BIRZEIT UNIVERSITY

Electrical and Computer Engineering Department

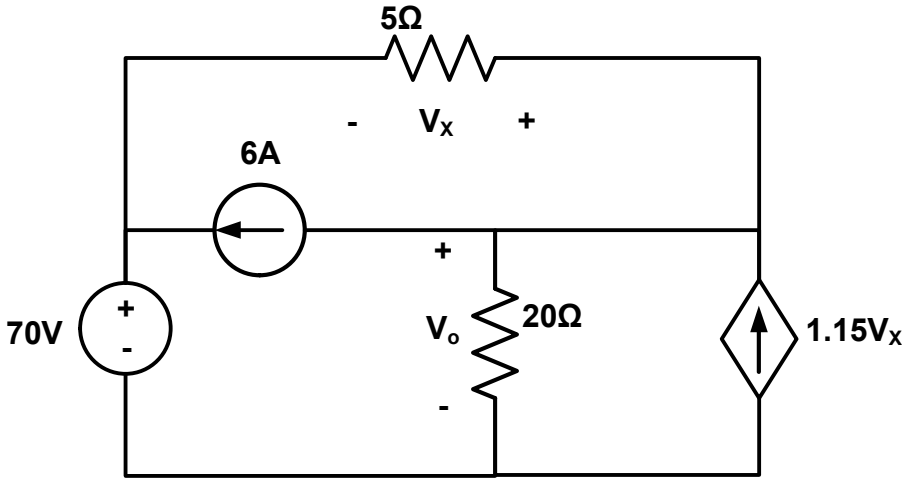
Network Analysis I, ENEE2301

Name: First Exam 17/4/2018

No.: Sec:

The exam Five question for 90 min.

Q1) Find $\mathbf{V_o}$ by Node-Voltage Method? (20 marks)



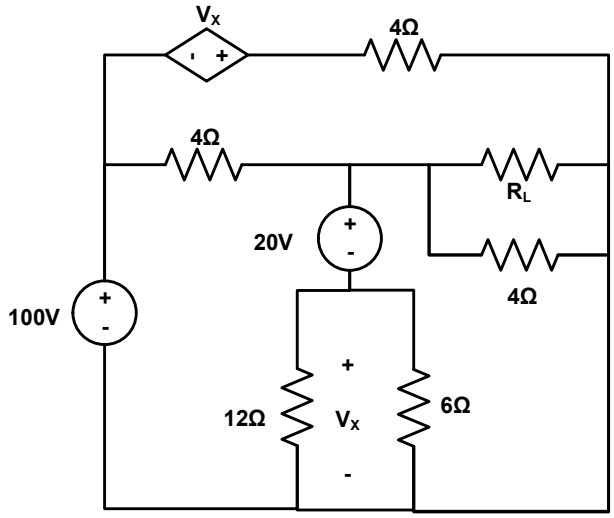
$$V_x = V_O - 70$$

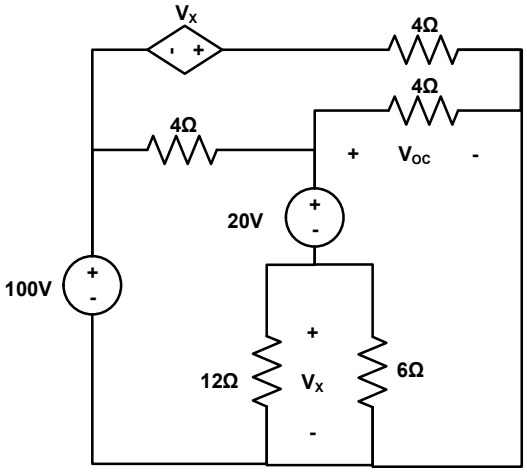
$$6 + \frac{V_O}{20} + \frac{V_O - 70}{5} - 1.15V_x = 0$$

$$6 + \frac{V_O}{20} + \frac{V_O - 70}{5} - 1.15(V_O - 70) =$$

$$V_O = \frac{6 - 14 + 80.5}{-0.05 - 0.2 + 1.15} = \frac{725}{9} = 80.56V$$

Q2) Find the maximum power delivered to the load $\mathbf{R_L}$? (20 marks)



