ELCT 401 "Electric Circuits II"
Course Project
Practical Filter Circuits

Project Objective:

The main objective of this project is to gain some experience in analyzing and building of small practical circuits. Upon completion the project, students will be able to distinguish between the different types of filters, to identify the appropriate circuit components for building filter circuits, to perform measurements of electric quantities and to test the designed circuit.

Project Description:

A filter is a circuit that is designed to pass signals with desired frequencies and reject or attenuate others. As a frequency-selective device, a filter can be used to limit the frequency spectrum of a signal to some specified band of frequencies. Filters are the circuits used in radio and TV receivers to allow us to select one desired signal out of a multitude of broadcast signals in the environment. A filter is a passive filter if it consists of only passive elements R, L, and C. It is said to be an active filter if it consists of active elements (such as transistors and op amps) in addition to passive elements R, L,

In this project, students will analyze, implement and test one of the well-known standard filter circuits.

List of Circuits:

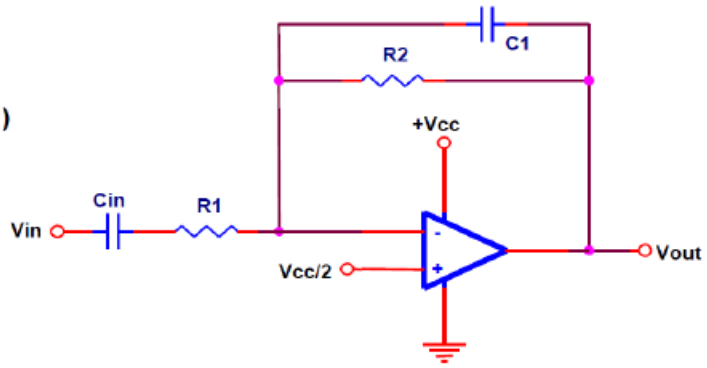
The filter can be one of the following types: Low Pass Filter, High Pass Filter, Band Pass Filter and Band Stop Filter. The standard designs allow you to adjust the filter center frequency and the filter

gain. Please select one filter circuit from the below table as your course project and follow the steps in the next section for successful implementation.

1. Low-pass filter circuits

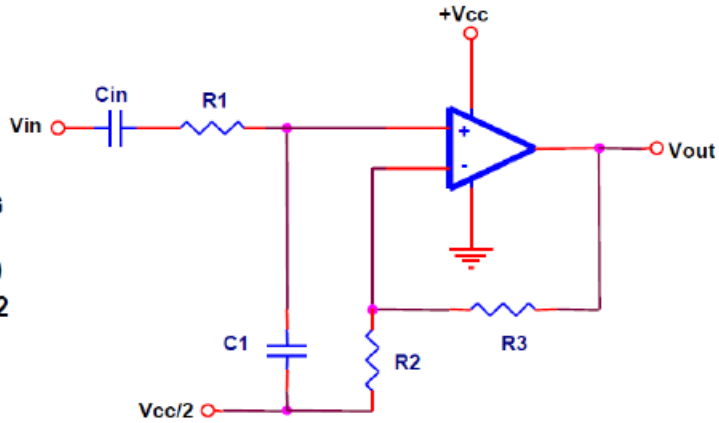
INVERTING

Fo = 1/(2pR2C1)
Gain = – R2/R1



NONINVERTING

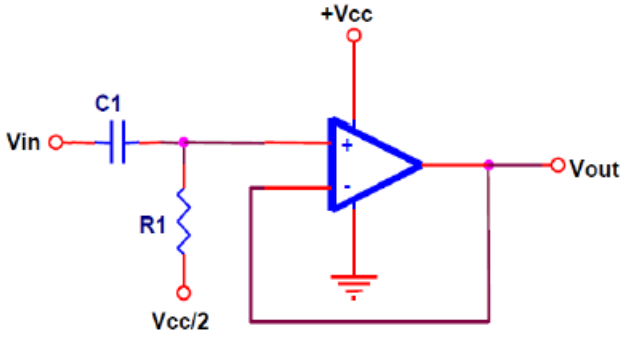
Fo = 1/(2pR1C1)
Gain = 1 + R3/R2



2. High-pass filter circuits

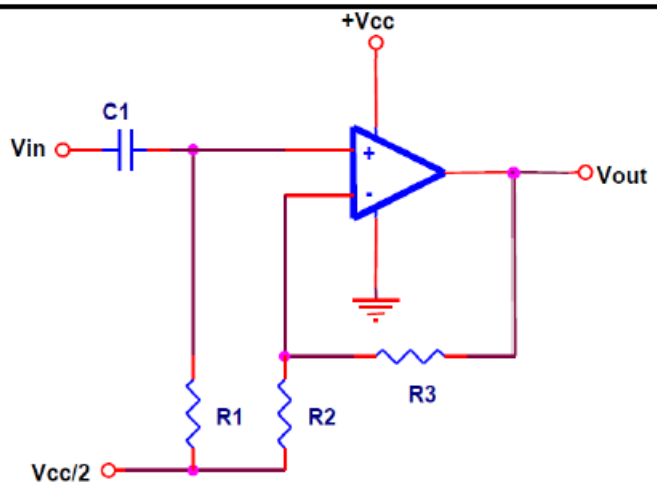
NONINVERTING

Gain = 1
Fo = 1/(2pR1C1)



NONINVERTING

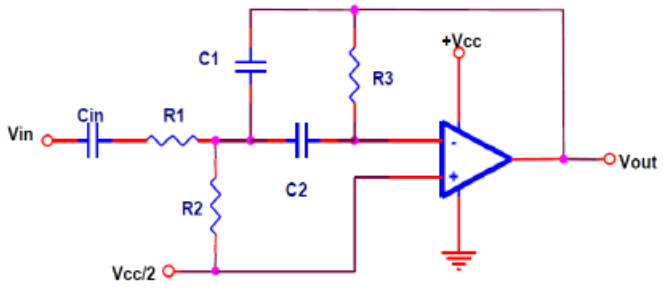
Fo = 1/(2pR1C1)
Gain = 1 + R3/R2



3. Band-pass filter circuit

BAND PASS

Gain = 2.3 dB
Fo = 1/(2.32πRC)
R1 = 10R
R2 = 0.001R
R3 = 100R
C1 = 10C
C2 = C



Steps:

The following are the requirements for completion of the course project:

1.0 Choose your own team: the team consists of maximum 2 students. **The team consists of students only from the same lab. No exceptions please**

2.0 Pick up your team project from the list of proposed circuits.

3.0 Set a value for the center frequency F_0 and tune the parameters to match the set value.

4.0 Simulate your circuit using Pspice and record your output. Make sure that your output matches the type of the chosen filter.

5.0 Get the required components to build your own circuits (Breadboards, Opamps). You can get the components from **IEEE student club in the GUC platform.**

6.0 Construct your circuit and test the output. Make sure that the circuit has a stable performance.

7.0 Prepare your document and be ready to present your circuit and receive questions regarding your project work at your last lab session.