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Question Paper Code: 52309

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Electrical and Electronics Engineering

15UEE209 - ELECTRIC CIRCUITS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The nodal analysis technique is applicable to circuits containing CO1- R
(a) current sources (b) current and voltage sources
(c) dependent sources (d) all of these
2. A 5 kilo ohm resistor is connected across a 50 V supply. The power consumed by the resistor is CO1- R
(a) 1000 mW (b) 500 mW (c) 250 mW (d) 10 mW
3. When maximum power is transferred, the efficiency of the circuit is CO2- R
(a) 25% (b) 100% (c) 50% (d) 75%
4. Star to delta and vice-versa transformations are employed to simplify circuit elements connected in CO2- R
(a) series-parallel (b) series (c) parallel (d) none of these
5. When an RLC series circuit is in resonance, the current through the circuit is determined by CO3- R
(a) V / X_L (b) V / R (c) V / X_C (d) VR

6. Mutual inductance is a property associated with CO3- R
- (a) Only one coil (b) two or more coils
(c) two or more coils with magnetic coupling (d) none of these
7. The time constant of a series RC circuit is CO4- R
- (a) $1/RC$ (b) R/C (c) RC (d) e^{-RC}
8. Inductor does not allow sudden changes CO4- R
- (a) in currents (b) in voltages
(c) in both (a) and (b) (d) in none of above
9. Three wattmeter method of power measurement can be used to CO5- R
measure power in
- (a) balanced circuits (b) unbalanced circuits
(c) both balanced and unbalanced circuits (d) none of these
10. The resultant voltage in a closed balanced delta circuit is given by CO5- R
- (a) three times the phase voltage (b) 1.732 times the phase voltage
(c) zero (d) unity

PART – B (5 x 2= 10Marks)

11. Three resistors are connected in parallel in an electrical circuit. Calculate the CO1- R
equivalent resistance of the circuit.
12. State reciprocity theorem. CO2- R
13. Define quality factor and write the expression for 'Q' factor of series RL CO3- R
Circuit.
14. In a series RL circuit with 60V supply, $R=30\ \Omega$ and $L=15H$. Determine the CO4- R
expression for current in the circuit when switch is closed at $t=0$.
15. Write the relationship between line and phase voltages of a delta connected CO5- R
system.

PART – C (5 x 16= 80Marks)

16. (a) Determine the equivalent resistance and the total supply current CO1- App (16)
for the circuit given in figure 1.

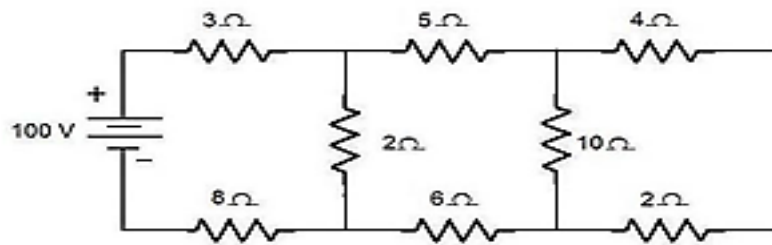


Figure 1

Or

- (b) Determine the current through 10Ω resistor given in figure 2, CO1- App (16) using mesh analysis.

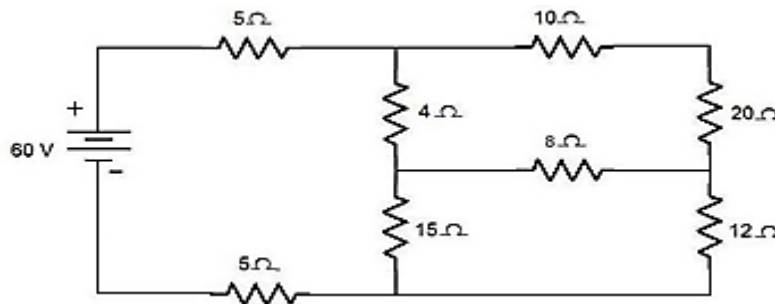


Figure 2

17. (a) Determine the Thevenin's equivalent circuit for the network CO2- App (16) shown in figure 3 and calculate the load current when R_L is 330Ω .

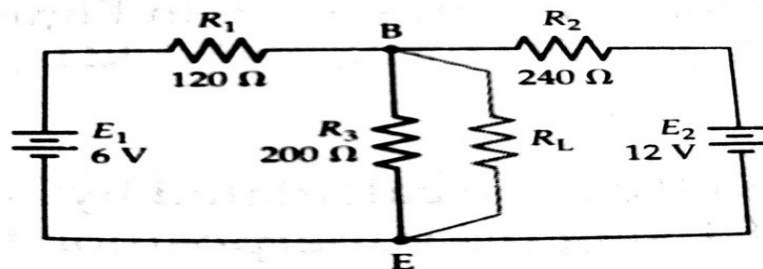


Figure 3

Or

- (b) Using superposition theorem, calculate current I_3 in the circuit CO2- App (16) shown in figure 4.

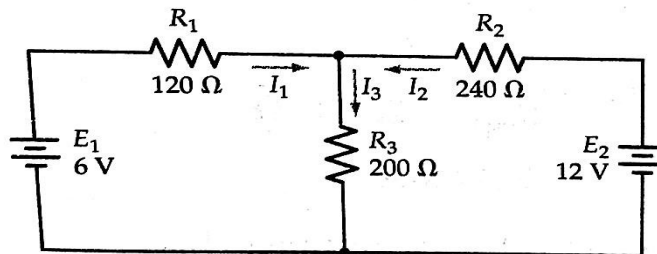


Figure 4.

18. (a) (i) What is resonant frequency? Derive an expression for resonant frequency in a series RLC circuit. CO3- Ana (8)
- (ii) In a series RLC resonant circuit, resonant frequency = 500kHz and $L=100\mu\text{H}$. Calculate the value of capacitor and power factor of the circuit. CO3- Ana (8)

Or

- (b) In a series RLC circuit, $R=25\Omega$, $L=100\mu\text{H}$ and $C=1000\text{pF}$. Calculate
 (i) Resonant frequency
 (ii) lower and upper cutoff frequency
 (iii) Bandwidth
 (iv) Q factor. CO3- Ana (16)
19. (a) Calculate the transient current in the circuit shown in figure 5. The $20\mu\text{F}$ capacitor has an initial charge $Q_0=0.001$ coulombs and switch S is closed at time $t=0$. CO4- Ana (16)

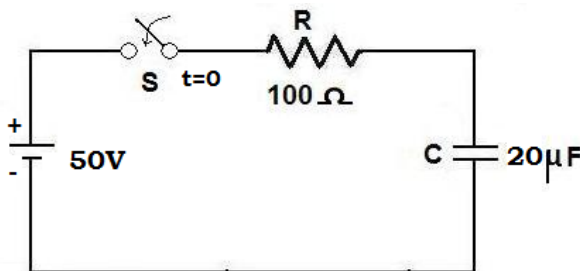


Figure 5

Or

- (b) Derive an expression for transient current response of a RLC series circuit to sinusoidal inputs. CO4- Ana (16)
20. (a) With a neat circuit and phasor diagram, explain the three phase power measurement by two wattmeter method. CO5- U (16)
- Or
- (b) In a star connected load, R_1 , R_2 and R_3 are each 100Ω and the phase voltage $V_p=100\text{V}$. Determine
 (a) line currents
 (b) Neutral current and
 (c) Line voltage CO5- U (16)