Semester: Summer, 2025
Course: CSE 251(Section: 10]
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Deadline: 14 july, 2025

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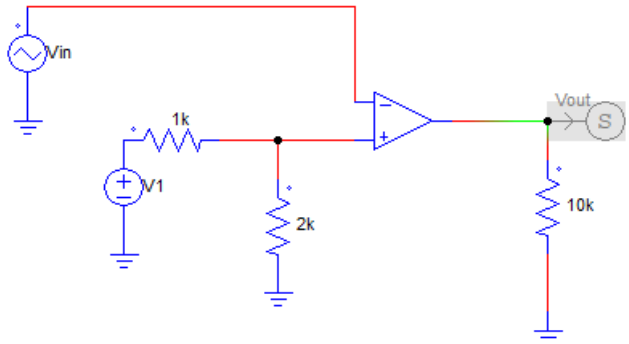
1)Discuss the working principle of op-amp in brief for open loop and closed loop configuration in terms of V_d , input resistance, open loop gain A_v, input current , V^+,V^-. (10)

2) Let an op-amp comparator ckt have V1=3V at inverting input and a triangular wave (8V p-p, 1kHz) as Vin at non-inverting input terminal .



i) Plot

Plot1: Vin and Vout vs time. (Vs+= 5V, Vs-=0V)

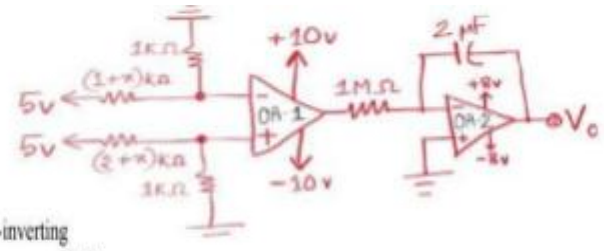
Plot2: VTC characteristics (Vout vs Vin)

ii) Repeat the plot for (Vs+= 10V, Vs-=-10V)

3)Design an op-amp based circuit which can do the following operations. Use the resistor for design between 2kΩ to 10kΩ (N.B : for differentiator/integrator use MΩ range resistance and uF range capacitor) **(15)**

Here x,y,z are input signals and Y is the final output
a) Y=(x+y+z) b)Y=-(3x+2y+z) c)Y=3x-y-2∫z dt d)Y= 3dx/dt -2∫ydt+2z

4)



In the circuit given above, x = *last digit of your student ID*

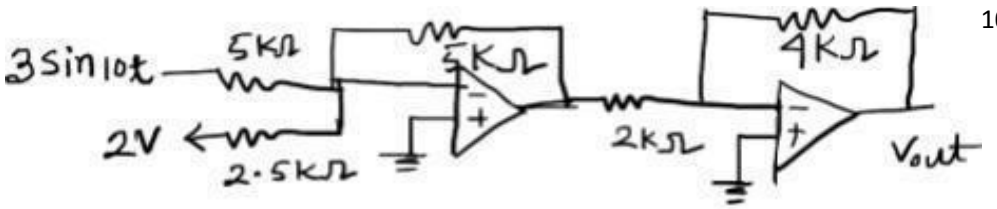
(a) **Analyze** the circuit and **determine** the voltage at the inverting, non-inverting terminals and the output of OA-1. [2+2

(b) **Determine** the highest V_0 you can get from this circuit. **Explain** briefly.

(c) **Analyze** the circuit to **determine** the output voltage, V_0 of OA-2 and **plot** V_0 vs time. **Label** the plot appropriately. [at t = 0, V_0 = 0]

