ID:	Name:

Brac University
Semester: Fall 2024
Course Code: CSE251
Electronic circuitry and devices
Section:09
Faculty: RMT

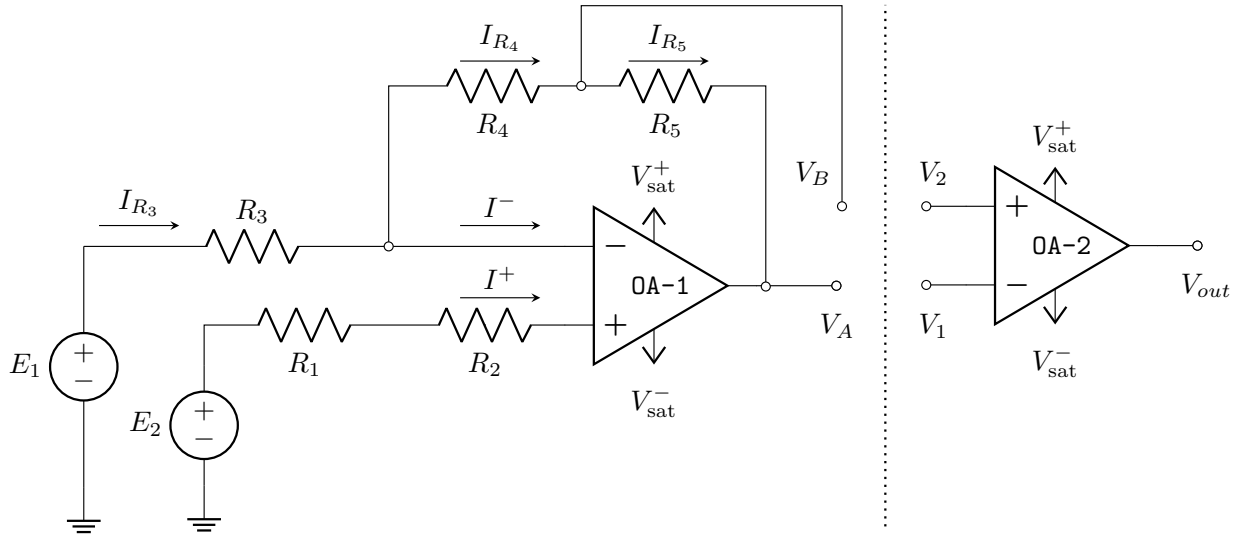
Set
A

Assessment: *Quiz 1*
Duration: 30 minutes
Date: November 26, 2024
Full Marks: 20

✓ **All questions** are compulsory. Marks allotted for each question are mentioned beside each question.
✓ Symbols have their usual meanings.

■ Question 1 of 2 *[CO1, CO2, CO3] [10 marks]*

The 'ideal' operational amplifiers (Op-Amp) below have been connected to saturation voltages $V_{\text{sat}}^{+} = +\,8\,\text{V}$and $V_{\text{sat}}^{-} = -\,8\,\text{V}$. The resistor values are given as: $R_1 = R_2 = 1\ \text{k}\Omega$, and $4R_4 = 10R_5 = 20\ \text{k}\Omega$.

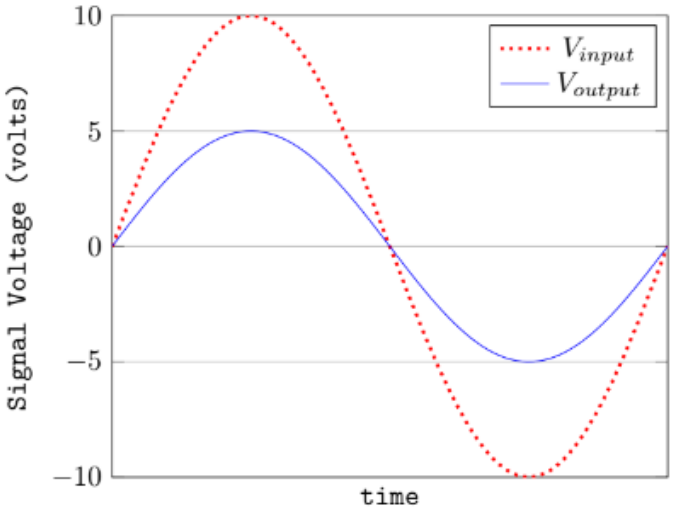


(a) ***[1 mark]*** **State** the current values of I^- and I^+.

(b) ***[6 marks]*** If $E_1 = 5\,\text{V}$, $E_2 = 0\,\text{V}$, and $R_3 = 10\,\text{k}\Omega$, **determine** V_A and V_B.

(c) ***[3 marks]*** **Find** the value of V_{out} if $V_1 = V_A$ and $V_2 = V_B$.

Michael Scott wants to make a phone call to his assistant, Dwight Schrute, but the outdated phone system keeps failing as the signal is too weak by the time it reaches Dwight. Dwight plans on designing a device to help Michael make the call. The device will take the weak signal as input and give a strong signal at its output without changing the waveshape and polarity of the signal as shown in the following figure.



■ Question 2 of 2 *[CO1, CO2, CO3] [10 marks]*

(a) ***[4 marks]*** Design circuit for the device based on the waveshapes in the figure shown above.

(b) ***[6 marks]*** Dwight calculates his yearly sales using the following function. Design a device to help Dwight implement the function, f

$$f = -3\frac{dx}{dt} + 6x + 9\int y \; dt \tag{1}$$

where x, y, and z will be the inputs of the device.