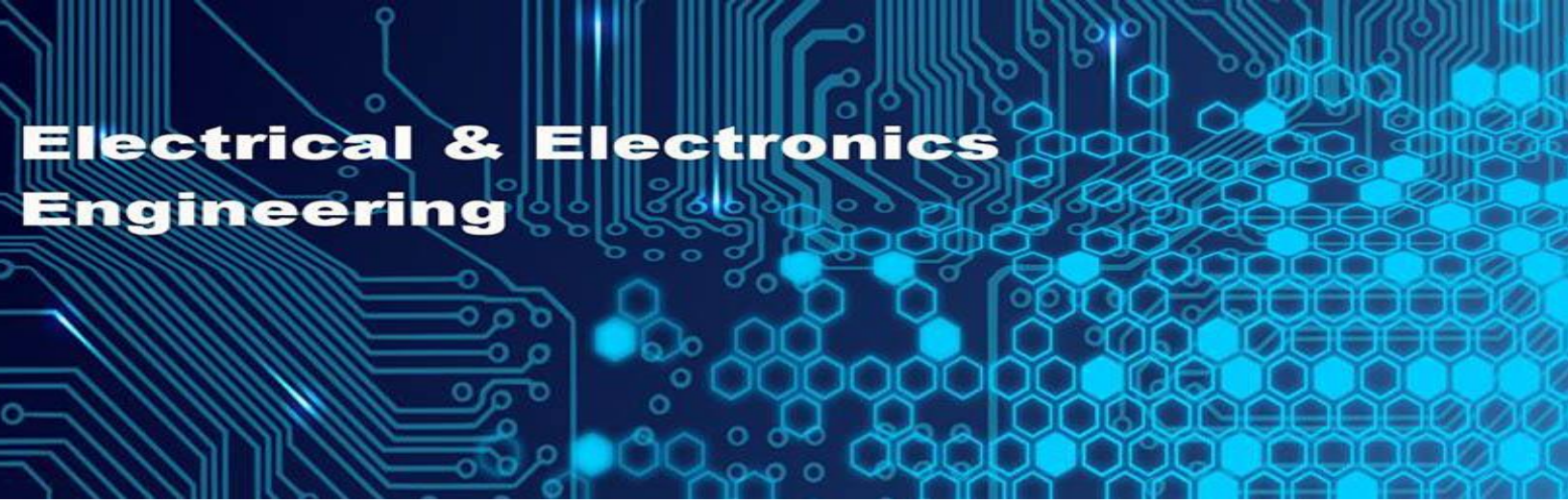

EEE Lab Report

Course: Electronic Devices and Circuits & Pulse Techniques Lab
Course Code: EEE 204

Experiment No: 07
Experiment Name: Differentiator
Date of Performance: 15/04/2021
Date of Submission: 21/04/2021

Submitted By:	Submitted To:
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Signature and Date
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Lecturer
Department of EEE
Green University of Bangladesh

Experiment No: 07

Experiment Name: Differentiator

Aim: To design and setup a Differentiator circuit using OP AMP 741C and plot their pulse response.

Objectives: After completion of this experiment, we will be able to design and setup a differentiator circuit using OP AMP.

Equipments/Components:

Sl. No.	Name and Specification	Quantity required
01.	Dual power supply +/-15V	1
02.	Function generator (0-1MHz)	1
03.	Oscilloscope	1
04.	Bread board	1
05.	IC 741C	1
06.	Resistor	1
07.	Capacitor	1
08.	Probes and connecting wires	As required

Principle: It is an OP amp circuit which performs the mathematical operation of differentiation. That is the output waveform is the derivative or differential of the input voltage. That is $V_o = -R_f C \frac{d(V_{in})}{dt}$. The differentiator circuit is constructed from basic inverting

amplifier by replacing the input resistance R_i with capacitor C. This circuit also works as high pass filter.

Procedure:

01. Check the components.
02. Setup the circuit on the breadboard and check the connections.
03. Switch on the power supply.
04. Keep the oscilloscope in AC coupling mode.
05. Give $V_i = 2V_{pp}$, 1KHz square wave.
06. Observe input and output on two channels of the oscilloscope simultaneously.
07. Note down and draw the input and output waveforms on the graph.

Circuit Diagram:

