Ex: No:2

Name:-Aadi Mahajan

Registration number:-19BEE0032

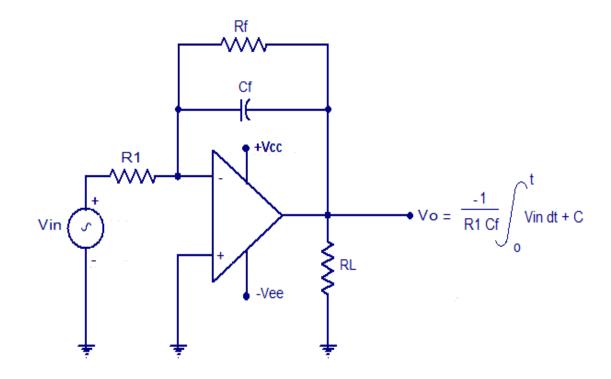
# Aim: Design of integrator and differentiator using op-amp

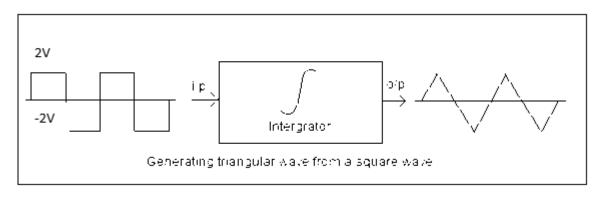
## Apparatus required:

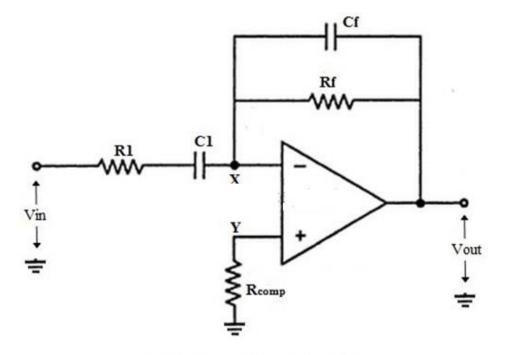
Name	Specialization	Quantity
Resistor	1)100k	One each of them
	2)10k	
	3)1.6k	
	4)75.7	
	5)79.5	
	6)9.09k	
capacitor	1)16nF	One each of them
	2)5nF	
	3)0.1mF	
Op-amp	LM-741	2
V-pulse	V1=1	2
	V2=-1	
	TD=0	
	TR=1n	
	TF=1n	
	PW=0.5m	
	PER=1m	
V-DC	15V	4

## Circuit diagram/ Calculation/equation:

### Practical op-amp integrator







A Practical Op-amp Differentiator Circuit

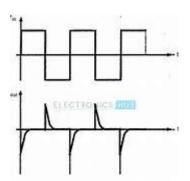
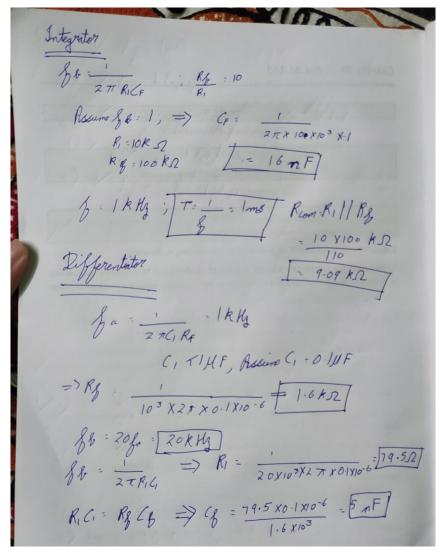


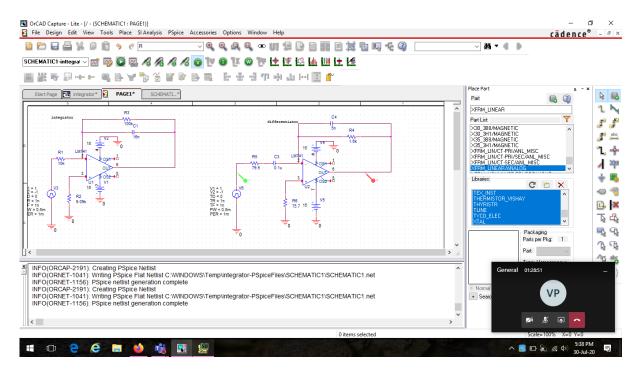
Fig. Input and Output waveforms for Square wave

$$v_0 = -R_F C_1 \frac{dv_{in}}{dt}$$



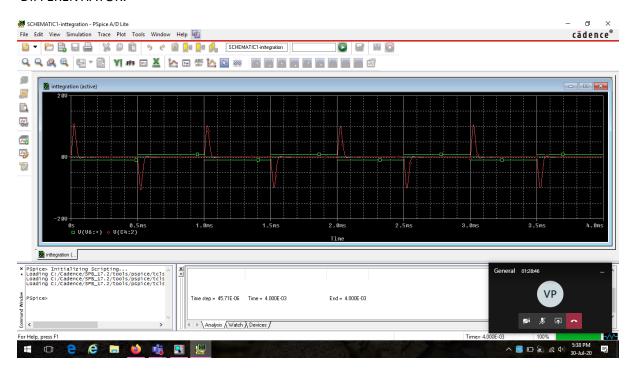
#### Simulation diagram:

### Output graph:



#### INTEGERATOR:-SCHEMATIC1-inttegration - PSpice A/D Lite o x File Edit View Simulation Trace Plot Tools Window Help cādence® 🖺 🔻 🗁 👺 🖫 🖴 🐕 🖟 📵 🔞 🥱 🤣 🚨 SCHEMATIC1-integration **№** N<sub>0</sub> Ŋ 0s 2ms □ V(R1:1) ◊ V(U1:0UT) inttegration (... x PSpice> Initializing Scripting... Loading C:/Cadence/SPB\_17.2/tools/pspice/tcls Loading C:/Cadence/SPB\_17.2/tools/pspice/tcls Loading C:/Cadence/SPB\_17.2/tools/pspice/tcls Circuit read in and checked, i ^ Calculating bias point for Trar Bias point calculated Transient Analysis Transient Analysis finished PSpice> Time step = 238.3E-06 Time = .015 End = .015 Total job time (using Solver INFO(DRPROBE-3190): Simu <u>د</u> へ 🛃 🗗 🔊 🦟 🗘 5:16 PM 30-Jul-20

#### **DIFFERENTIATOR:-**



Result and inference: The integrator changes square wave to triangular wave while a differentiator gives a spike waveform.