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(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2022/2023 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS YEAR ONE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

COURSE CODE: CSC 116.

COURSE TITLE: ELECTRICAL PRINCIPLES

DATE: 22/12/2022

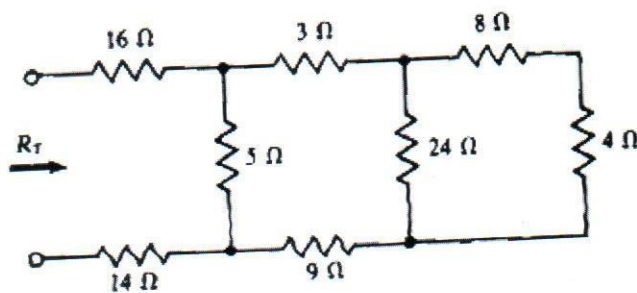
TIME: 9.00 A.M. – 11.00 A.M.

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) Under dc and steady state conditions, find (a) I , V_C & I_L , (b) W_C and W_L
[5mks]
- d) How long must a current of 300mA flow so as to transfer a charge of 40 C?
[3mks]
- e) The current flowing through a resistor is 0.16A when a p.d. of 10V is applied. Determine the value of the resistance.
[3mks]
- f) A 200V battery is connected across a resistor and causes a current of 10mA to flow. Determine the resistance of the resistor. If the voltage is now reduced to 20V, what will be the new value of the current flowing?
[6mks]
- g) Calculate the power dissipated when a current of 20mA flows through a resistance of $4.5k\Omega$.
[2mks]
- h) Find the total resistance R_T of the resistor ladder network shown in Fig. 1b
[4mks]



- i) 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 [20 MARKS]

- 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 1.50Ω resistor in series. Find the current through the lamp when the hair dryer is on.
[9mks]
- d) A current of 10A flows in the winding of an electric motor, the resistance of the winding being 200Ω . Determine the
(a) P.d. across the winding
[2mks]
(b) Power dissipated by the coil.
[3mks]

QUESTION THREE [20 MARKS]

- a) Briefly explain how mesh technique is used to analyze an electric circuit
[5mks]
- b) The resistance of 1.5 km of wire of cross-sectional area 0.17 mm^2 is 150 ohms. Determine the resistivity of the wire.
[3mks]
- c) A coil of copper wire has a resistance of 20 ohms at 18°C . If the temperature coefficient of resistance of copper at 18°C is $0.004/^\circ\text{C}$, determine the resistance of the coil when the temperature rises to 98°C
[4mks]
- d) Find the mesh currents in the circuit shown in Fig. 3.
[8mks]

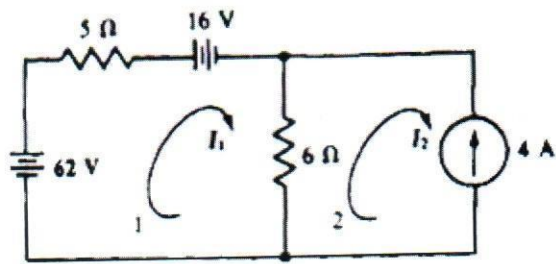


Figure 3

QUESTION FOUR [20 MARKS]

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

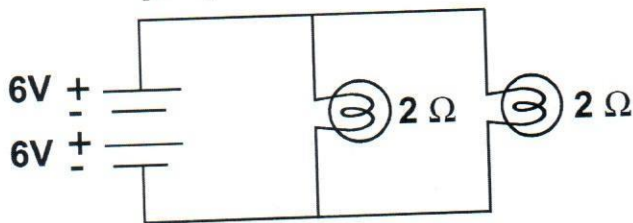
[1mk]

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]

d) Calculate the value of voltage V in Fig. 4d.

[3mks]

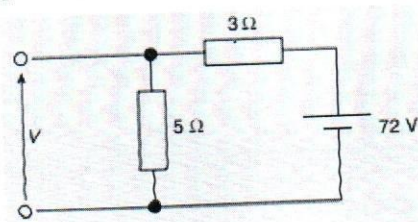
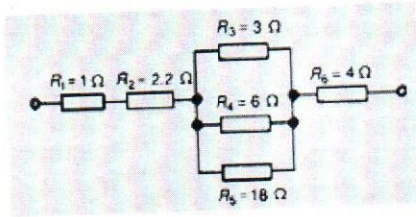


Figure 7

e) Find the equivalent resistance for the circuit shown in Fig. 4e.

[4mks]



QUESTION FIVE [20 MARKS]

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

i) The Thevenin resistance

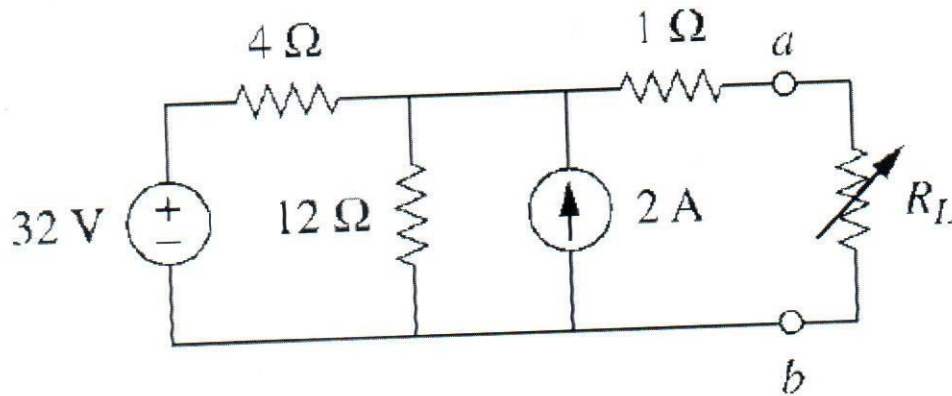
[2mks]

ii) The Thevenin voltage

[2mks]

b) Find the Thevenin's equivalent circuit of the circuit shown below in fig. 5a, to the left of the terminals a-b. Then find the current through $R_L = 6\Omega, 16\Omega,$ and 36Ω .

[7mks]



c) Find currents I_3, I_4 and I_6 in Fig. 5b

[5mks]

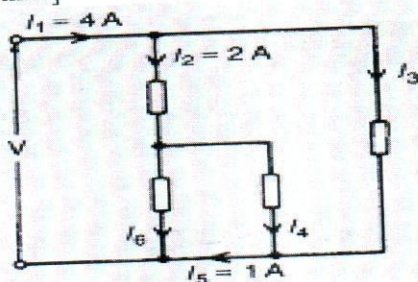


Figure 9

d) An e.m.f. of 200V at a frequency of 2 kHz is applied to a coil of pure inductance 50 mH.

Determine

(a) Reactance of the coil, and

[2mk]

(b) Current flowing in the coil.

[2mk]