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Question Paper Code: 21010

B.E. / B.Tech. DEGREE EXAMINATION, OCTOBER 2014.

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. Two resistors are connected in series, the effective resistance is 100 Ω. When connected in parallel the effective value is 24 Ω. Determine the value of two resistances.
3. Write the resistance of each arm of star connected load in terms of delta connected load.
4. What is the condition for maximum power transfer in DC and AC circuits?
5. Determine the resonance frequency of a RLC series circuit with R= 5 Ω, L = 0.02 H and C= 5 μf.
6. Two identical coils with L = 0.03 H have a coupling coefficient k = 0.8. Find the mutual inductance and the equivalent inductance with the coils connected in series opposing mode.

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. Write the condition for under damping and critical damping in 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. A star connected balanced load draws a current of 35 A per phase when connected to a 440 V supply. Determine the apparent power.

PART - B (5 x 16 = 80 Marks)

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

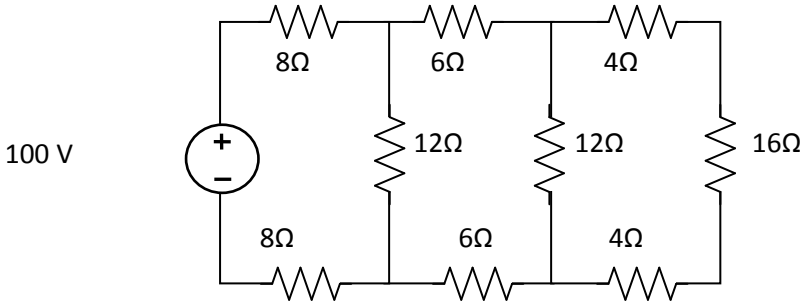

Figure 1

(16)

Or

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

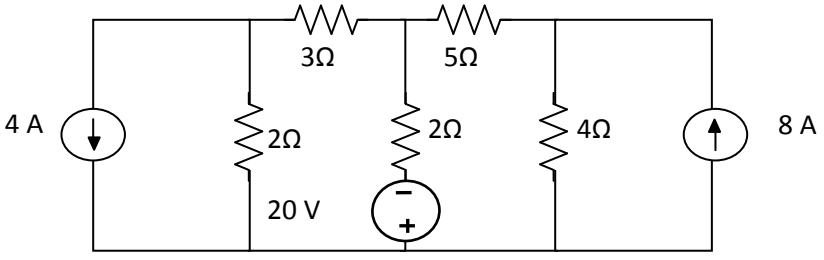

Figure 2

12. (a) Find i_o in the network shown in figure 3 using Superposition theorem.

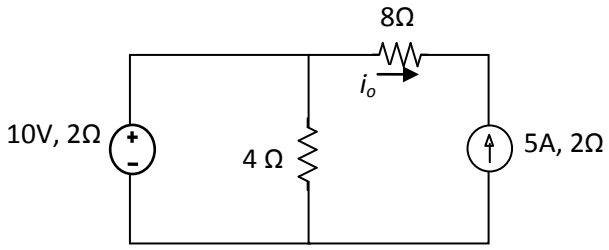

Figure 3

(16)

Or

(b) Find the equivalent resistance between A and B, in the network shown in figure 4.

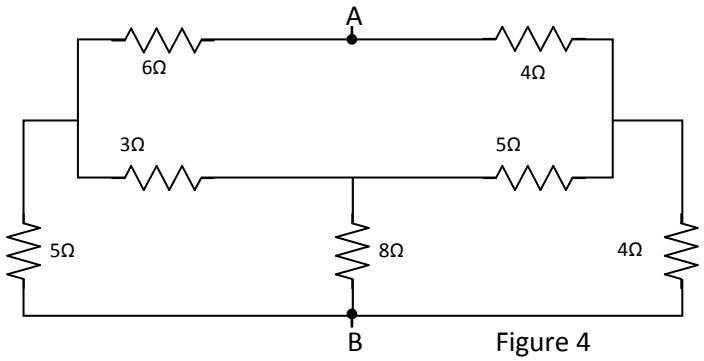

Figure 4

(16)

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)

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 Ω and L = 0.1 H. Determine the current i(t) flowing through the RL circuit. (16)

Or

(b) A capacitor has an initial charge of Q_o. A resistor R is connected across the capacitor at t = 0, to discharge the charge. The power transient of the capacitor $p_c(t) = 800e^{-4000t}$ W. Find the value of R and Q_o. Take C = 10 μF. (16)

15. (a) A 415V, 50Hz, 3ϕ voltage is applied to three star connected identical impedances. Each impedance consists of a resistance of 15 Ω, a capacitance of 177 μF and an inductance of 0.1 H in series. Find (i) phase current (ii) line current (iii) power factor (iv) active power (v) reactive power and (vi) total VA. If the same impedance is connected in delta, find the line current and power consumed. (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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