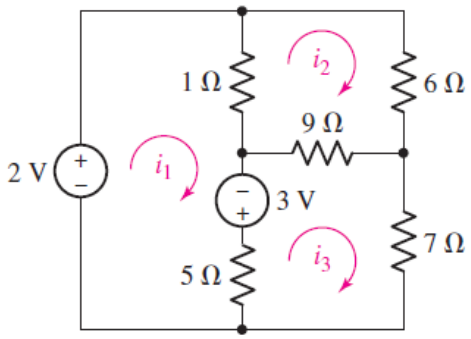
Basic Electronics (ECE113) (40 marks)

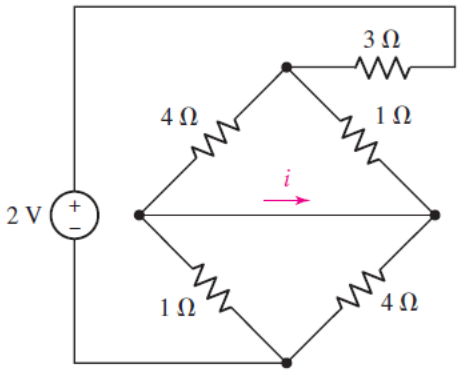
Assignment 1

1) Determine numerical values for each of the three mesh currents as labeled in the circuit diagram shown below:-



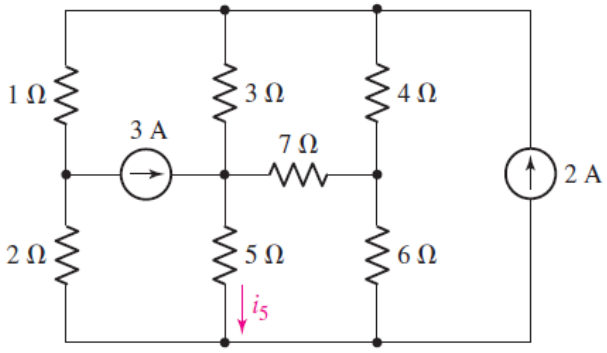
(4 marks)

2) Employing mesh analysis procedures, obtain a value for the current labeled 'i' in the circuit shown below:-



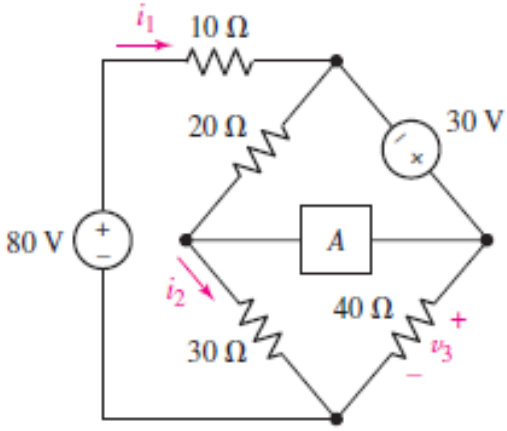
(4 marks)

3) For the circuit represented below:
   (a) How many nodal equations would be required to determine i_5?
   (b) Alternatively, how many mesh equations would be required?
   (c) Would your preferred analysis method change if only the voltage across the 7Ω resistor were needed? Explain.



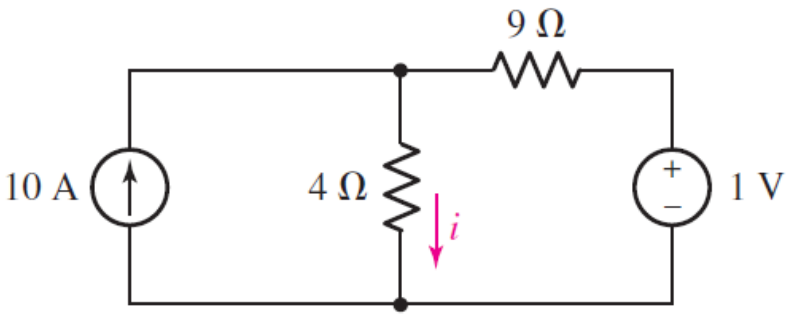
(**6 marks**- 2 marks each)

4) Referring to Fig. shown below,
   (a) Determine whether nodal or mesh analysis is more appropriate in determining i_2 if element A is replaced with a short circuit, then carry out the analysis.
   (b) Verify your answer with an appropriate ltspice simulation. Submit a properly labeled schematic along with the answer highlighted.



(6 marks-2 marks each**)**

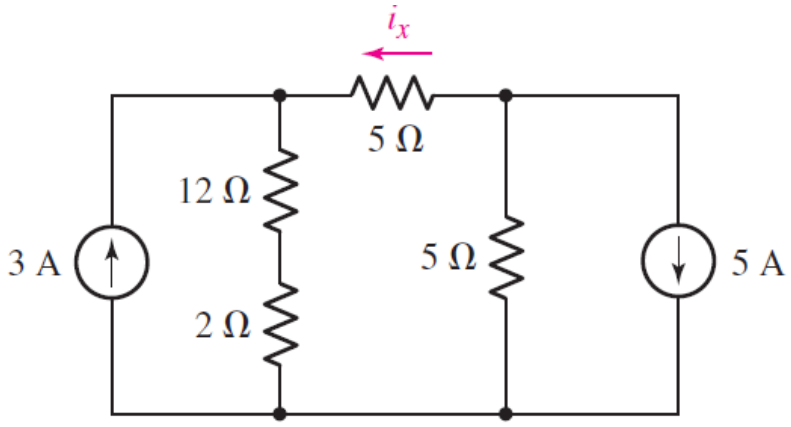
5) (a) Employ superposition to determine the current labeled 'i' in the circuit shown below.
   (b) Express the contribution the 1 V source makes to the total current 'i' in terms of a percentage.
   (c) Changing only the value of the 10 A source, adjust the circuit shown below so that the two sources contribute equally to the current 'i'.



(6 marks- 2 marks each**)**

6) a) Employ superposition to obtain the individual contributions each of the two sources in Fig. shown below makes to the current labeled i_x .

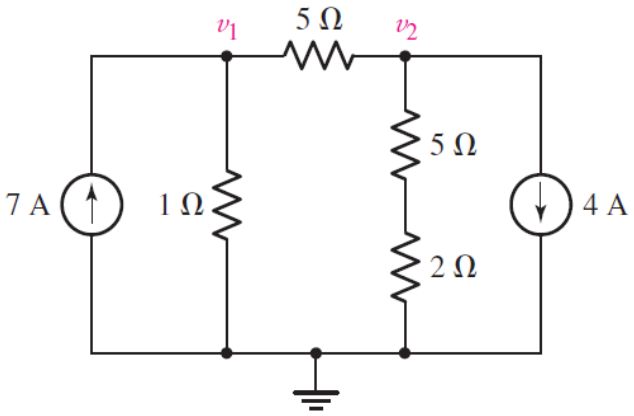
(b) Adjusting only the value of the rightmost current source, alter the circuit so that the two sources contribute equally to i_x .



(6 marks- 3marks each**)**

7) (a) Determine the individual contributions of each of the two current sources in the circuit shown below to the nodal voltage v_1.

(b) Determine the percentage contribution of each of the two sources to the power dissipated by the 2Ω resistor.



(**8 marks**- 4 marks each)