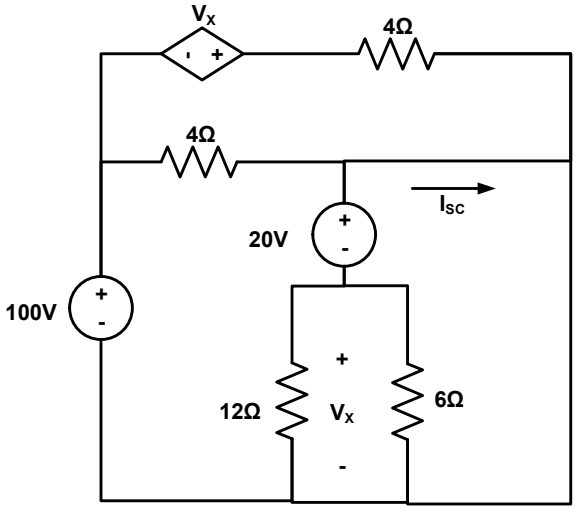


$$V_{OC} = 20 + V_x$$

$$\frac{V_x + 20 - 100}{4} + \frac{V_x}{4} + \frac{V_x + 20}{4} = 0$$

$$V_x = 20V$$

$$V_{OC} = 40V$$



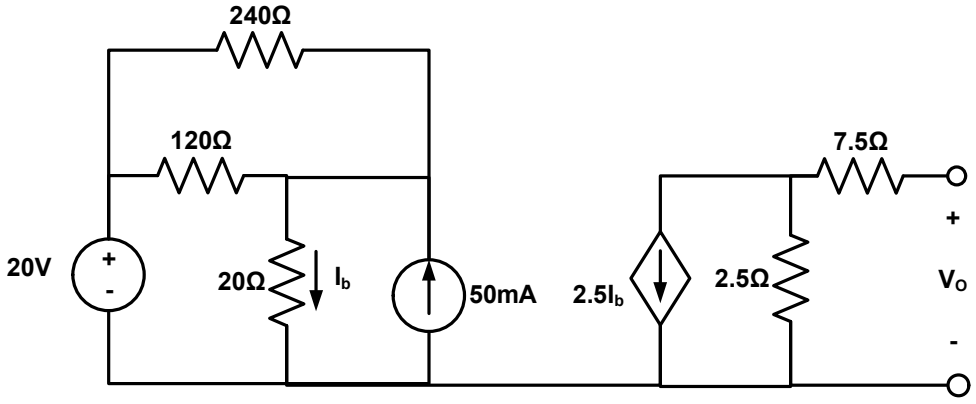
$$I_{SC} - \frac{100}{4} - \frac{20}{4} = 0$$

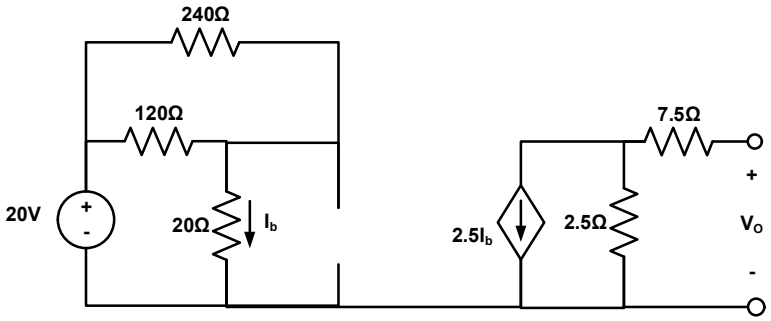
$$I_{SC} = 30A$$

$$R_L = \frac{V_{OC}}{I_{SC}} = \frac{4}{3}\Omega$$

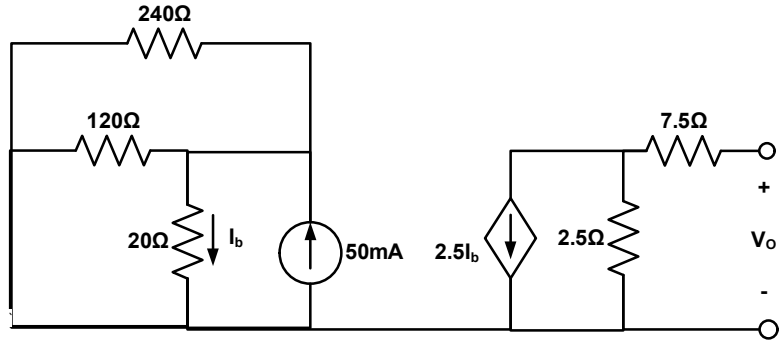
$$P_{MAX} = \frac{{V_{OC}}^2}{4R_L} = \frac{40^2}{4 * \frac{4}{3}} = 300W$$

Q3) Find $\mathbf{V_o}$ by Superposition Method? (20 marks)





