected to one another to provide additional functionality.
- 4) They are relatively simple in design and are inexpensive.

Disadvantages: -

- 1) One main disadvantage of Monostable Multivibrator is that the time between the application of the next trigger pulse T has to be greater than the RC time Constant of the circuit.

Biastable Multivibrator

Advantages: -

1. Bistable multivibrator is one that maintains a given output voltage level unless an external trigger is applied.
2. In the bistable multivibrator both the resistive-capacitive network are replaced by resistive networks.
3. Perfect logic levels are maintained.
4. It helps avoiding Meta-stability.
5. Circuit design is simply.
6. Stores the previous output unless disturbed.

Disadvantages:

1. Two kinds of trigger pulses are required.
2. A bit costlier than other multivibrator.

Applications: -

1. Bistable Multivibrator have many applications such as frequency dividers, counters or as a storage device in computer memories but they are best used in circuits such as Latches and Counters.

Comparison of Multivibrator circuits

Astable Multivibrator	Monostable Multivibrator	Bistable Multivibrator
1. There is no stable state.	1. It has only one stable state.	1. There are two stable state of the output.
2. Trigger is not required to change the state hence called free running.	2. Trigger is required for the operation to change the state.	2. Trigger input is required for changing the state of output.
3. Three component s R1, R2 and C are necessary with IC	3. Two comparators R and C are necessary with IC 555 to	-

555 to obtain the circuit.	obtain the circuit.	
4. The frequency is given by $f=1/T$	4. The pulse width is given by $T = 1.1RC$ seconds.	-
5. The frequency of operation is controlled by R1, R2 and C.	5. The frequency of operation is given by frequency of trigger pulses applied	-
6. The applications are square wave generator, flasher, voltage controlled oscillator etc.	6. The applications are timer, frequency divider, pulse width modulation etc..	6. used as flip-flop
7. Number of quasi-stable state is 2	7. Number of quasi-stable state is 1	7. No quasi-stable state
8. Time for the two quasi stable states depends on RC time constant. The two quasi stable states can have different intervals.	8. Time for the two quasi stable states depends on RC time constant.	8. No quasi-stable state