

Date of Examination :03/12/2019

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department : Electrical and Electronic Engineering

Program : Bachelor of Science in Computer Science and Engineering

Semester Final Examination, Spring 2019

Year: 1st

Semester: 2nd

Course number: EEE 1241

Course Name: Basic Electrical Engineering

Time: 3 (Three) hours

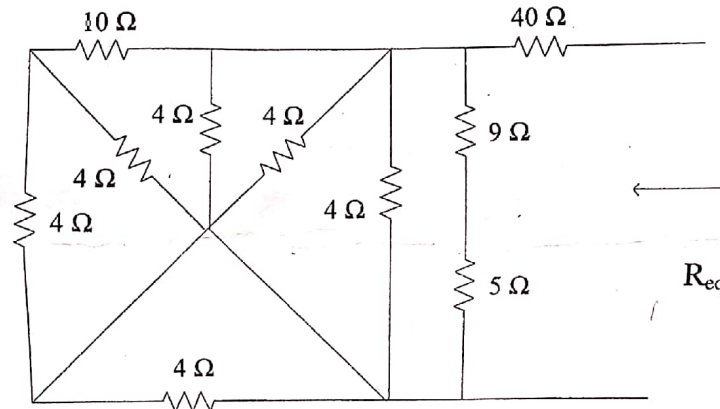
Full Marks: 210

There are eight (8) questions. Answer any six (6)

Marks allotted for each question are indicated in the right margin

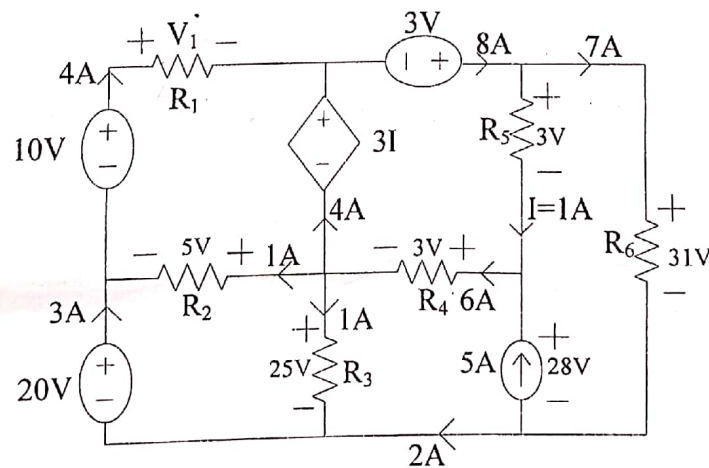
Assume any missing value

- a. Determine the equivalent resistance R_{eq} for the following network.



17

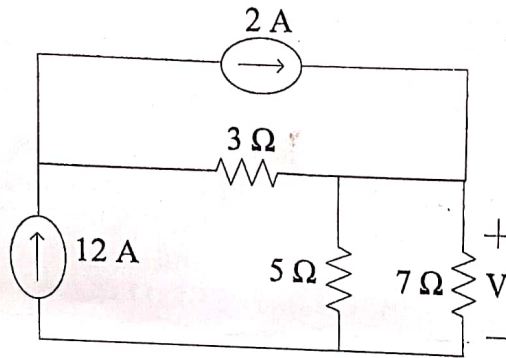
- b. Using the concepts of power, find the voltage V_1 of the following circuit.



18

2. a. State Kirchhoff's voltage law (KVL) and Kirchhoff's current law (KCL). Using these laws determine the voltage V of the following circuit.

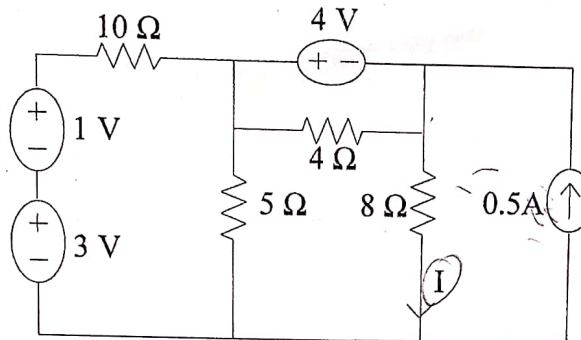
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0.177
0.086
0.091

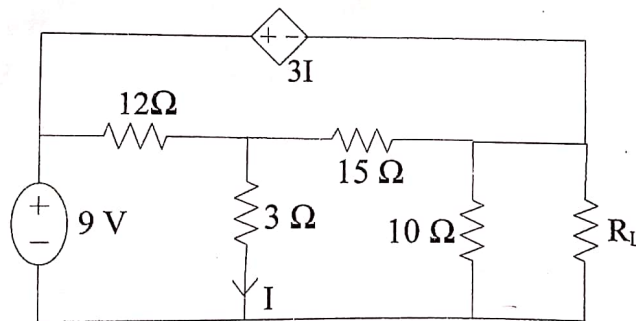
- b. Perform source transformation to find the current I of the following circuit.

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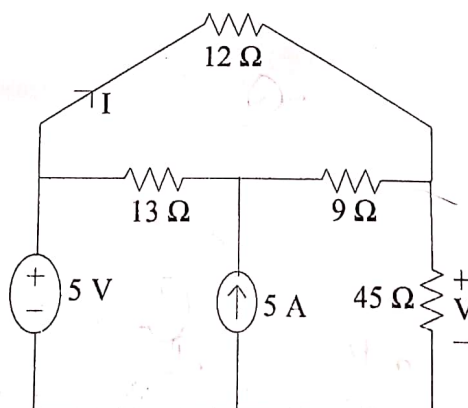
- a. Determine Thevenin's equivalent circuit with respect to the load resistance R_L for the following circuit.

