



United International University

Department of Computer Science and Engineering

EEE 2113 : Electrical Circuit

Final Exam : Spring 2023 Time: 2 hours Marks: 40

There are five questions here. Answer **all of them**.

1. Determine the followings for the circuit shown in Figure 1.

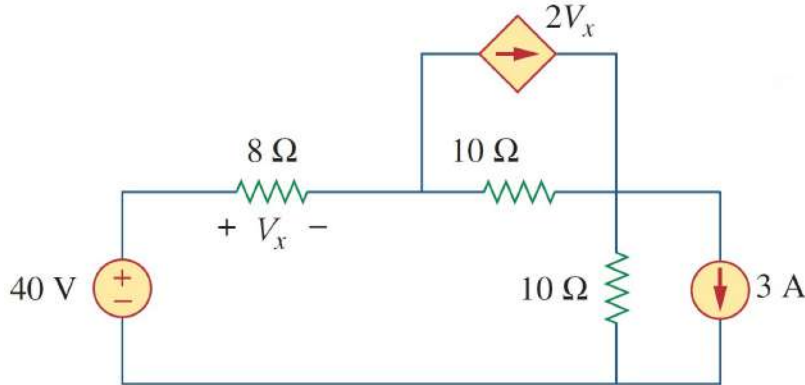


Figure 1: Circuit diagram for Q-1

- (a) Use superposition to determine the voltage, V_x . [6]
- (b) If a 6 A current source is used instead of the 3 A current source, then what should be the new value of V_x . [2]

2. For the following circuit $v(t) = 12\sin(200t + 45^\circ)$:

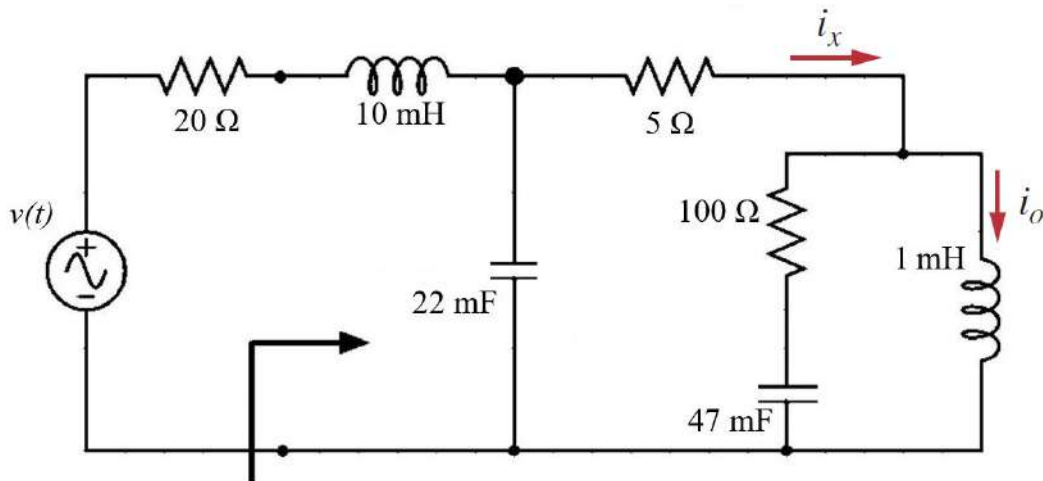


Figure 2: Circuit diagram for Q-2

- (a) Find the equivalent impedance across the terminals $a - b$. [4]
- (b) Using current division rule, determine the branch currents i_x and i_o . [4]

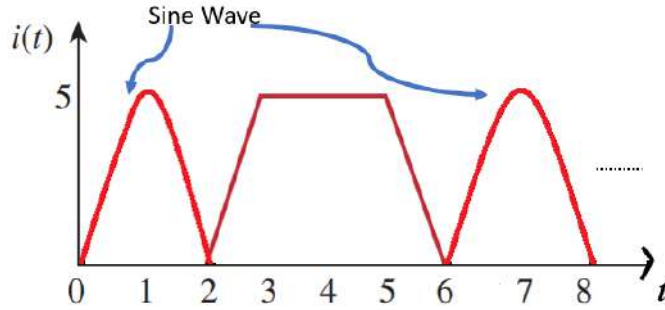


Figure 3: Waveshape for Q-3

3. (a) Find the *RMS* value of the current waveform, I_{rms} shown in the above figure. [3]
- (b) If this I_{rms} is used in the current source of the following circuit, calculate the complex power, average power and reactive power supplied by the current source. [3]
- (c) Calculate the power factor of the entire circuit as seen by the current source. [2]

