Question Paper Code: 43504

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

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. Application of Norton's theorem to a circuit yields

    (a) Equivalent current source and impedance in series
    (b) Equivalent current source and impedance in parallel
    (c) Equivalent impedance
    (d) Equivalent current source

4. If the source impedance is purely resistive R_g and load impedance consists of variable R_L and fixed reactance X ,then ,for maximum transfer

    (a) $R_L = R_g$ (b) $R_L = R_g^2 + X^2$ (c) $R_L = X$ (d) $R_L = X^2$

5. Dynamic resistance of the parallel resonance circuit

    (a) $Z_o = CR/L$ (b) $Z_o = L/CR$ (c) $Z_o = R L/ C$ (d) $Z_o = C R/L$

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. By which of the following elements transients will not occur

    (a) R   (b) L   (c) C   (d) all the above

8. With some initial change at t = 0+, a capacitor will act as

    (a) Short circuit   (b) Open circuit

    (c) A voltage source   (d) A current source

9. In a three-phase system, the volt ampere rating is given by

    (a) $3V_L I_L$ (b) $\sqrt{3}V_L I_L$ (c) $V_L I_L$ (d) $3\sqrt{3}V_L I_L$

10. The relation between the line and phase current in a three phase star connected system

    (a) $I_L = I_{ph}$ (b) $I_L = 3I_{ph}$ (c) $I_L = \sqrt{3}\,I_{ph}$ (d) $I_L = I_{ph}/\sqrt{3}$

PART - B (5 x 2 = 10 Marks)

11. State Kirchhoff's laws.

12. State superposition theorem.

13. Define bandwidth.

14. Define transient response.

15. When do the two wattmeters read equal in the two wattmeter method of three phase power measurement?

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)
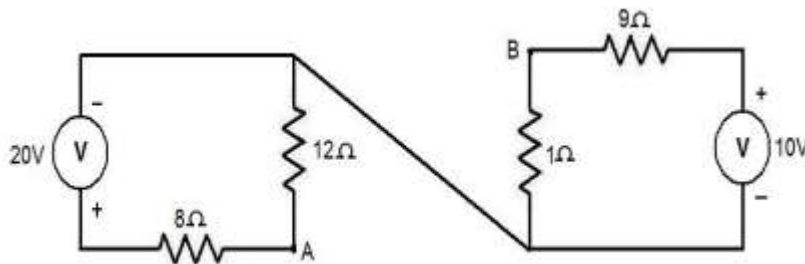

Or

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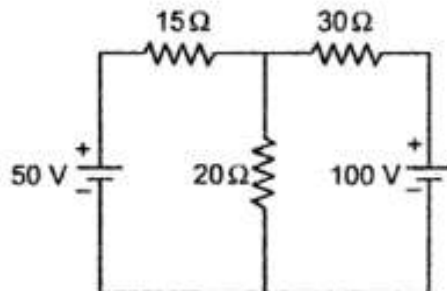
(b) Find the current through branch a-b using mesh analysis for the circuit shown below. (16)
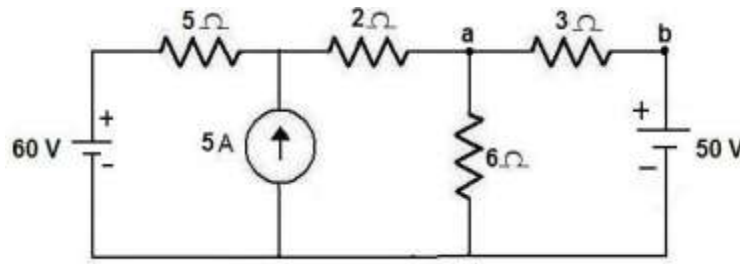
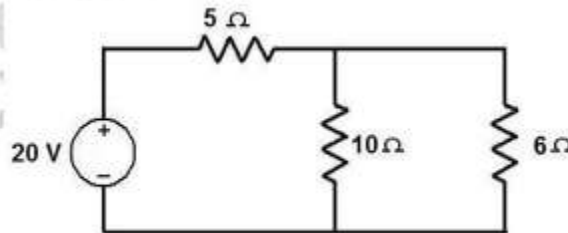

17. (a) Determine Thevenin's equivalent across the terminals AB for the circuit shown in figure below. (16)

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)

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19. (a) A sinusoidal voltage of 10 sin (100 t) V is connected in series with a switch and R = 10Ω & L = 0.1 H. If the switch is closed at t = 0, determine the transient current i(t). (16)

Or

(b) In the circuit shown in figure, find the current i. Assume that initial charge across the capacitor is zero. (16)
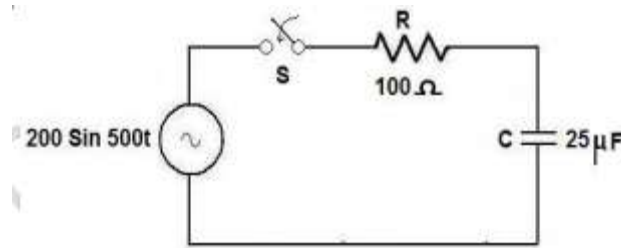
20. (a) With a neat circuit and phasor diagram explain the three phase power measurement by two wattmeter method and also derive the expression for power factor. (16)

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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