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Question Paper Code: 21011

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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. A 230V, 100W lamp is connected to 100V supply. What will be the power dissipated by the lamp?
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. A 12 V DC source has internal resistance of 1Ω. The maximum power that can be delivered by the source is _____.
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. Give the relationship between Quality factor and Bandwidth.
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. The time constant of an RC circuit with R=1k and C= 100μF is _____.

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

9. The phase voltage of a balanced three phase system is 230V. What will be the line voltage?

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

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Three resistors are in series and have a total constant voltage V_T. R_1 has a voltage of 20V, R_2 has a power of 25W and $R_3 = 2\Omega$. If the current through them is 5A, find V_T. (8)

(ii) Write the mesh current matrix equations for the network of figure 1. by inspection and solve for the mesh currents. (8)

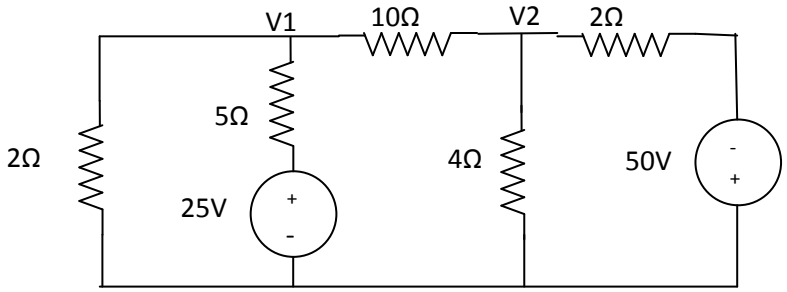

Figure 1

Or

(b) (i) A series RL circuit with R = 5Ω and L = 2mH has an applied voltage V = 150sin 5000t Volts. Calculate current and power factor. (8)

(ii) For the circuit shown in figure 2, determine current through various resistors using Nodal Method. (8)

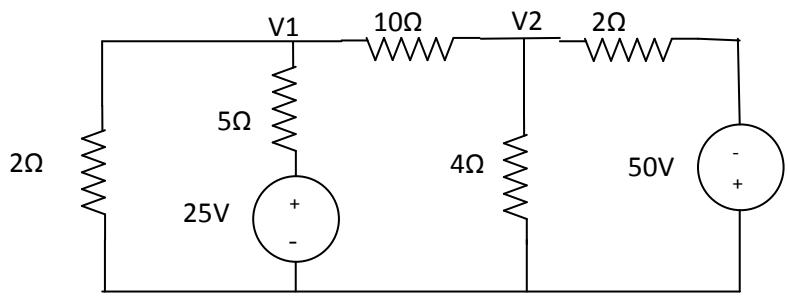

Figure 2

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

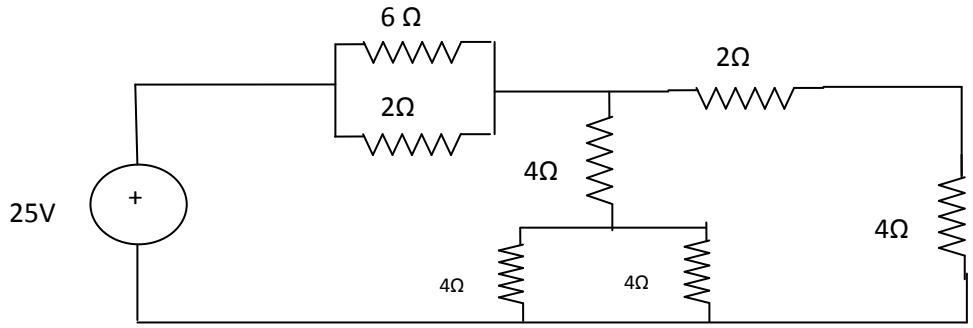

Figure 3

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

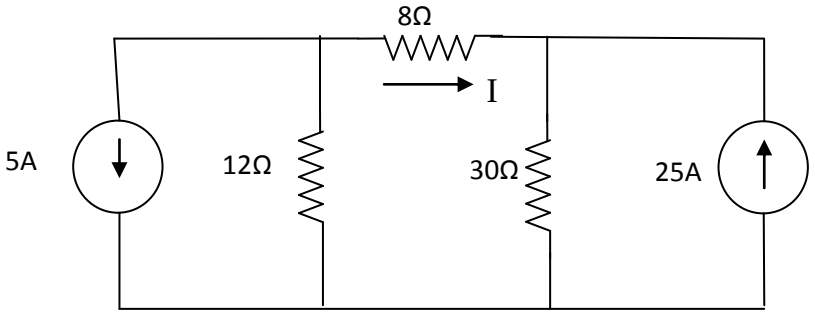

Figure. 4

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) (i) Derive the relationship between resonant frequency and Quality factor of an RLC series circuit. (8)

(ii) Compute the Quality factor of an RLC series circuit with R=20Ω, L = 50mH and C = 1μF. (8)

Or

(b) (i) Derive the relationship between Self Inductance and Mutual Inductance. (8)

(ii) Two coupled coils $L_1 = 0.8H$ and $L_2 = 0.2H$ have a co efficient of coupling $k = 0.9$. Find the mutual inductance M and turns ratio N_1 / N_2. (8)

14. (a) The switch in the circuit shown in figure 5. is closed on position 1 at $t = 0$ and moved to position 2 after one time constant (τ). Obtain the current for $0 < t < \tau$ and $t > \tau$.

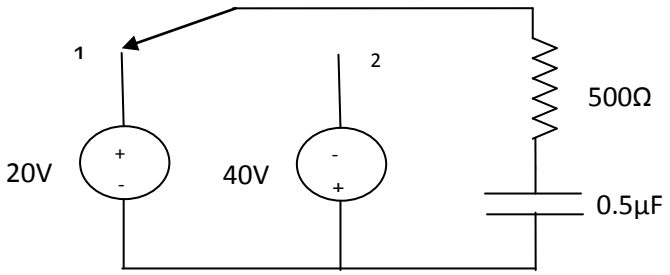

Figure. 5

(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) Power is measured in a 3 phase, 400V (Line-Line) system by two wattmeters. If the readings are $W_1 = 3500W$ and $W_2 = 1500W$, determine the line currents, power and power factor if reading of W_2 is obtained after reversing its potential coil. (16)