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

Question Paper Code: 52B08

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

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. A circuit contains two un-equal resistances in parallel CO1-R

   (a) Current is same in both (b) Large current flows in larger resistor

   (c) Potential difference across each is same (d) Smaller resistance has smaller conductance

2. Ohm's law is not applicable in all the following cases except CO1- R

   (a) Electrolytes (b) Arc lamps

   (c) Insulators (d) Vacuum ratio values.

3. Superposition theorem is valid only for CO2- R

   (a) linear circuits (b) nonlinear circuits

   (c) both linear and non linear (d) neither of the two

4. Norton's equivalent circuit consists of CO2- R

   (a) voltage source in parallel with resistance (b) voltage source in series with resistance

   (c) current source in series with resistance (d) current source in parallel with resistance

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. The bandwidth is defined as the band of frequencies between f_2 and f_1. CO3- R

(a) $f_1 - f_2$ (b) $f_2 - f_1$ (c) $f_1 \times f_2$ (d) f_1 / f_2

7. The transient response occurs CO4- R

(a) only in resistive circuits (b) only in inductive circuits

(c) only in capacitive circuits (d) both in (b) and (c)

8. The transient current in a loss – free LC circuit when excited from an ac source is an _____sine wave. CO4- R

(a) undamped (b) over damped (c) under damped (d) critically damped

9. In a three phase unbalanced star connected system, the vector sum of the current in the three lines is CO5- R

(a) Zero (b) not zero

(c) one (d) three times the current in the each phase

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) real power in the circuit

PART – B (5 x 2= 10Marks)

11. What is a node, a junction and a branch? CO1- R

12. List some applications of maximum power transfer theorem. CO2- R

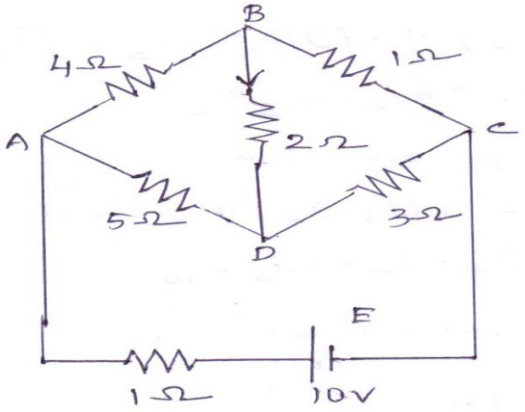
13. Give the relationship between bandwidth and selectivity. CO3- R

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

15. Write down the line and phase values in star and delta connection. CO5- R

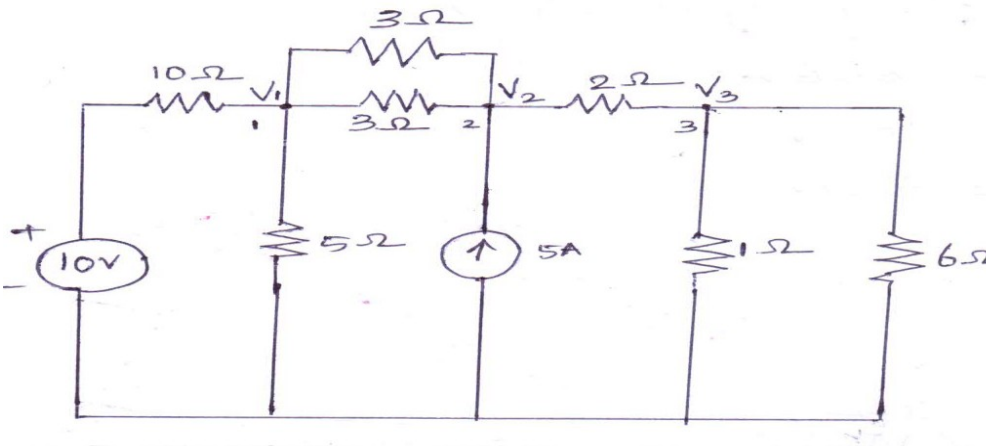
PART – C (5 x 16= 80Marks)

16. (a) In the circuit shown, determine the current through the 2Ω resistor and the total current delivered by the battery. Use Kirchoff's law. CO1- App (16)