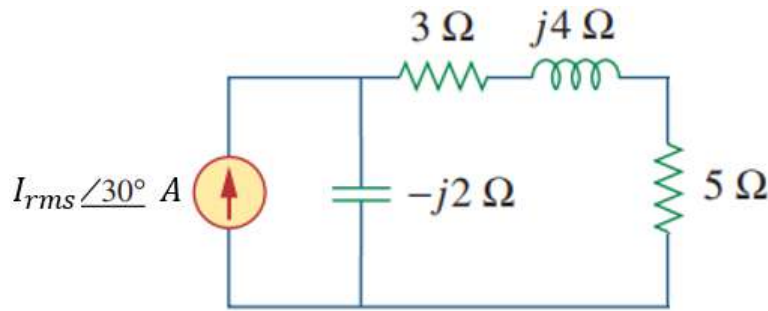


Figure 3: Circuit diagram for Q-3

4. (a) Find Thevenin Equivalent circuit across $a - b$ terminals. [4]
- (b) Which resistance must be connected across $a - b$ terminals to ensure maximum power delivery from the source? Mathematically show that resistance of value more or less than the selected value will give less power. [4]

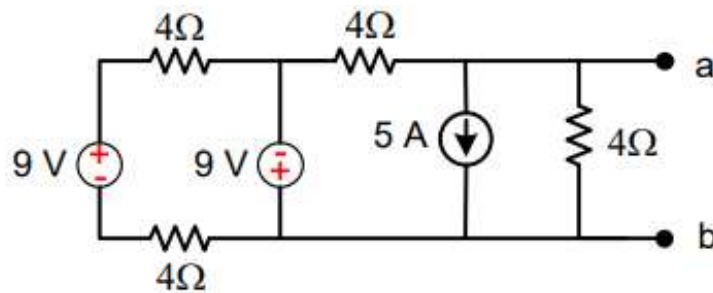


Figure 4: Circuit diagram for Q-4

5. (a) Apply appropriate series of source transformations to find the voltage and current through the R resistance. [6]
- (b) Is maximum power being delivered to the R resistance in current condition? If not, what measure should be taken to ensure maximum power delivery to R ? [2]

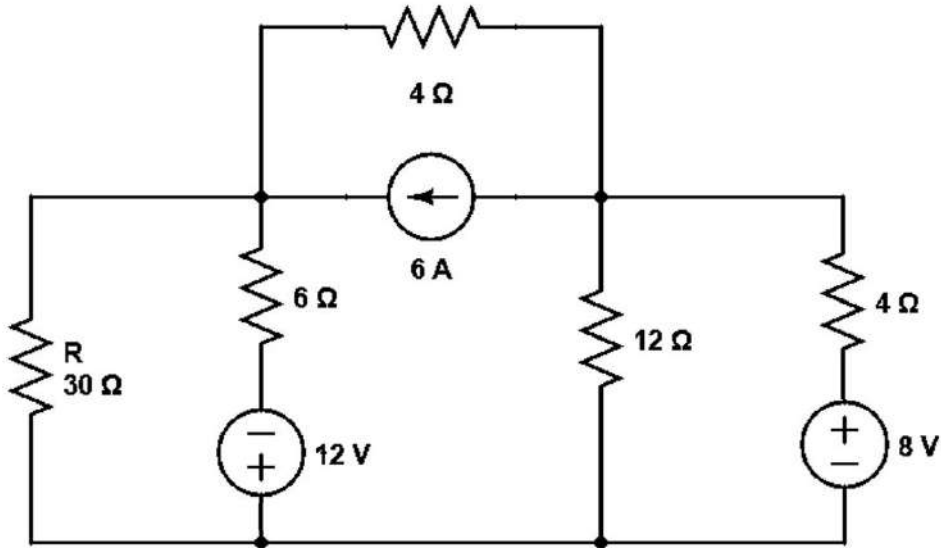


Figure 5: Circuit diagram for Q-5