

KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Level : B.E./B.Sc./B.Tech.
Year : I
Time : 2 hrs. 30 mins.

07 JUL 2024

Course : ENGG 112
Semester : II
F.M. : 40

SECTION "B"

[5 Q. × 8 = 40 marks]

Attempt *ANY FIVE* questions. Assume any suitable data if required.

1. a. In the circuit shown in Fig. 1, power produced by bulb1 and bulb2 is 1kW and 50W, respectively. Which bulb has higher resistance? [4]

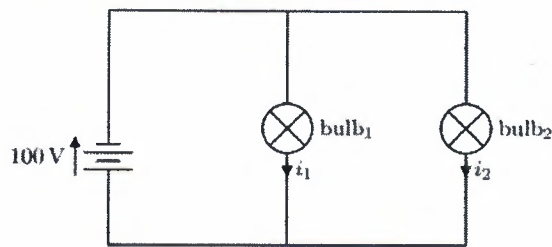


Fig. 1

- b. In a network shown in Fig 2, calculate the total resistance R_T of the network. [4]

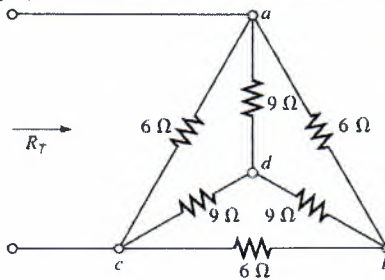


Fig. 2

2. a. "A load will receive maximum power from a network when its resistance is exactly equal to the Thevenin resistance of the network applied to the load" prove it. [4]
b. In the given Fig 3, use Nodal analysis to calculate the current flowing through R_1 . [4]

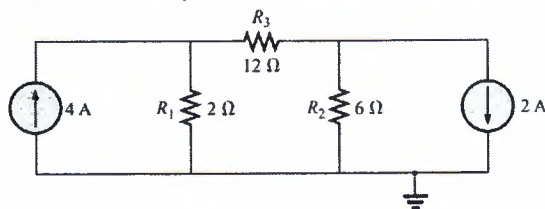


Fig. 3

3. a. Plot the phase relationship between the sinusoidal waveforms of each of the following, also interpret the meaning. [4]
 $i = 15 \sin(\omega t + 60^\circ)$ and $v = 10 \sin(\omega t - 20^\circ)$

P.T.O.

- b. In the given Fig 4, determine current i_s , if the branch current $i_1 = \sqrt{2} \times 20 \sin(\omega t - 60^\circ)$, and $i_2 = 6 \sin(\omega t - 30^\circ)$. Also sketch the plot in time domain and phaser domain. [4]

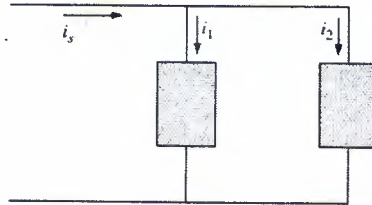


Fig. 4

4. a. For the circuit in Fig 5, use mesh analysis to determine current I_L through 200 mH. [4]

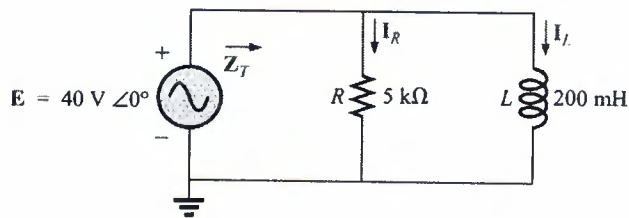


Fig. 5

- b. For the circuit in Fig 6, calculate current, power factor and average power delivered to circuit. [4]

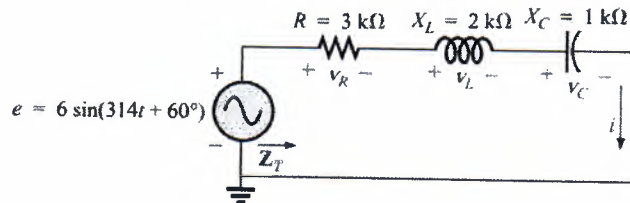


Fig. 6

5. a. Compare the magnetic circuits terminologies with electric circuits. Also find the number of turns N_1 required to establish a flux $\phi = 1.2 \times 10^{-4}$ Wb in the magnetic circuit of Fig. 7 [4]

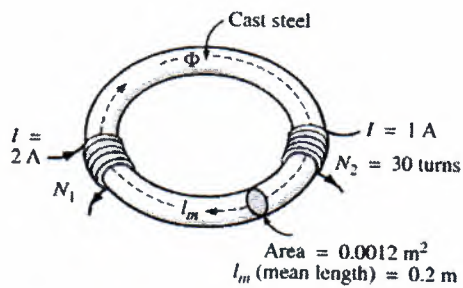


Fig-7

- b. Derive the expression for emf in transformer. [4]

6. a. Discuss the series RLC resonance circuit. From Fig. 8, Calculate Qs and bandwidth if the resonant frequency is 5 kHz. [2+2=4]

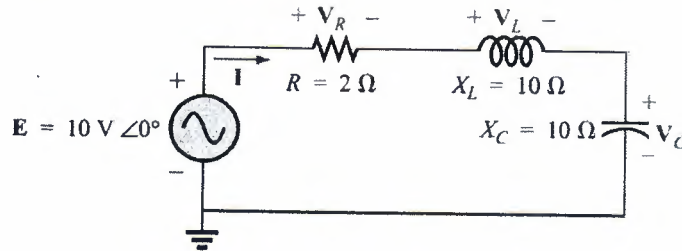


Fig. 8

- b. In the balanced star-delta connected system Fig. 9, find, [4]
- i. phase angles θ_2 and θ_3
 - ii. phase currents
 - iii. line currents
 - iv. average power to each phase.

