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UNIVERSITY SPECIAL/SUPPLEMENTARY EXAMINATIONS

2022/2023 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

COURSE CODE: CSC 116

COURSE TITLE: ELECTRICAL PRINCIPLES

DATE: 04/08/2023

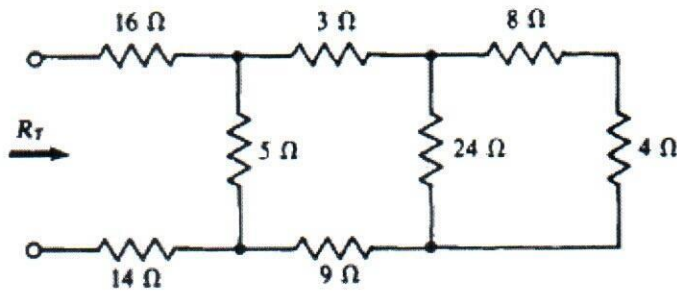
TIME: 2.00PM-4.00PM

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and Any other TWO (2) Questions

QUESTION ONE (COMPUSORY 30 Marks)

- a) Differentiate between direct current and alternating current [2mks]
- b) Differentiate between resistance and reactance [2mks]
- c) An inductor has a 54.0Ω reactance at 60Hz . What will be the maximum current if this inductor is connected to a 50Hz source that produces 100V rms . [5mks]
- d) Find the total resistance R_T , of the resistor ladder network shown in Fig.1b [4mks]



- e) Determine the resistance of a light bulb that uses an average of 75W when connected to a 60Hz power source with a peak voltage of 170V . [3mks]

QUESTION TWO

- a) Explain the effect on brightness of light bulbs when connected in
 - i) Series [2mks]
 - ii) Parallel [2mks]
- b) Define power factor in ac circuits [2mks]
- c) A hair dryer with a resistance of 12.0Ω and a lamp with a resistance of 125Ω are connected in parallel to a 125-V source through a $1.50\text{-}\Omega$ resistor in series. Find the current through the lamp when the hair dryer is on. [9mks]

QUESTION THREE

- a) Briefly explain how mesh technique is used to analyze an electric circuit [5mks]
- b) Find the mesh currents in the circuit shown in Fig. 3. [8mks]

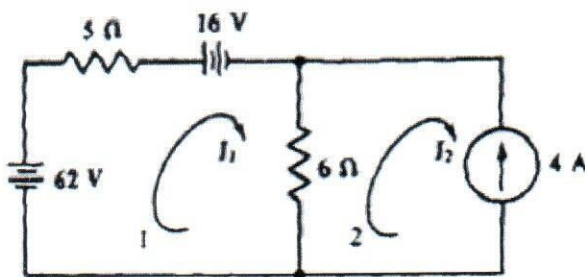


Figure 3

QUESTION FOUR

a) State Kirchhoff's current and voltage laws

[4mks]

b) Using the parallel circuit of figure 4a calculate:

i) The voltage for the circuit

[1mk]

ii) The current flow through each branch

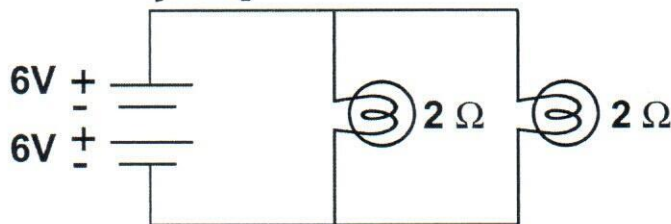
[1mk]

iii) The total current

[1mk]

iv) The voltage in each branch

[1mk]



c) When a $4.0\mu\text{F}$ capacitor is connected to a generator whose rms output voltage is 30V, the current in the circuit is observed to be 0.30A. What is the frequency of the source? [5mks]

QUESTION FIVE

a) With the help of diagrams, list the steps followed when applying Thevenin's theorem to obtain:

i) The Thevenin resistance

[2mks]

ii) The Thevenin voltage

[2mks]

b) Find the Thevenin's equivalent circuit of the circuit shown below, to the left of the terminals a-b. Then find the current through $R_L = 6\Omega$, 16Ω , and 36Ω . [7mks]

