A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 52B08A

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

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. Resistors are circuit elements that resist the flow of CO1- R

   (a) Current (b) Voltage (c) Power (d) Energy

2. Mesh analysis is based on CO1- R

   (a) Kirchhoff's current law (b) Kirchhoff's voltage law (c) Source (d) Load

3. In superposition theorem, the independent current sources must be replaced by CO2- R

   (a) Active elements (b) Short circuit

   (c) Open circuit (d) Linear bilateral elements

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. What is the total reactance of a series RLC circuit at resonance? CO3- R

   (a) Equal to X_L (b) Equal to X_C (c) Equal to R (d) Zero

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. A network in which branch current and node voltages are not changing with respect to time is said to be — CO4- R

(a) Transition period (b) Transient response

(c) Excitation (d) Steady state

8. The time constant of a series RL circuit is — CO4- R

(a) LR (b) L/R (c) R/L (d) 0

9. Three phase system give _____ output. — CO5- R

(a) DC (b) Constant

(c) Steady (d) Poor

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. Name different network elements — CO1- R

12. Three equivalent resistances of 3Ω are connected in delta circuit. Obtain the equivalent star connected circuit. — CO2- R

13. Define the dot rule for coupled circuits — CO3- R

14. Define time constant of RL and RC circuit. — CO4- R

15. State the relation between the line and phase quantities of a balanced three-phase wye connected system. — CO5- R

PART – C (5 x 16= 80 Marks)

16. (a) (i) Explain the classification of electrical networks — CO1-U — (8)

(ii) State and explain Kirchhoff's laws — CO1-U — (8)

Or

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

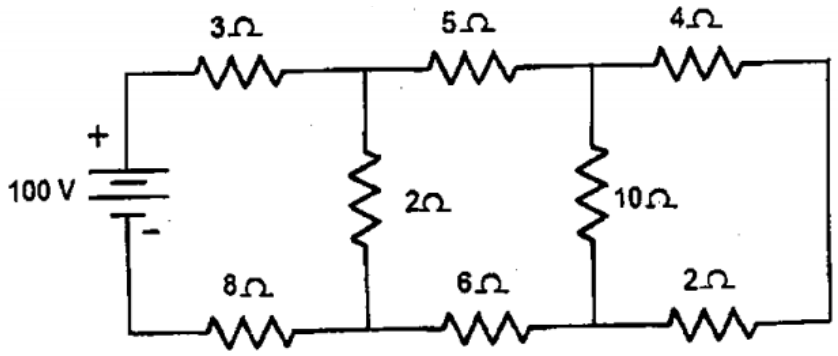
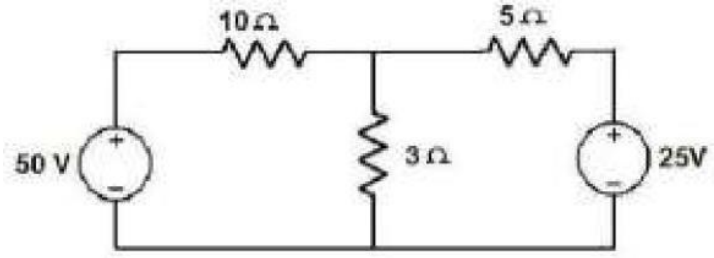


Figure. 16(b).

17. (a) A linear time invariant network when terminated with i) R = 1Ω, the current is $5< -45^0$ A ii) X_C = 1Ω, the current is $10 <-45^0$ A. Find the thevenin's equivalent of the network. What will be the current if it is terminated with X_L = 1Ω. CO2- App (16)

Or

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



18. (a) In series RLC circuit with variable capacitance, the current is at maximum value with capacitance of 20 μF and the current reduces to 0.707 times maximum value with capacitance of 30 μF. Find the values of R and L. What is the bandwidth of circuit if supply voltage is 20 sin (6.28×10^3) t volts. 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 Ω, L= 0.1 H and C= 10μF. CO3- Ana (16)

19. (a) Derive and determine the DC response of an RL Series circuit and also find the voltage across the resistance and Inductance of the DC response. CO4- U (16)

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 = 5msec. When the value of R and C are $100\,\Omega$ ohm and 100 mF, respectively.	CO4- U	(16)
20.	(a)	A three-phase balanced delta–connected load of (4+j8)Ω is connected across a 400 V,3phase balanced supply.Determine the phase currents and line currents.Assume the phase sequence to be RYB.Also, calculate the power drawn by the load.	CO5- U	(16)
		Or		
	(b)	Unbalanced four wire star connected load has balanced supply 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.	CO5- U	(16)