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Question Paper Code: 52B08

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Second Semester

Biomedical Engineering

15UBM208 - ELECTRICAL CIRCUITS ANALYSIS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If a 10V battery is connected across the parallel resistors of 3Ω , 5Ω , 10Ω and 20Ω . How much voltage is there across 5Ω resistor? CO1- R
(a) 10V (b) 5V (c) 20V (d) 2.5V
2. Mesh analysis is based on CO1- R
(a) Kirchhoff's current law (b) Kirchhoff's voltage law (c) Source (d) Load
3. Superposition theorem is valid only for CO2- R
(a) Linear circuits (b) Non-linear circuits
(c) Both linear and non-linear (d) Neither of the two
4. Maximum power is transferred when load impedance is CO2- R
(a) Equal to source impedance (b) Equal to half of the source impedance
(c) Equal to zero (d) None of the above
5. In a series RLC circuit, if C is increased, what happens to the resonant frequency? CO3- R
(a) It increases (b) It decreases (c) It is zero (d) It remains the same
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 the above

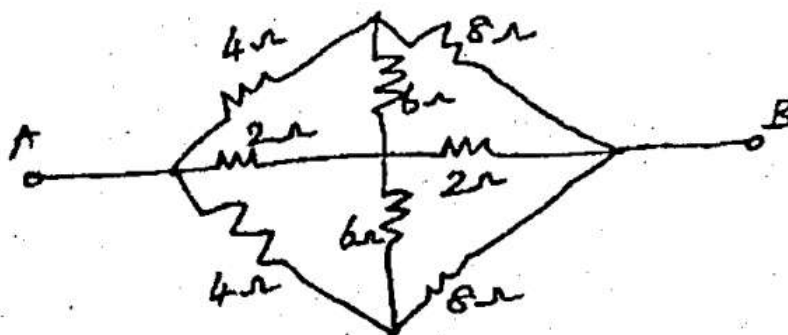
7. The time constant of a series RL circuit is CO4- R
 (a) L R (b) L / R (c) R / L (d) $\exp(-R/L)$
8. The time constant of a series RL circuit is CO4- R
 (a) LR (b) L/R (c) R/L (d) 0
9. The resultant voltage in a closed balanced delta circuit is given by CO5- R
 (a) Three times the phase voltage (b) $\sqrt{3}$ times the phase voltage
 (c) Zero (d) one
10. Wattmeter deflection in AC circuit is proportional to the CO5- R
 (a) Maximum power in the circuit (b) Instantaneous power in the circuit
 (c) Average power in the circuit (d) Half power in the circuit

PART – B (5 x 2= 10 Marks)

11. State Kirchoff's Law. CO1- R
12. Three equivalent resistances of 3Ω are connected in delta circuit. Obtain the equivalent star connected circuit. CO2- R
13. Compare serial and parallel resonance circuit. CO3- R
14. Define time constant of RL and RC circuit. CO4- R
15. List any two advantages of three phase system over single phase system. CO5- R

PART – C (5 x 16= 80 Marks)

16. (a) Find the equivalent resistance across the terminals A and B shown in figure.16.(a) CO1-App (16)



Or

- (b) Using mesh analyses find the three loop current in the circuit given in figure. 16.(b) CO1-App (16)

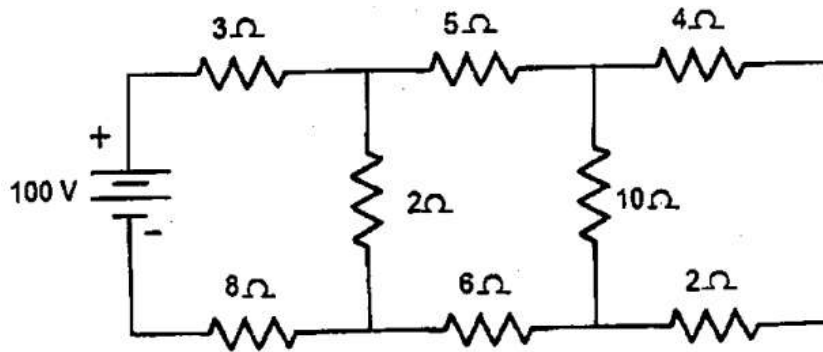
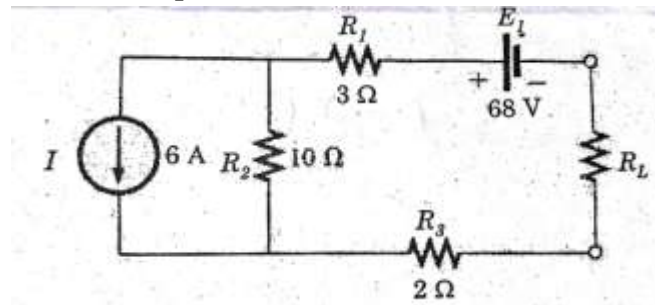


Figure. 16(b).

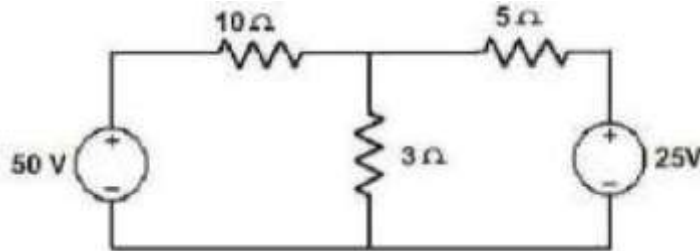
17. (a) Use the maximum power transfer theorem to calculate R_L in the circuit for maximum power transfer CO2- App (16)



Figure

Or

- (b) Find the current in each resistor using superposition principle of CO2- App (16)



18. (a) Derive bandwidth for a parallel RLC circuit as a function of resonant frequency CO3- Ana (16)

Or

- (b) Determine the half power frequencies Bandwidth, the quality factor of a coil for the series circuit consisting of $R=10\ \Omega$, $L=0.1\ \text{H}$ and $C=10\ \mu\text{F}$. CO3- Ana (16)

19. (a) Derive the response of a series RLC circuit for a DC input. CO4- U (16)
Discuss the all possible responses.

Or

- (b) A RC series circuit is connected to a DC source of 100V through a switch. A switch is closed at time $t = 0$. Find the value of voltage and current at $t = 5\text{msec}$. When the value of R and C are 100Ω ohm and 100 mF, respectively. CO4- U (16)

20. (a) Show that three phase power can be measured by two wattmeters. CO5- U (16)
Draw the phasor diagrams. Derive an expression for power factor interms of wattmeter readings..

Or

- (b) Unbalanced four wire star connected load has balanced supply CO5- U (16)
voltage of 400V. The load impedances are $Z_R = (4 + j8)\Omega$,
 $Z_Y = (4 + j8)\Omega$ and $Z_B = (4 + j8)\Omega$. Calculate the line currents, neutral current and total power.