

# EHB211E Basics of Electrical Circuits

## MIDTERM II

*Duration: 120 Minutes*

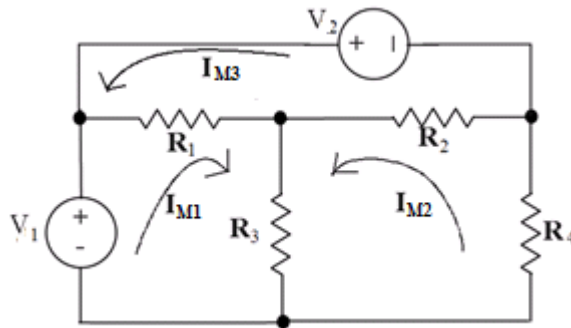
*Grading: 1) 25%, 2) 25%, 3) 25%, 4) 25%*

*Exam is in closed-notes and closed-books format*

*For your answers please use the space provided in the exam sheet*

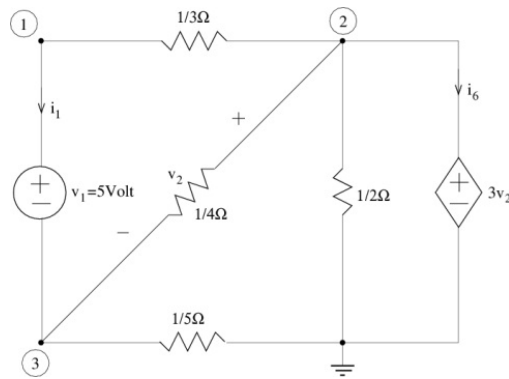
*GOOD LUCK!*

1. For the circuit below  $V_1=11V$ ,  $I_{M1}=1A$ ,  $I_{M2}=2A$  and  $R_1=R_2=R_3=1\Omega$ . Find the mesh current  $I_{M3}$ ,  $V_2$ , and  $R_4$ .



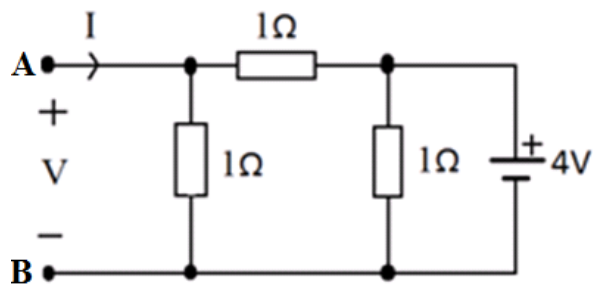
*Circuit with three meshes*

2. What are the equations obtained by generalized node voltages method for the circuit below?



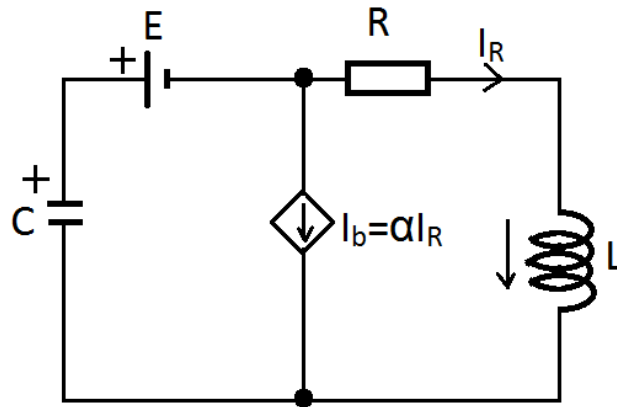
*Circuit with three nodes*

3. Find the Thevenin equivalent of the circuit shown below (considering A and B nodes); what are the values of  $V_{TH}$  and  $R_{TH}$ ?



*Circuit with three resistors and a voltage source*

4. Derive the state space equations for the circuit shown below. Note that the number of equations should equal to the number of unknown voltages/currents.



*Circuit with a capacitor and an inductor*