Reg. No. : | | | | | | | | | | |

Question Paper Code: 31534

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Electronics and Instrumentation Engineering

01UEI304 - ELECTRICAL CIRCUITS AND NETWORKS

(Common to Instrumentation and Control Engineering)

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

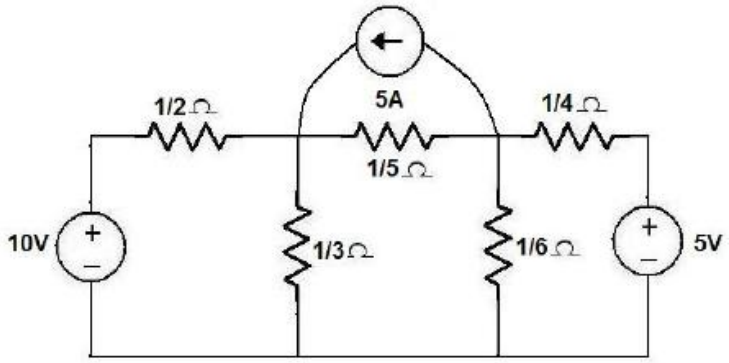
1. State Ohm's law.
2. State Kirchoff's current law and voltage law.
3. Each of the three arms of a delta connected network has a resistance of 3Ω. Formulate the equivalent star connected network.
4. Define Maximum power transfer theorem.
5. A series RLC circuit resonates at 1.5 *kHz* and consumes 50*W* from a 50*V* supply. The circuit has a bandwidth of 0.75*kHz*. Calculate the values of *R, L* and *C*.
6. Define Q factor of a coil.
7. A series RC circuit has a constant voltage V applied at t=0. Predict the time to reach the condition $V_R=V_C$.
8. Calculate the time constant of RL circuit having R=10Ω and L= 0.1*mH*.

9. Compare three-phase star connected system with delta connected system.

10. A three phase balanced star connected load has $400V$ line to line voltage and $10A$ line current. Determine the line to neutral voltage and phase current.

PART - B (5 x 16 = 80 Marks)

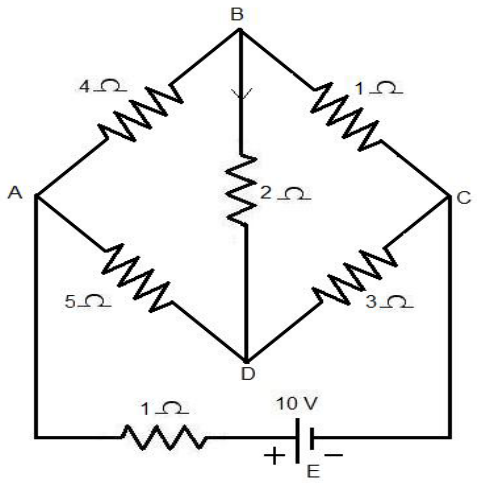
11. (a) (i) Using the node voltage analysis, find all the node voltages and currents in 1/3 *ohm* and 1/5 *ohm* resistances of figure. (10)



(ii) Discuss about voltage and current division principles. (6)

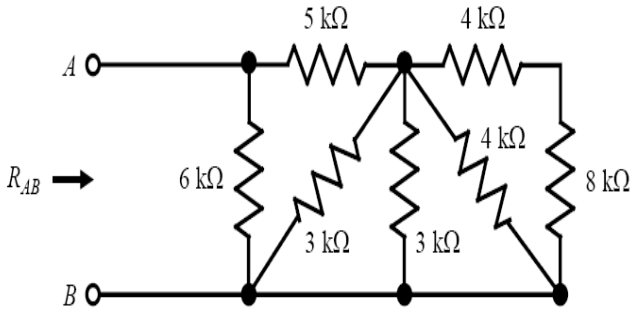
Or

(b) In the network shown below, identify the voltage across 2Ω resistor and the total current delivered by the battery using Kirchoff's laws. (16)



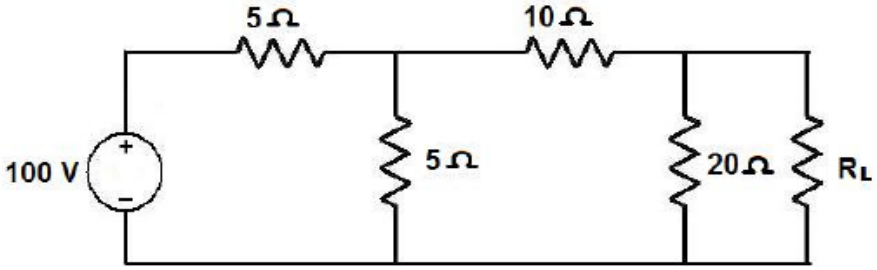
12. (a) (i) Derive and show the expressions for converting the star connected network into delta and delta connected network into star. (10)

(ii) Estimate R_{AB} from the following network given below. (6)



Or

(b) (i) Find the value of R_L so that maximum power is delivered to the load resistance shown in figure. (8)



(ii) State and explain reciprocity theorem. (8)

13. (a) Describe the condition for resonance in a series RLC circuit and derive an expression for resonant frequency and frequency at which voltage across capacitor is maximum. Also draw the resonance curve and explain the values for the following parameters at resonance (i) phase angle (ii) current (iii) impedance (iv) admittance and (v) power factor. (16)

Or

(b) (i) An alternating voltage V(t)= 250 sin 800t volts is applied across a series circuit containing a 30Ω resistor and 50μF capacitor. Calculate (a) the circuit impedance (b) the current flowing through the circuit (c) the potential difference across each element d) the phase angle between voltage and current. (8)

(ii) Two coils connected in series-aiding fashion have a total inductance of 250*mH*. When connected in a series-opposing configuration, the coils have a total inductance of 150*mH*. If the inductance of one coil (L1) is three times the other. Calculate the value of L1, L2, M and determine the coupling coefficient. (8)

14. (a) A series RLC circuits has R = 50 *ohm*, L = 0.2*H*, and C = 50 μF. Constant voltage of 100*V* is impressed upon the circuit at t = 0. Find the expression for the transient current assuming initially relaxed conditions. (16)

Or

(b) A series RL circuit has R=25Ω and L=5*H*. A DC voltage of 100*V* is applied at t=0. Evaluate (a) the equation for charging current (b) voltage across R and L (c) current in the circuit after 0.5s (d) the time at which the voltage drops across R and L are same. (16)

15. (a) Explain the three phase power and power factor measurement by two wattmeter method with neat circuit and phasor diagrams. (16)

Or

(b) Estimate the total input power and readings of the two Wattmeter connected to measure power in a three phase balanced load, if the reactive power input is 15 KVAR, and the load power factor is 0.8. (16)

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