ID:	Name:

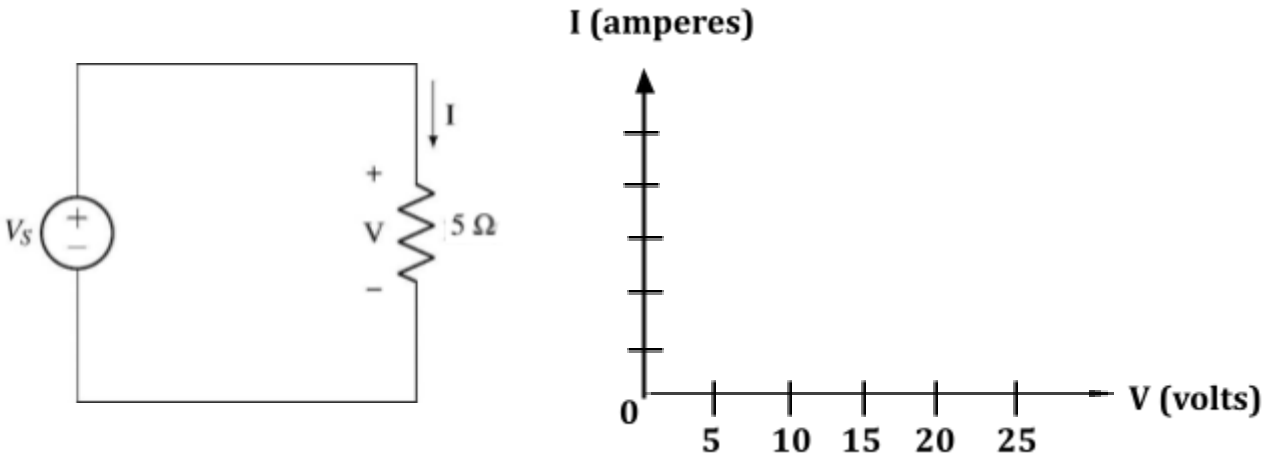
Set: 2

Brac University

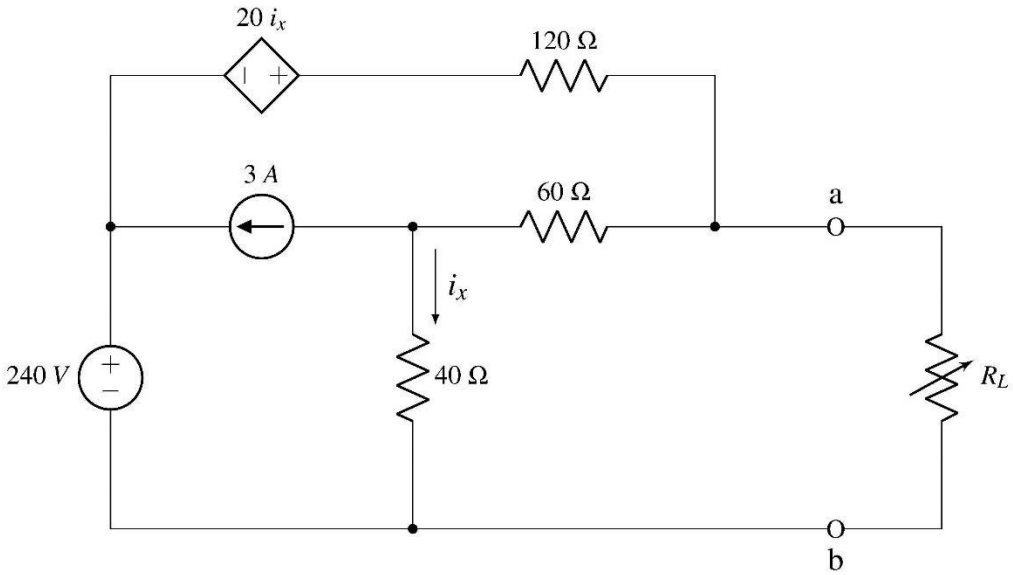
Semester: Summer 2022
Course No: CSE250
Course Title: CIRCUITS AND ELECTRONICS
Date: September 09, 2022

