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Question Paper Code: 31327

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Second Semester

Electrical and Electronics Engineering

01UEE207- ELECTRIC CIRCUITS

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Draw the VI characteristics of ideal and practical voltage sources.

2. A fluorescent tube choke is connected across 230V, 50Hz AC supply. If the resistance and reactance of the choke are 100Ω, 1H respectively, determine the current through the choke.

3. Write the resistance of each arm of star connected load in terms of delta connected load.

4. Two resistors 10Ω and 20Ω are connected in parallel. If the total current is 3A, what will be the current through each resistor?

5. Determine the resonance frequency of a RLC series circuit with R= 5 Ω, L = 0.02 H and C= 5 μf.

6. An R,L,C series circuit is supplied with 230V AC of variable frequency. If R=10Ω, L=10mH and C=10μF, determine the maximum current through the circuit.

7. A RL series circuit with R=10 Ω is excited by a dc voltage source of 30 V by closing the switch at t = 0. Determine the current in the circuit at t = 2τ.

8. Give the condition for Critical Damping of an RLC series circuit.

9. A star connected load has impedance of (6 + j8) Ω in each phase. Determine the line current when it is connected to 400 V, 3ϕ, 50 Hz supply.

10. In three phase power measurement using two wattmeter, what is the power factor if one wattmeter reads zero?

<div align="center">PART - B (5 x 16 = 80 Marks)</div>

11. (a) Calculate (i) the equivalent resistance across the terminals of the supply (ii) total current supplied by the source and (iii) power delivered to 16 Ω resistors in the circuit shown in figure 1.
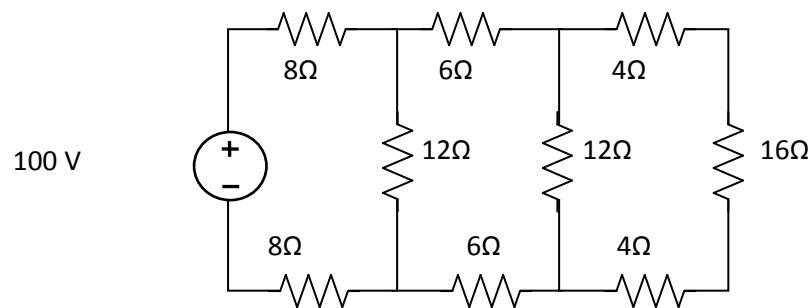

Figure 1

(16)

<div align="center">Or</div>

(b) Using nodal analysis, calculate the current through the 5 Ω resistor in the circuit shown in figure 2. (16)
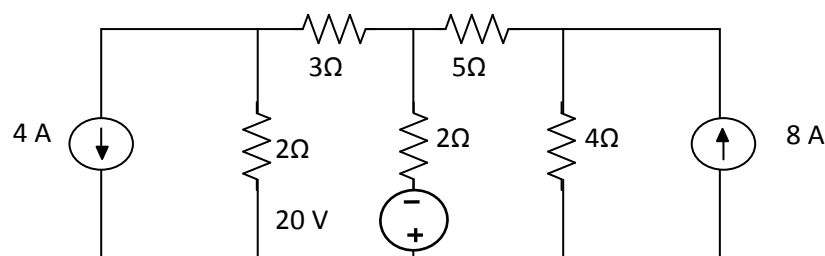

Figure 2

12. (a) (i) In the circuit shown in figure 3, obtain the current in each resistor using Network reduction method. (8)
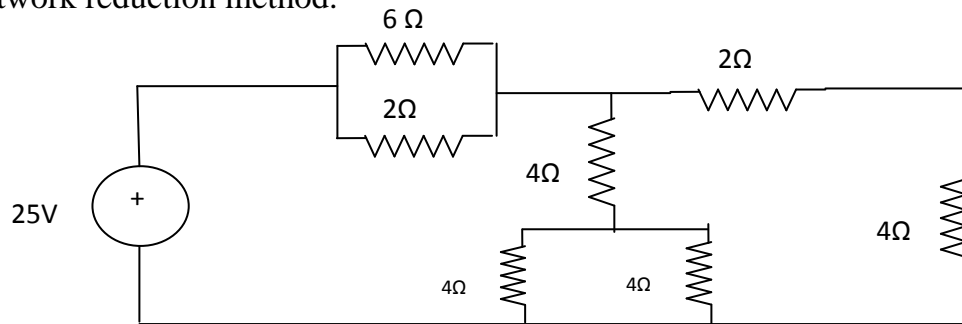

Figure 3

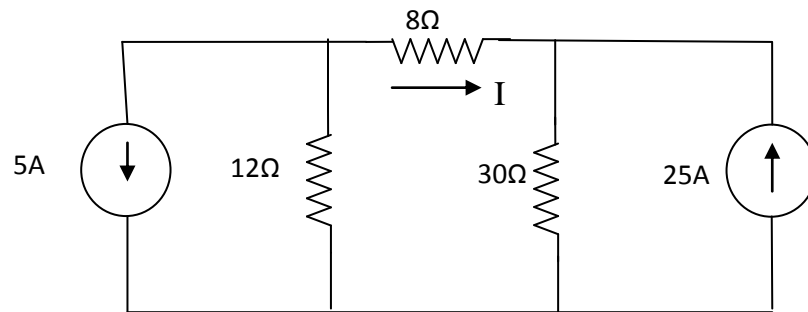(ii) Using Superposition theorem, find current I in figure 4. (8)

Figure. 4

Or

(b) (i) Explain how three resistances connected in delta can be converted into equivalent star. Derive the relationship. (8)

(ii) An AC power source $100V$, $50Hz$ has an internal impedance of $2 + j5$ Ω. What will be the maximum power that can be delivered by this source to load? (8)

13. (a) A series RLC circuit consists of $R = 16$ Ω, $L = 5$ mH and C $= 2$ μF. Calculate the quality factor, bandwidth and half power frequencies. (16)

Or

(b) Two coils connected in series have an equivalent inductance of 0.8 H when connected in aiding and an equivalent inductance of 0.4 H when connected in opposing. Determine the mutual inductance. Calculate the self-inductance of the coils, by taking $k = 0.55$. (16)

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14. (a) A RL series circuit is excited by a sinusoidal source $e(t) = 10 \sin 100t$ volts, by closing the switch at $t = 0$. Take $R = 10\ \Omega$ and $L = 0.1\ H$. Determine the current $i(t)$ flowing through the RL circuit. (16)

Or

(b) (i) Derive the expression for transient current and voltage drop across resistance of an RL series circuit supplied by a constant voltage source at $t = 0$. (8)

(ii) A series RL circuit has a constant voltage V applied at $t = 0$. At what time does voltage drop across R is equal to voltage drop across L? (8)

15. (a) A three phase balanced supply of $400V$ (line to line) $50Hz$ is given to a three phase delta connected load with impedance 20 $\angle 45°\ \Omega$. Obtain the line currents, power and power factor. Also draw the phasor diagram. (16)

Or

(b) A 500 V, three phase motor has an output of 3.73 kW and operates at a power factor of 0.85, with an efficiency of 90%. Calculate the reading of each of the two watt meter connected to measure the input. (16)

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