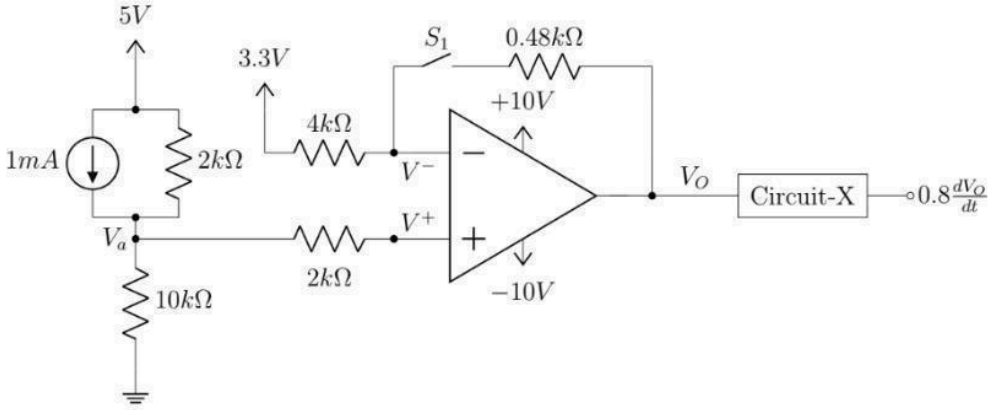
15

5)Find the expression for Vout and current through the closed loop 5kΩ resistor and draw the Vout signal with time 10



6)

The circuit diagram has a switch S_1 which is shown to be 'open' in the figure. The output V_O is passed through an unknown block of 'Circuit-X' and a differentiated result is generated.



(a) **[1 mark] State** the equation of gain of a non-inverting amplifier.

(b) **[3 marks] Calculate** the values of V_a and $V+$.

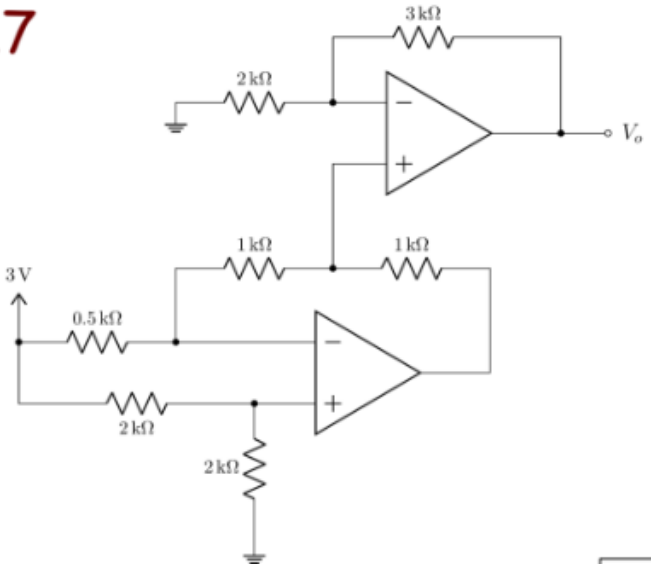
(c) **[2 marks] Determine** V_O when the switch S_1 is closed.

(d) **[2 marks] Determine** V_O when the switch S_1 is open.

7)

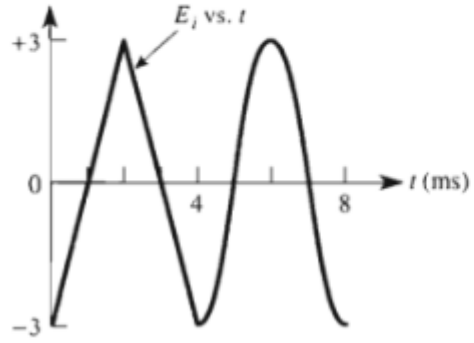
Problem 17

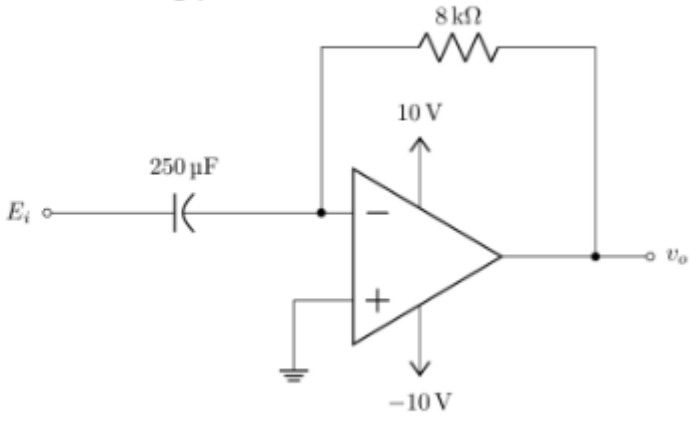
- Determine V_o.



8)

- Sketch $v_o \; vs. \, t$, if E_i is as shown in the following plot.





9)

- Determine V_o for the circuit shown below.