Final Exam
Full marks: 50 (+5 Bonus)
Duration: 2 hours

Question 1 of 3 *[20 marks]*



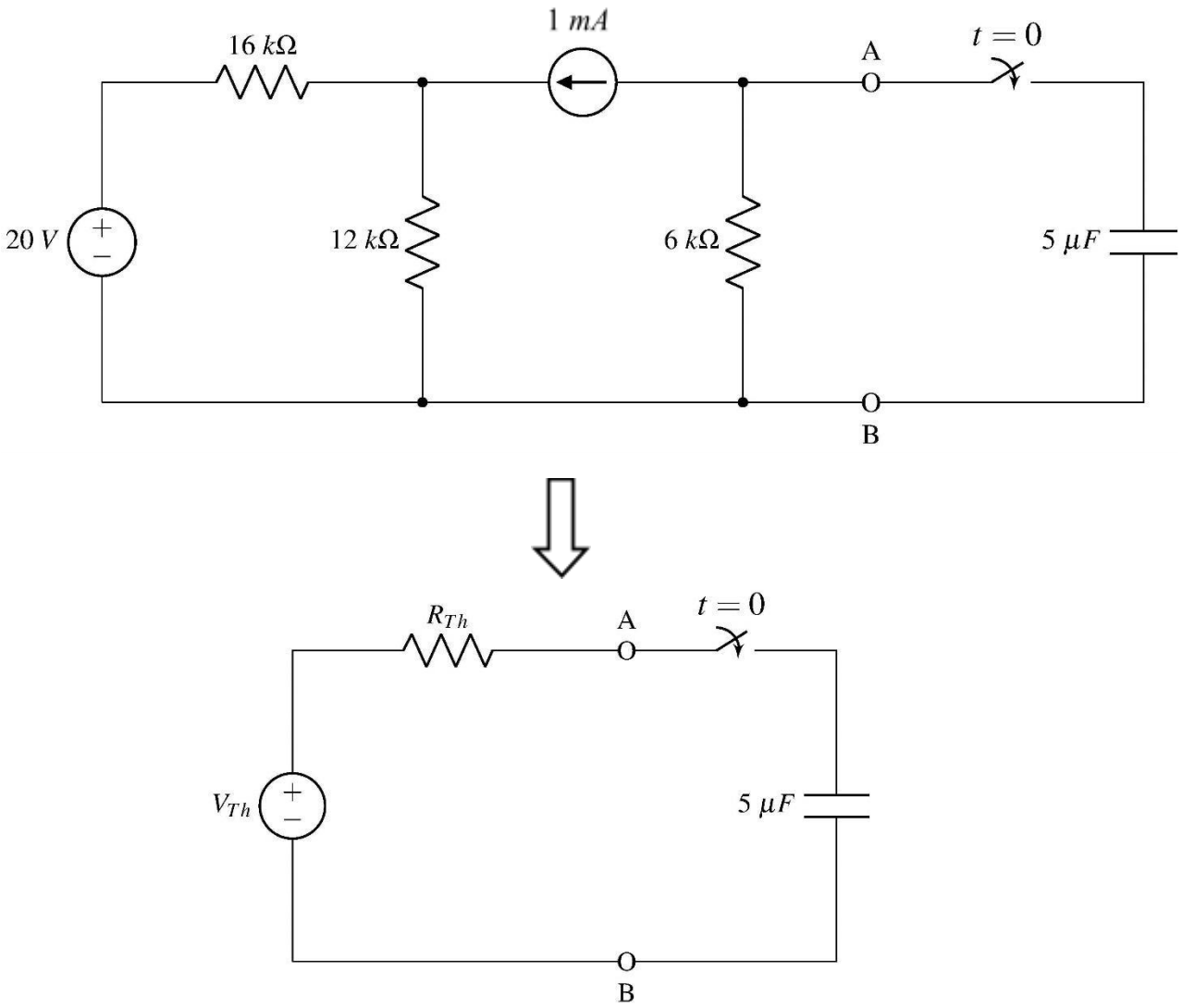
- **Draw** the **I–V characteristics** of the 5 Ω resistor shown in the circuit above. Please redraw the plot template given above on your script. You must label the axes with appropriate values.
  (2 marks) [CO1]



- **Determine** the value of R_L that will draw **Maximum Power** from the rest of the circuit.
  (10 marks) [CO3, CO4]
- **Determine** that value of the **Maximum Power**.
  (8 marks) [CO2, CO4]