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- b. Perform mesh analysis to determine the voltage V and the current I of the following circuit.

17



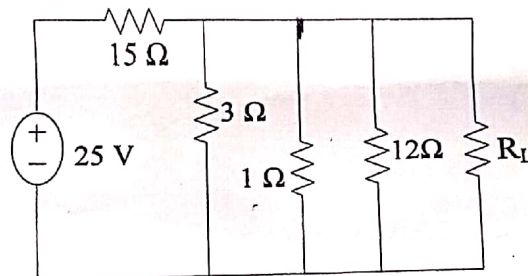
- a. State and prove maximum power transfer theorem.

15

b. For the following circuit, determine:

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- R_L for maximum power transfer
- Current level and power delivered to the load under maximum power transfer condition
- Efficiency and transferred power if a load of 50Ω is connected
- R_L for obtaining efficiency of 79%.



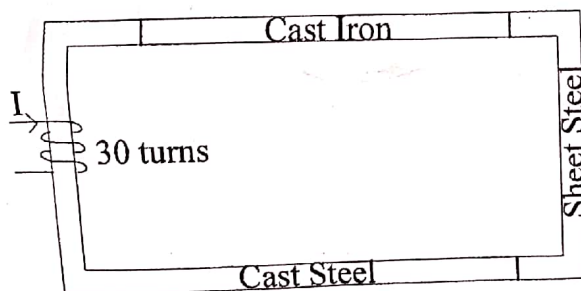
$$V = IR$$

a. State and Explain Ampere's circuital law.

15

b. Find the current I required to establish a flux of 2×10^{-4} Wb in the following magnetic circuit. A set of B-H curves is attached at the end of the question. Mark the appropriate points on the B-H curves and attach the page with your answer script.

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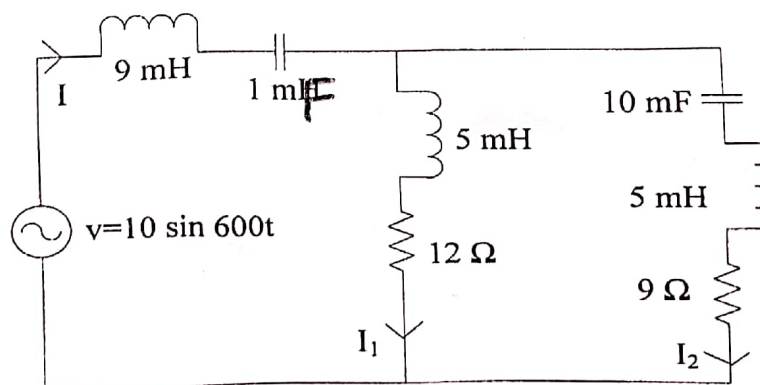
Area, $A = 10 \times 10^{-4} \text{ m}^2$
 Length_{cast iron} = 2 inch
 Length_{cast steel} = 6 inch
 Length_{sheet steel} = 2 inch

15

a. Show that for a capacitor, current leads voltage by 90° . Also find the expression for instantaneous power.

b. For the following circuit, calculate I , I_1 and I_2 . Also find the power factor of the network.

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7. a. Determine the phase relationship between the waveforms of each of the following sets. 20

i. $v(t) = 20 \sin(600t)$
 $i(t) = 9 \sin(600t + 90^\circ)$

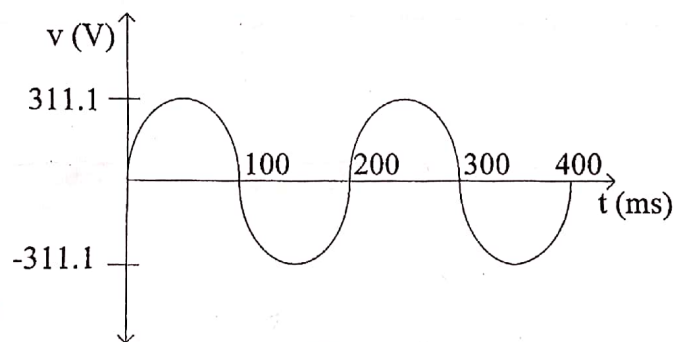
ii. $v(t) = \sin(800t + 10^\circ)$
 $i(t) = -5 \sin(800t)$

iii. $v(t) = 100 \cos(500t + 30^\circ)$
 $i(t) = 500 \cos(500t - 30^\circ)$

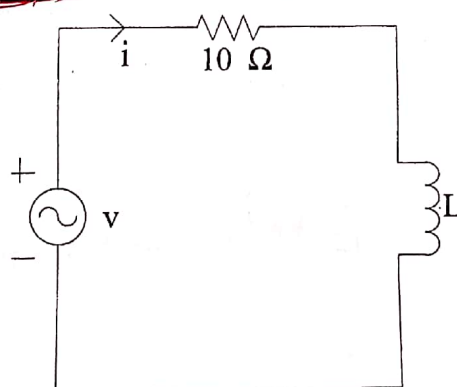
iv. $v(t) = 20 \sin(600t)$
 $i(t) = 10 \sin(600t)$

- b. Define amplitude, period, frequency, cycle and peak to peak value of an alternating signal. 15

8. a. Find the amplitude, period, frequency, average value and root mean square (rms) value of the following voltage signal and also represent the signal with an equation. 20



- b. If inductance $L = 10 \text{ mH}$ and applied voltage $v = 100 \sin 314t$, find the reactance of the inductor and current i of the following circuit. 15



70-33