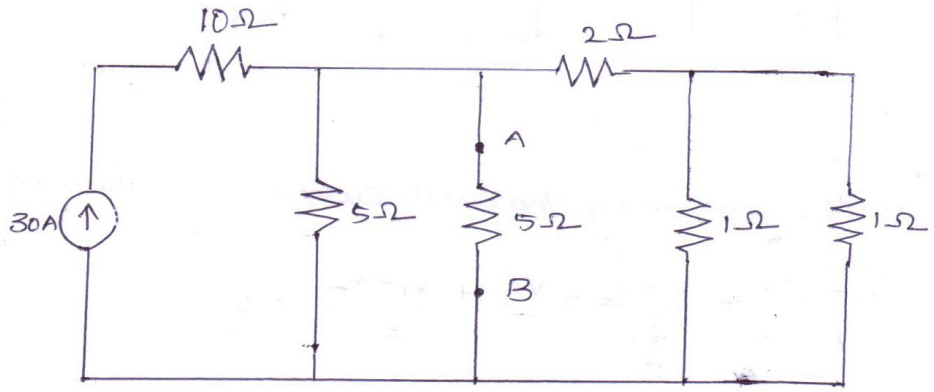


Or

(b) Determine voltages at each node for the circuit shown CO1- App (16)

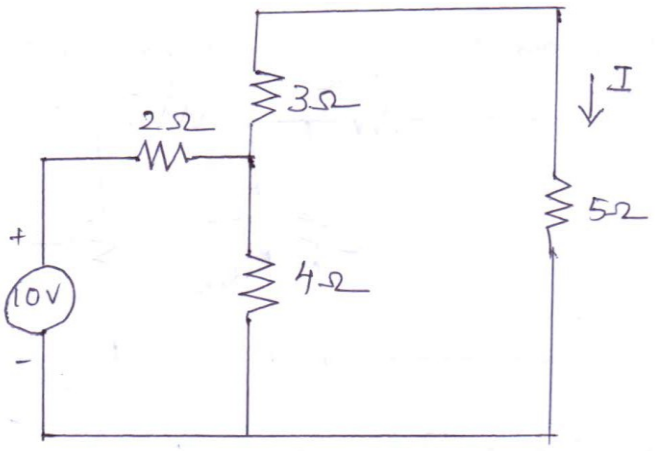


17. (a) Obtain the Norton's equivalent circuit and determine the current flowing through the 5Ω resistor for the circuit shown. CO2- App (16)



Or

(b) For the circuit shown, verify reciprocity theorem. CO2-Ana (16)



18. (a) Obtain the expression for Q- Factor of parallel resonance of a circuit having R,L and C. CO3- Ana (16)

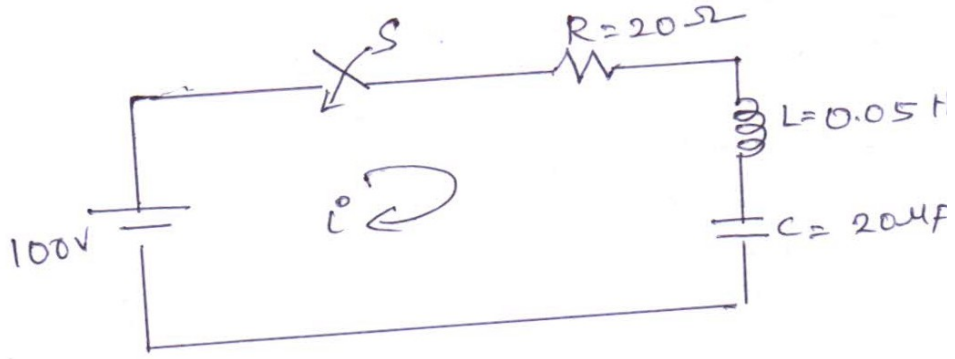
Or

(b) Explain and derive the relationships for bandwidth and half power frequencies of RLC series circuit. CO3- Ana (16)

19. (a) Derive an expression for the complete solution of current for RC series circuit. CO4-U (16)

Or

(b) The circuit shown consists of resistance, inductance, and capacitance in series with a 100V source when the switch is closed at t = 0.Find the current transient. CO4- Ana (16)



20. (a) With a neat circuit and phasor diagram, explain the three phase power measurement by two wattmeter method and also derive the expression for Power Factor. CO5- U (16)

Or

(b) (i) Develop the expression for balanced delta connected load and draw the phasor diagram. CO5- U (8)

(ii) A balanced star connected load having an impedance (15+j20) Ω is connected to a three phase, 440v; 50Hz supply. Find the line currents and the power absorbed by the load. Assume RYB phase sequence. CO5- U (8)