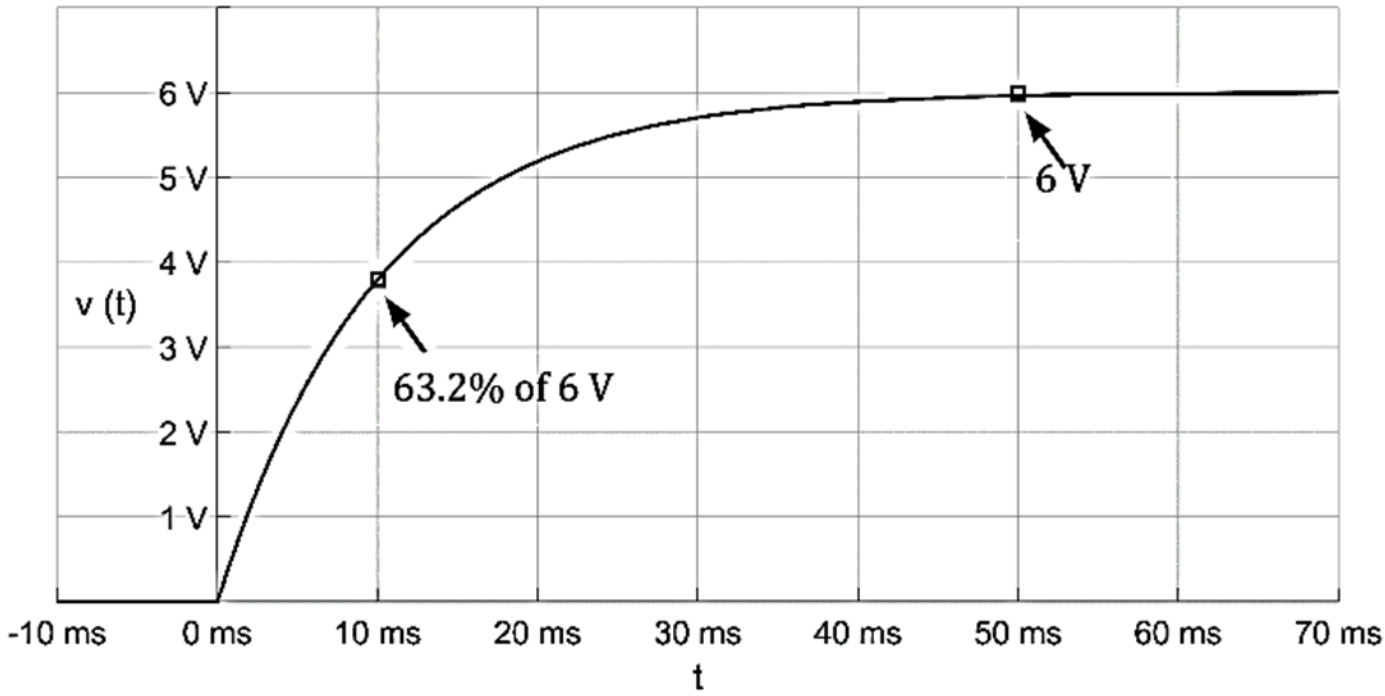
Set: 2

Question 2 of 3 *[20 marks]*



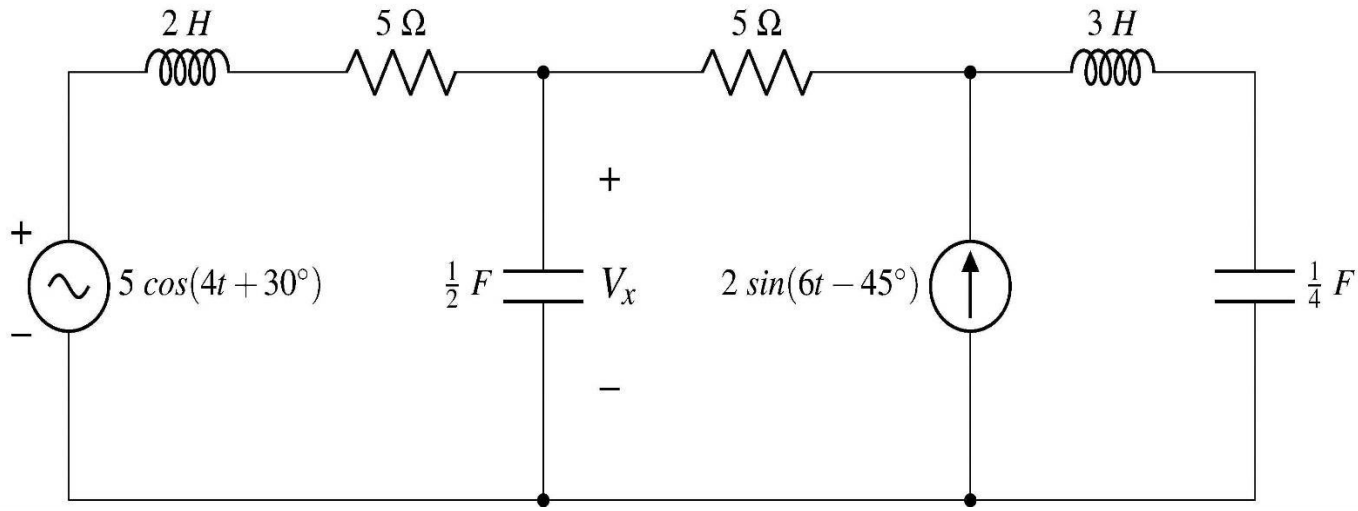
- **Reduce** the first circuit so that it takes the form of the 2nd circuit as shown above. *[Hint: Use Thevenin's principle]*
  (8 marks) [CO4]
- **Perform** transient analysis to determine $v(0), v(\infty),\ and\ v(t)$ for $t > 0$. Also, determine the **current through the capacitor** at $t = 0.5\ ms$.
  (9 marks) [CO5]

Set: 2



- The figure above shows the voltage response of a series RC circuit to a sudden DC voltage applied through an equivalent resistance of $2\,k\Omega$. **Determine** the approximate **time constant** from the figure. Also, **determine** the value of the **capacitor** used in the RC circuit and find the **expression** for $v(t)$ as only a function of t. *[Hint: Time constant is the time required for the capacitor voltage to reach to* 63.2% *of its final value from an initially discharged state]*
  (3 marks) [CO5]

Question 3 of 3 *[15 marks]*



- **Determine** the voltage v_x. *[Hint: Use Superposition principle]*
  (15 marks) [CO4, CO6]