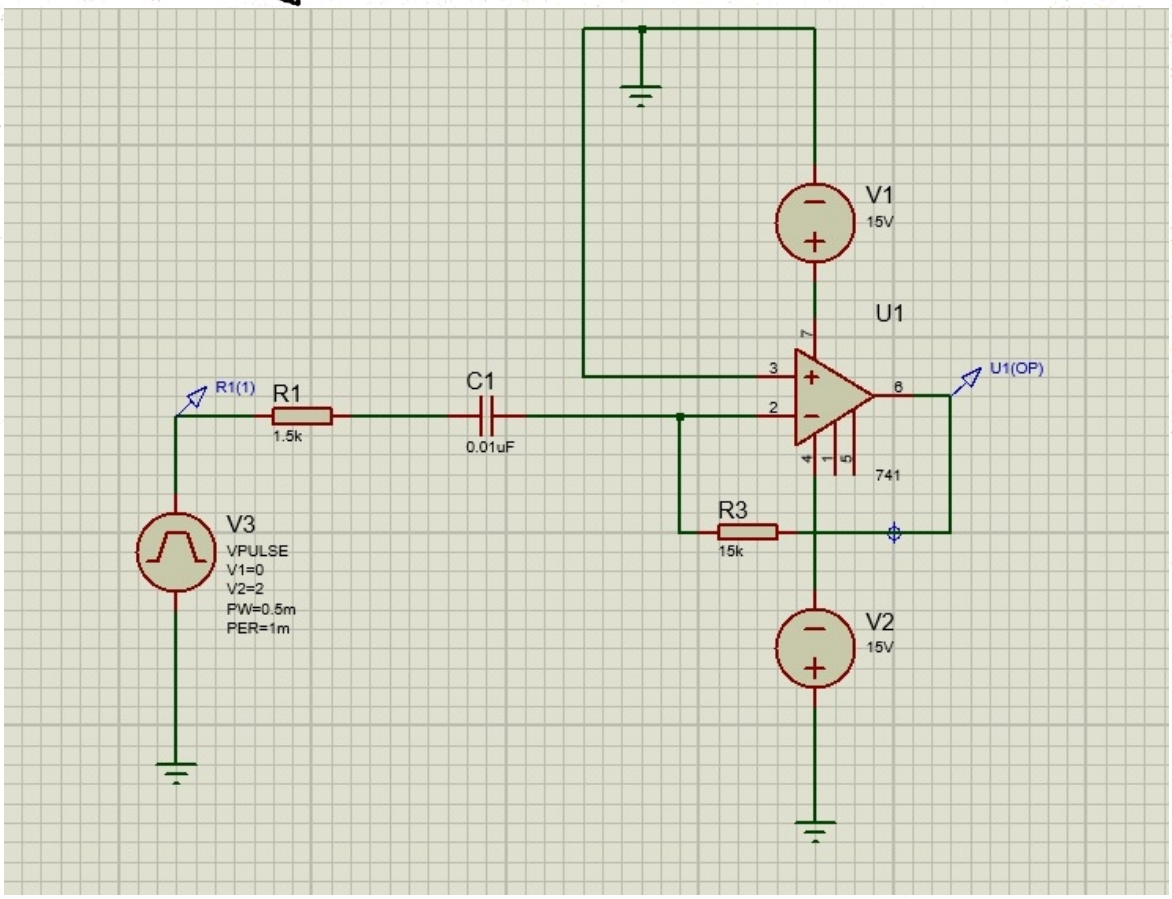

Figure: Differntiator(Proteus)

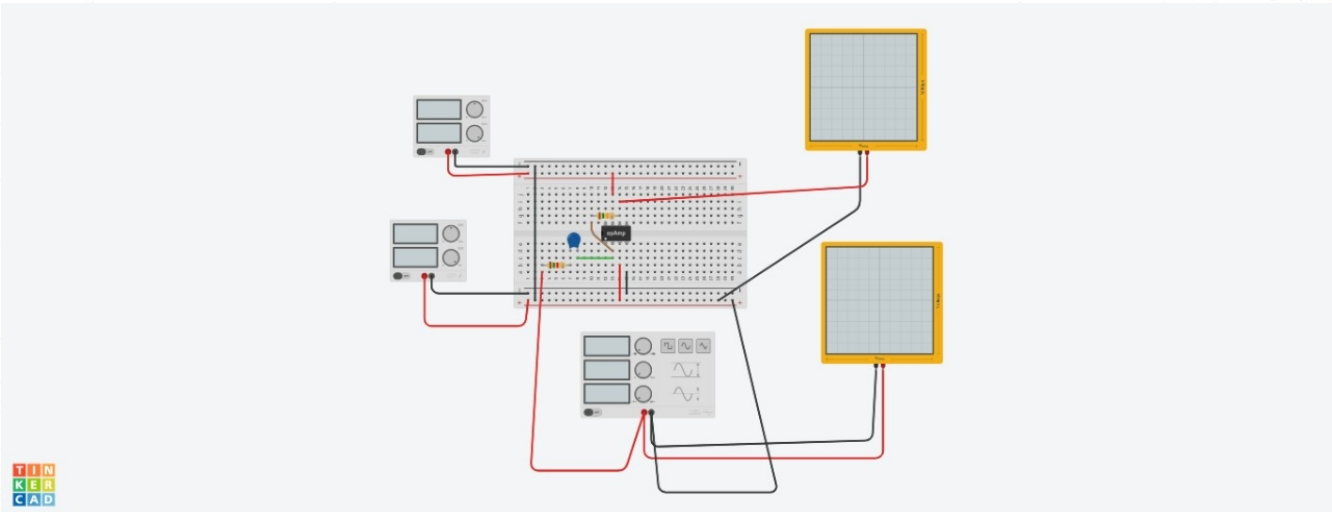

Figure: Differentiator(TinkerCAD)

Discussion:

Differentiator amplifier is an op-amp circuit configuration which is inverse of the integrator circuit. It produces an output signal where the instantaneous amplitude is proportional to the rate of change of the applied input voltage. Mathematically speaking, the output signal of a Differentiator is the first order derivative of the input signal.

From this experiment, we will be able to design an op-amp circuit configuration which will produce a first order derivative signal as an output signal of the input signal.

Finally we can say that, this experiment

is more effective to gain knowledge a differentiator amplifier and from this experiment - we can realize that, how a differentiator amplifier - works by a graph clearly. So at last - we can say that, this experiment is more important for us.

References:

[1] Lab Manual for EEE 204 Course [Made & Edited by Mr. Md. Sharif Nafis Mahmood, Lecturer, Dept. of EEE, Green University of Bangladesh]

[2] https://www.electronicshub.org/operational-amplifier-as-differentiator/