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Question Paper Code: 41327

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Second Semester

Electrical and Electronics Engineering

14UEE207- ELECTRIC CIRCUITS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. If a resistor to carry 1 A of current to handle 100 W of power, estimate the value of resistance.
Assume that voltage can be adjusted to any required value.
(a) 50 Ω (b) 100 Ω (c) 10 Ω (d) 1 Ω
2. A 100 Ω resistor is connected across the terminals of a 9 V battery. What is the power dissipation in the resistor?
(a) 9 W (b) 0.9 W (c) 0.19 W (d) 0.81 W
3. Three equal resistances of 9 Ω are connected in delta. What is the resistance in one of the arms in an equivalent star circuit?
(a) 3 Ω (b) 9 Ω (c) 1 Ω (d) 27 Ω
4. Reciprocity theorem is applicable to
(a) Linear networks only (b) Bilateral networks only
(c) Linear/bilateral networks (d) Neither of the two
5. The current in a pure capacitor
(a) lags behind the voltage by 90° (b) leads the voltage by 90°
(c) is in phase with the voltage (d) lags behind the voltage by 45°
6. The admittance and impedance of the following kind of network have the same properties
(a) LC (b) RL (c) RC (d) RLC

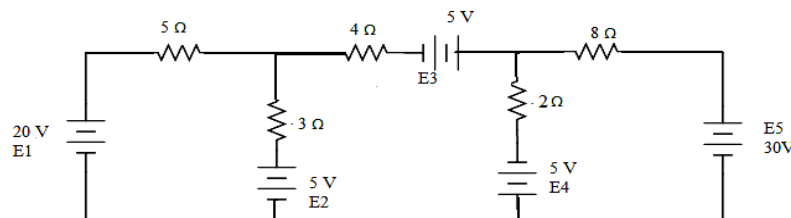
7. In a series parallel circuit, any two resistances in the same current path must be in
- (a) series with each other (b) parallel with each other
(c) series with the voltage source (d) parallel with the voltage source
8. An RL circuit has $R = 2 \Omega$ and $L = 4 H$. The time constant is
- (a) $4s$ (b) $0.5s$ (c) $8s$ (d) $2s$
9. Which of the following is a bilateral element?
- (a) constant current source (b) constant voltage source
(c) capacitance (d) none of these
10. A network which contains one or more than one source of e.m.f. is known as
- (a) linear network (b) non-linear network
(c) passive network (d) active network

PART - B (5 x 2 = 10 Marks)

11. State reciprocity theorem.
12. Define the term 'Quality factor'.
13. Determine the quality factor for the series circuit consisting of $R = 10 \Omega$, $L = 0.1 H$ and $C = 10 \mu F$.
14. Calculate the power factor if $V(t) = V_m \sin(\omega t - 45^\circ)$ and $I(t) = I_m \sin(\omega t - 135^\circ)$.
15. Compare the 3 phase star with delta connected system.

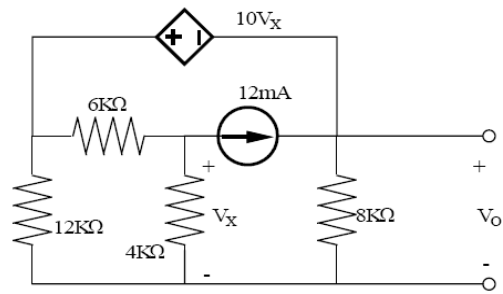
PART - C (5 x 16 = 80 Marks)

16. (a) Determine the current supplied by each battery in the circuit shown in figure using mesh analysis. (16)

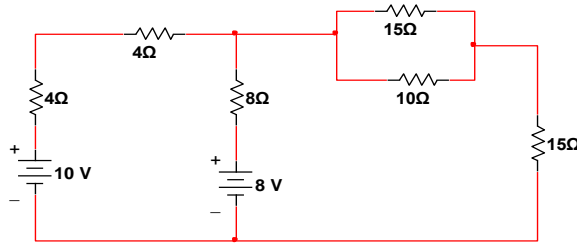


Or

- (b) Calculate V_o from the following circuit shown below using mesh analysis. (16)

