

Assignment 01

BRAC University
Semester: Spring 2024

Course No: CSE251

Course Title: Electronic Devices and Circuits

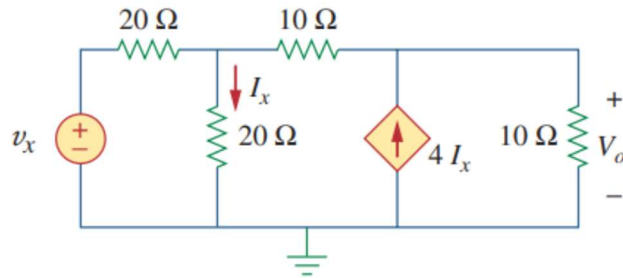
Faculty: AGS

Marks: 60

Deadline: 15 Feb., 2024-11:59 pm

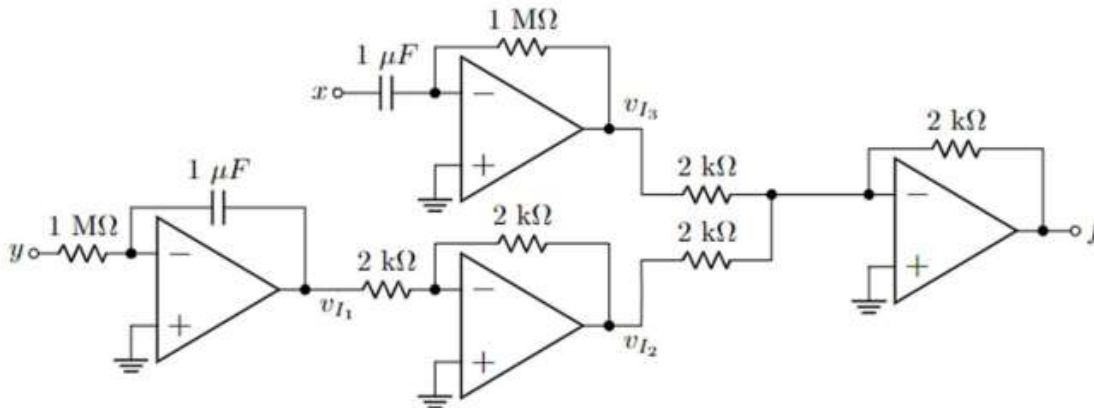
NB: For alternative representation, the number of floating sources should be minimized in your design.

1. **Draw** the alternate representation of the following circuit and find the value of V_o , I_x by using nodal analysis. (CO1) **[5+10]**



Assume, $v_x = 24$ V

2. If $x = \sin(5t)$ and $y = 2^t + 2 \cos(2t)$, then **analyze** the circuit above to find an expression of f in terms of inputs x and y . Also, **determine** the value of f at $t = 0.2$ s where $V_{s+} = 15$ V and $V_{s-} = -7$ V for all op-amps. (CO3) **[10]**
[Assume, angle unit in radian]



3. **Implement** the following function using Op Amps- (CO3)

[3x5]

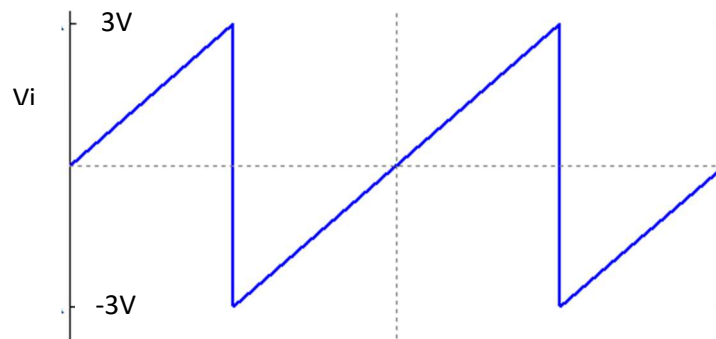
a) $f = -(-5x + 2y + 6 \int z dt - 4 \frac{dw}{dt})$

b) $f = -(3 \ln(x + y) - 2e^{z-w} - 5v)$

c) $f = -4x + 3 \frac{v}{yz}$

4. Suppose you have a temperature sensor which outputs 1V for 20° C, 3V for 22° C and 2V for 21° C. If your desired room temperature is 22° C then **design** a comparator to turn on/off AC automatically. **Analyze** the operation principle of the designed setup. (CO2) [10]

5. $V_{CC} = 8V$, $-V_{EE} = -2V$, $V_{ref} = 1V$, V_i is a 6V p-p sawtooth signal as shown below.



Draw output V_o for the following op-amp circuit. (CO1)

[10]

[Hint: Inverting comparator]

