EXPERIMENT-9
Voltage Controlled Oscillator

a. Aim: a. To Design a Voltage Controlled Oscillator.

b. To Verify the functionality of above circuits.

b. Apparatus

Hardware:
a. Resistors (1kΩ, 100kΩ,10kΩ)
b. Capacitors (50nF)
c. LM 741
d. Regulated Power Supply
e. Bread board
f. Transistor (BC107)
g. DSO

c. Theory:

A Voltage-Controlled Oscillator (VCO) is an electronic oscillator whose oscillation frequency is controlled by a voltage input. The frequency of the output signal varies in relation to the amplitude of the input control voltage. VCOs are widely used in signal generators, phase-locked loops (PLL's), and frequency modulation applications.

d. Procedure:

a. Connect the circuit as per the circuit diagram
b. Apply input as per the requirements and observe the outputs.
c. Observe the outputs of VCO using a DSO.
d. Check the voltage and frequency of the generated waveform(square).

Design:

$$f = \frac{V_{in}}{2\pi RCV_{ref}}$$

e. Simulation Observation:

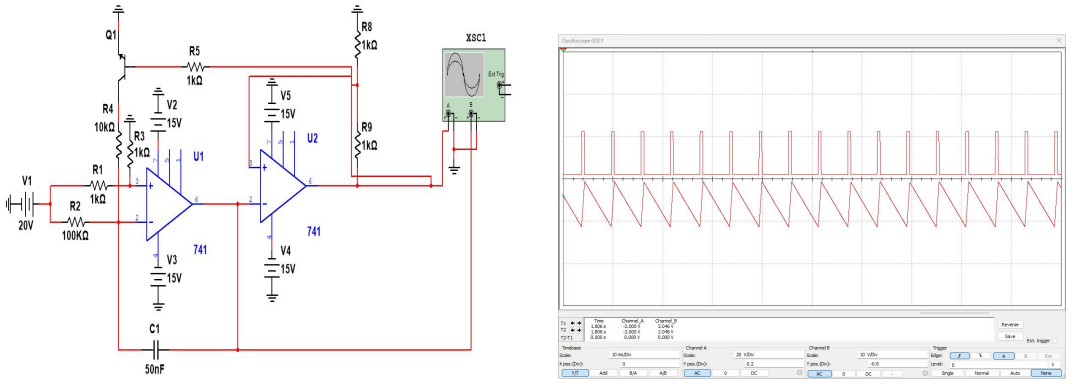
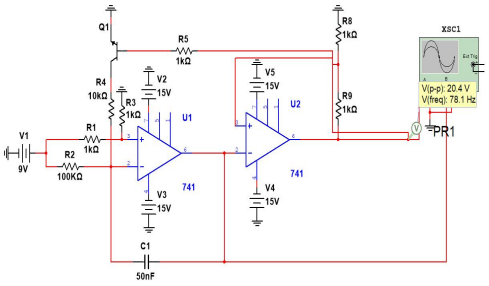


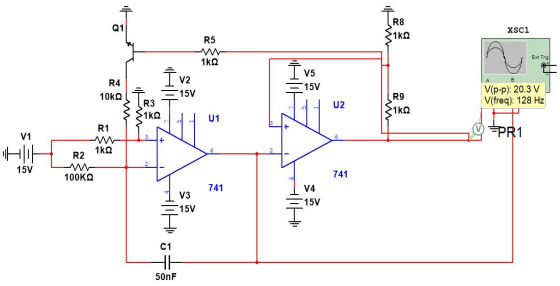
Fig 1: VCO circuit

Case 1: V_{in} = 9V



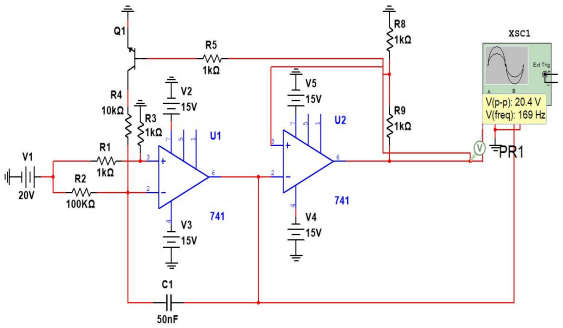
For input V_{in} = 9V, Square wave of frequency 78.1Hz is generated.

Case 2: V_{in} = 15V



For input V_{in} = 15V, square wave of frequency 128Hz is generated.

Case 2: V_{in} = 20V



For input V_{in} = 20V, square wave of frequency 169Hz is generated.

CONCLUSION:

From above cases we have observed that as input V_{in} is increases, frequency of square wave is increases.

f. Result:

Hence, we have designed, implemented and verified VCO.

Signature of the Faculty