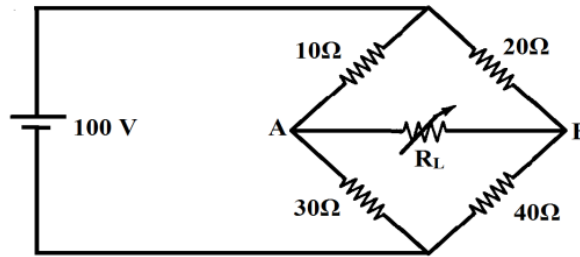


17. (a) Calculate the current in 10Ω resistor of the network shown below using superposition theorem. (16)



Or

- (b) Determine the load resistance to receive maximum power from the source; also find the maximum power delivered to the load in the circuit shown in below figure. (16)



18. (a) State the condition for resonance in series RLC circuit and obtain the expression for resonant frequency. Derive the expression for bandwidth for a series RLC circuit as a function of resonant frequency. (16)

Or

- (b) (i) A coil of resistance 3Ω and inductance 100 mH is connected in series with a $100 \mu\text{F}$ capacitor across a 220 V , 50 Hz supply. Calculate (1) Impedance of the circuit in polar form (2) the current (3) power factor and (4) voltage across each element. (8)

- (ii) A coil of $400 \mu\text{H}$ is magnetically coupled to another coil of $100 \mu\text{H}$. The coefficient of coupling between two coils is 0.08 . Calculate the inductance if two coils are connected in:

- | | | |
|---------------------|-----------------------|-----|
| (1) Series aiding | (2) Series opposing | |
| (3) Parallel aiding | (4) Parallel opposing | (8) |

19. (a) In the series circuit shown in Fig.7, the switch is closed on position 1 at $t=0$. At $t=1$ milli-second, the switch moved to position 2. Obtain the equations for the current in both intervals and draw the transient current curve. (16)

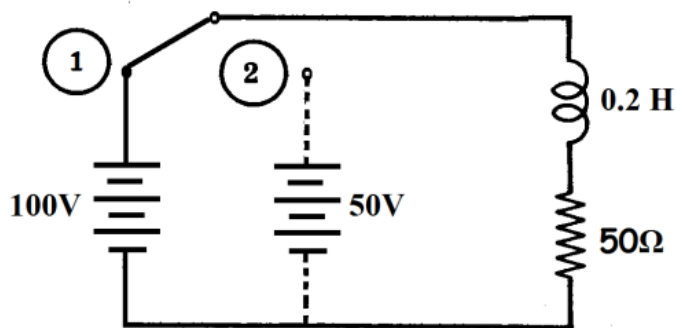


Fig.7

Or

- (b) Find the Y parameters for the RC ladder network shown in Fig.8. (16)

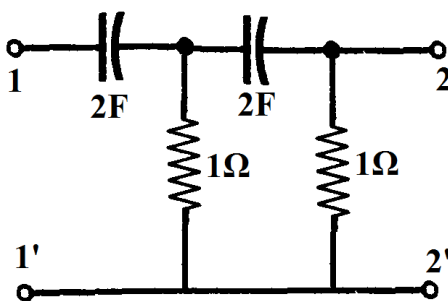


Fig.8

20. (a) An unbalanced four wire star connected load has balanced supply voltage of 400 V. Load impedances are $4+j8 \Omega$, $3+j4 \Omega$ and $15+j10 \Omega$ for R phase, Y phase and B phase respectively. Estimate the line currents, neutral currents and total power (16)

Or

- (b) With a neat circuit and phasor diagram explain the three phase power and power factor measurement by two Wattmeter method. (16)