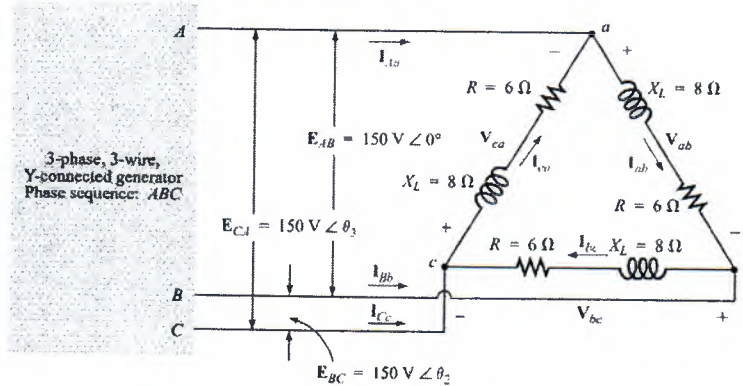


Fig. 9

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Exam Roll No. : Time: 30 mins.

F. M. : 10

Registration No.:

Date : 07 JUL 2024

SECTION "A"

[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option from each set of choices.

- The power dissipated by a resistor with a resistance of 8Ω and current of 3A flowing through it is ____
 24W. 48W. 72W. 92W.
- A junction or a point where two or more network elements intersect is called as ____.
 Node Branch Loop Mesh
- The time constant of an RC circuit with a $5k\Omega$ resistor and a $10\mu F$ capacitor is ____.
 500 ms. 0.5s 50 μs . 50 ms.
- In Fig 1, ammeter and voltmeter readings will be ____.

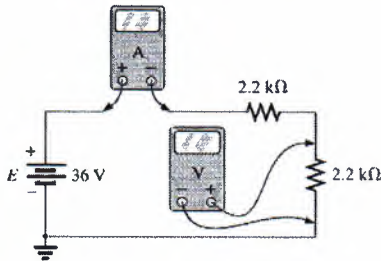
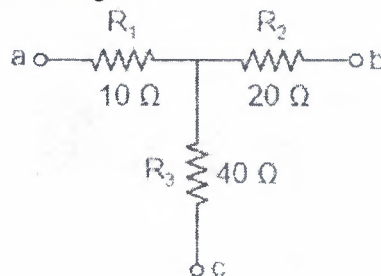


Fig 1

- 8 Amp, 8.18 Volt. 4 Amp, 8.18 Volt.
 8.18 Amp, 36 V. 8.18 Amp, 18 Volt.
- What are the values of delta connected branch resistances R_{ab} , R_{bc} , and R_{ac} of the star connected network shown in the figure?



- 35 Ω , 140 Ω , and 70 Ω 35 Ω , 60 Ω , and 70 Ω
 70 Ω , 60 Ω , and 35 Ω 70 Ω , 150 Ω , and 35 Ω

6. The maximum power is delivered to a circuit when source resistance is _____ load resistance.
 Greater than Less than Equal to Not equal to
7. The time period of a waveform having frequency of 60 Hz is _____.
 16.67 ms 16.67 s 1.667 ms 0.1667 s
8. If the peak value of a sine wave is 100V, the RMS value will be _____.
 100 V 70.7 V 50 V 141.4 V
9. A coil has a resistance of 4Ω , inductive reactance of 3Ω , then total impedance of coil is _____.
 7Ω 6Ω 5Ω 4Ω
10. The phase angle (θ) in the coil with a resistance of 4Ω and an inductive reactance of 3Ω is _____.
 60.1° 50° 43.5° 36.8°
11. The resonant frequency of an LC circuit with an inductance of 2mH and a capacitance of $54\ \mu\text{F}$.
 225.1 Hz 159.2 Hz 114.27 Hz 99.45 Hz
12. Power in a three phase circuit is _____.
 $P = V_{ph}I_{ph}\cos\phi$ $P = \sqrt{3}V_LI_L\cos\phi$
 both [a] and [b] None of the above.
13. In a series RLC circuit with $R = 10\Omega$, $L = 0.1\text{H}$, and $C = 10\mu\text{F}$, quality factor (Q) at resonance is _____.
 10 15.92 25.29 31.62
14. In a three phase delta connection _____.
 line current is equal to phase current Line voltage and line current are zero
 Line voltage is equal to phase voltage all of the above
15. In a series resonance circuit with $X_L = X_C$, circuit is _____.
 purely resistive purely capacitive
 purely inductive Need to calculate
16. What is the total impedance of a series RLC circuit with $R = 8\Omega$, $L = 0.05\text{H}$, and $C = 20\mu\text{F}$ at 1 kHz _____.
 8Ω $10\ \Omega$ $12.8\ \Omega$ $14.14\ \Omega$
17. The 'electric current' in an electric circuit is analogy with _____ in magnetic circuit..
 mmf flux flux density Tesla
18. If a current of 5A flows through a 100-turn coil in a magnetic field, and the magnetic flux linkage is 0.02 Wb, what is the inductance of the coil?
 4 H 2 H 0.4 H 0.2 H

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19. Which of the following does not change in an ordinary transformer _____
 Current Voltage Frequency All of above
20. In a transformer, if the primary winding has 200 turns and the secondary winding has 400 turns, and the primary voltage is 120V AC, the secondary voltage will be _____
 240 V 140 V 60 V 480 V

2019.11.11

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