EXPERIMENT 5

BASIC APPLICATIONS OF OPERATIONAL AMPLIFIERS- II

5.1 Objective

In this experiment the basic properties of operational amplifiers (op-amp's) will be introduced and building circuits with op-amp will be learned. Op-amp circuits such as summing amplifier, difference amplifier will be investigated.

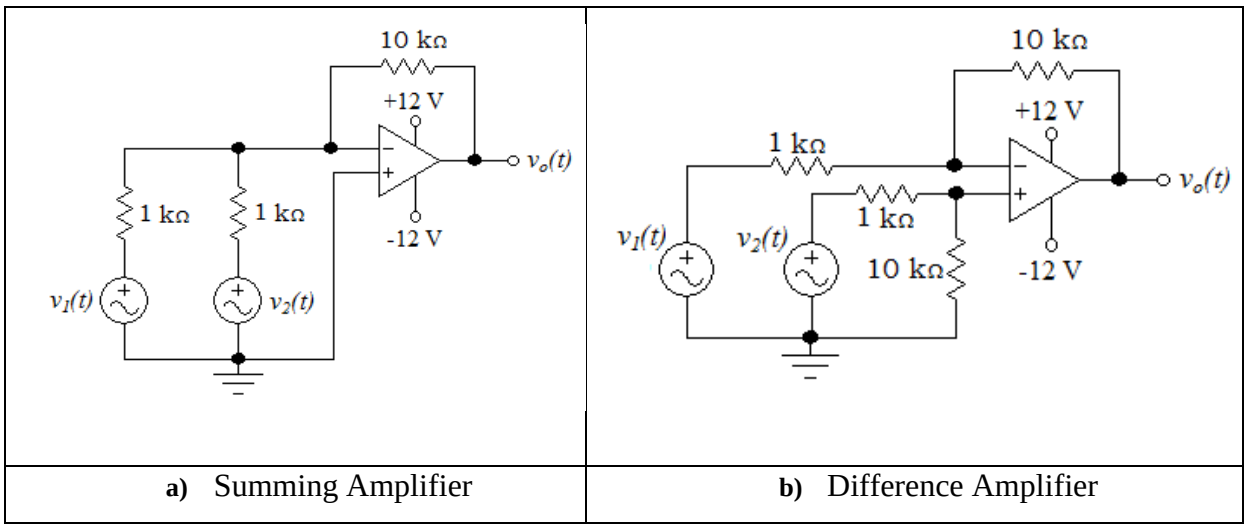
5.2 Equipment List

1. Digital Storage Oscilloscope (GW Instek GDS-1072A-U), Function/Arbitrary Waveform Generator (AATech AWG 1020A), DC Power Supply,
2. Op-Amp: LM 358,
3. Resistors: 2x1 kΩ, 2x10 kΩ,

5.3 Preliminary Work

In the following questions, assume that the op-amp's are ideal.

1) Find the expressions relating the output voltage to the input voltage for the circuits given in Figure 5.1(a) and Figure 5.1(b), where $v_1(t)$=0.5sin(2000πt) and $v_2(t)$=0.2sin(2000πt) volts, and **plot $v_o(t)$** for each of circuits **on any of circuit design programs**. Draw all the results to the graph paper and bring it to the laboratory.



a) Summing Amplifier | **b)** Difference Amplifier

Figure 5.1 Complex Op-Amp Circuits

5.5 Experimental Work

1. Setup the circuit in Figure 5.1 (a). Observe and plot the output signal ($v_o(t)$) into the graph paper when,

i) $v_1(t)$=0.5sin(2000πt) and $v_2(t)$=0.2sin(2000πt)

ii) $v_1(t)$=0.5sin(2000πt) and $v_2(t)$=1sin(2000πt)

iii) $v_1(t)$=0.5sin(2000πt) and $v_2(t)$ is a square wave with V_{pp} = 1V and f = 1 kHz.

2. Repeat Step 6 for the circuit in Figure 5.1 (b). Observe and plot the output signal ($v_o(t)$) into the graph paper.