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

Question Paper Code: 41534

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

Third Semester

Electronics and Instrumentation Engineering

14UEI304 - ELECTRICAL CIRCUITS AND NETWORKS

(Common to Instrumentation and Control Engineering)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Ohm's law is not applicable to

   (a) DC circuits (b) high currents
   (c) small resistors (d) Semi-conductors

2. A circuit contains two un-equal resistances in parallel

   (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

3. Thevenin resistance R_{th} is found

   (a) By removing voltage source along with their internal resistance
   (b) By short-circuiting the given two terminals
   (c) Between any two open terminals
   (d) Between same open terminals

4. If all the elements in a particular network are linear, then the superposition theorem would hold, when the excitation is

   (a) DC only (b) AC only
   (c) Either AC or DC (d) An Impulse

5. What is the Q (Quality factor) of a series circuit that resonates at 6 kHz, has equal reactance of 4 kilo-ohms each, and a resistor value of 50 ohms?

(a) 0.001 (b) 50 (c) 80 (d) 4

6. If the bandwidth of a filter increases

(a) Q increases (b) The roll-off rate increases
(c) The half power frequency decreases (d) The center frequency decreases

7. The time constant of RL circuit is

(a) RL (b) L/R (c) R/L (d) L

8. When a series RC circuit is connected to a voltage V at t=0, the current passing through the circuit at t=0+ is

(a) 0 (b) infinity (c) 1 (d) V/R

9. In a three-phase system, the voltages are separated by

(a) 80^o (b) 120^o (c) 45^o (d) 90^o

10. In a balanced three-phase load, each phase has

(a) An equal amount of power
(b) One-third of total power
(c) Two-third of total power
(d) A power consumption equal to $\sqrt{3VI}$

PART - B (5 x 2 = 10 Marks)

11. State kirchhoff's law.

12. State Thevenin's theorem.

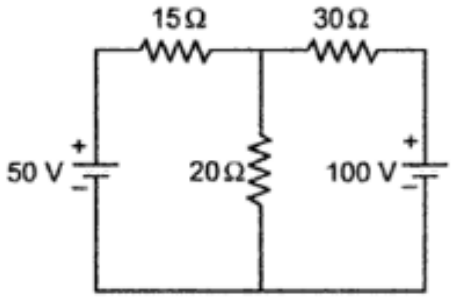
13. Define Quality factor.

14. Distinguish between steady state and transient response.

15. List any two advantages of three phase system over single phase system.

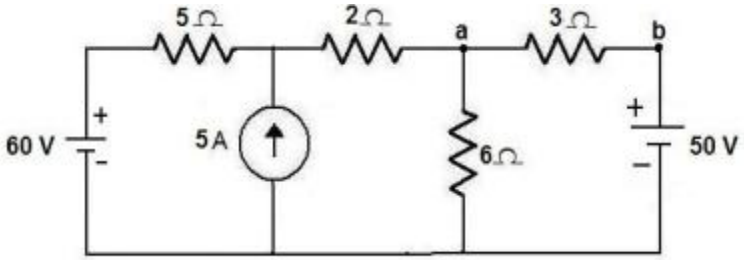
PART - C (5 x 16 = 80 Marks)

16. (a) Apply Kirchhoff's current law and voltage law to the circuit given below. Indicate the various branch currents. Write down the equations relating the various branch currents. Solve these equations to find the values of these currents. (16)

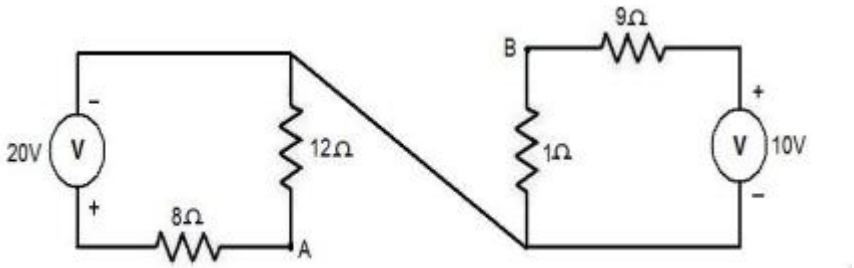


Or

(b) Find the current through branch a-b using mesh analysis for the circuit shown below. (16)



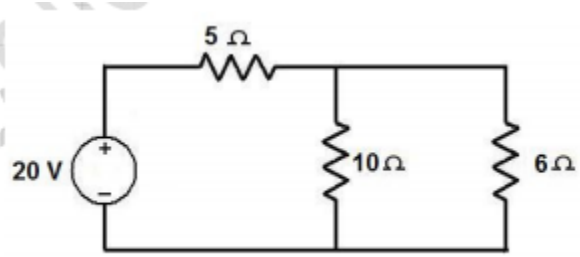
17. (a) Determine Thevenin's equivalent across the terminals AB for the circuit shown in figure below. (16)



Or

(b) (i) State and explain maximum power transfer theorem for variable pure resistive load. (8)

(ii) Using Norton's theorem, find the current through 6 Ohm resistance for the circuit given below. (8)



18. (a) Derive bandwidth for a series RLC circuit as a function of resonant frequency. (16)

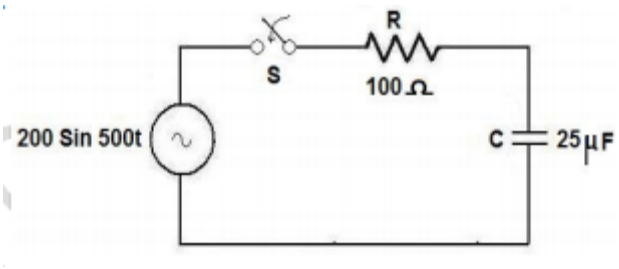
Or

(b) A series RLC circuit consists of R=100 ohm, L = 0.02 H and C = 0.02 microfarad. Calculate frequency of resonance. A variable frequency sinusoidal voltage of constant RMS value of 50V is applied to the circuit. Find the frequency at which voltage across L and C is maximum. Also calculate voltage across L and C is maximum. Also calculate voltages across L and C at frequency of resonance. Find maximum current in the circuit. (16)

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

Or

(b) In the circuit shown in figure, find the current i. Assume that initial charge across the capacitor is zero. (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. (16)

Or

(b) (i) A balanced star connected load of 4+j3 ohm per phase is connected to a 400V, 3 phase, 50 Hz supply. Find the line current, power factor, power, reactive volt ampere and total volt ampere. (8)

(ii) A Voltage source 100V with resistance of 10 ohms and inductance 50 mH, a capacitor 50 microfarad are connected in series. Calculate the impedance when the frequency is (i) 50HZ (ii) 500Hz (iii) the power factor at 100Hz. (8)

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