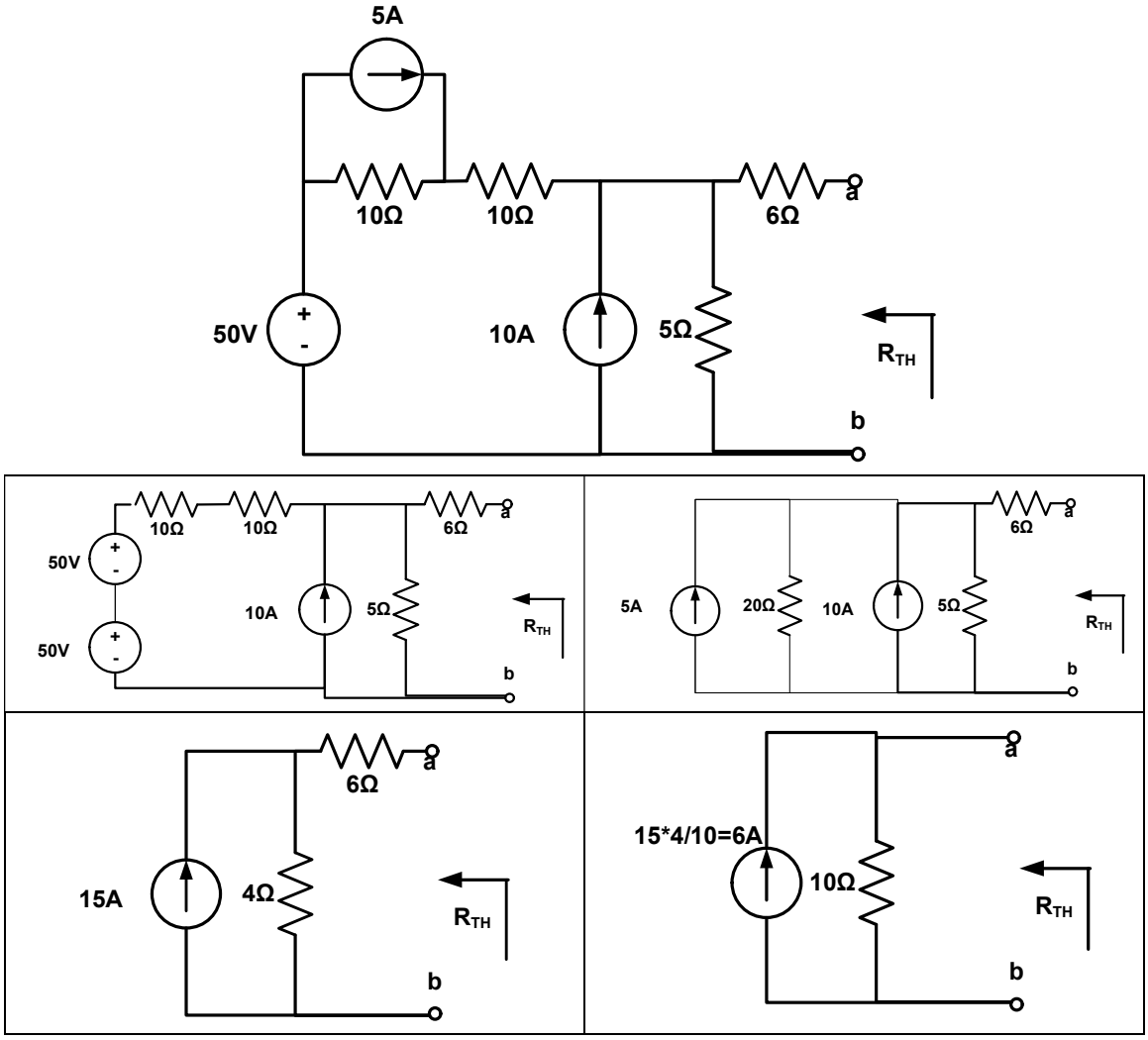
$$I_b = \frac{20}{240//120 + 20}$$
$$= 0.2A$$
$$V_O' = -2.5I_b * 2.5 =$$
$$-1.25\text{V}$$



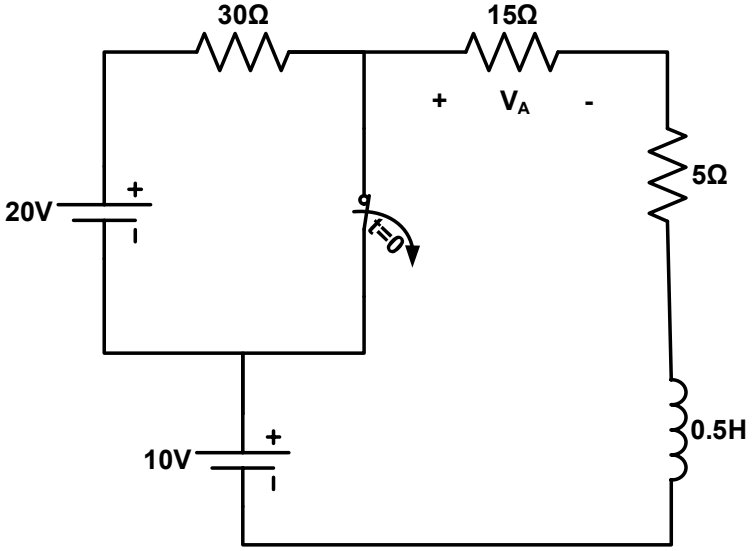
$$I_b = \frac{240//120}{240//120 + 20} 50m$$
$$= 40m$$
$$V_O'' = -2.5I_b * 2.5$$
$$= -0.25V$$

$$V_O = V_O' + V_O''$$
$$= -1.5V$$

Q4) Find Norton equivalent circuit between (a,b) ? (20 marks)



Q5) The switch has been closed for a long time and then it was opened at t=0. Find V_A for t>0 ? (20 marks)



$$i_L(0) = \frac{10}{20} = 0.5A$$

$$i_L(\infty) = \frac{30}{50} = 0.6A$$

$$i_L(t) = 0.6 + (0.5 - 0.6)e^{-\frac{50}{0.5}t}$$

$$V_A(t) = 15\left[0.6 - (0.1)e^{-\frac{50}{0.5}t}\right]$$

$$V_A(t) = 9 - 1.5e^{-100t}V$$

Good Luck