Reg. No. :

Question Paper Code: 41534

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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 describes the mathematical relationship between

    (a) Ohms, kilohms, and megohms   (b) Resistor size and resistor value
    (c) Resistance, voltage, and current   (d) None of these

2. Mesh analysis is applicable for

    (a) Linear networks   (b) Bilateral networks
    (c) Both Linear and Bilateral networks   (d) Neither Linear nor Bilateral networks

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. Maximum power output is obtained from a network when the load resistance is equal to the source resistance of the network as seen from the terminals of the load. The above statement is associated with

    (a) Millman's theorem   (b) Thevenin's theorem
    (c) Superposition theorem   (d) Maximum power transfer theorem

5. For occurrence of resonance which of the following elements are required?

    (a) R   (b) L   (c) C   (d) both (ii) and (iii)

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 delta connected circuit when one resistor is open, then power will be

    (a) 0   (b) Increased by factor of 3
    (c) Reduced by the factor of 3   (d) Remain unchanged

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 superposition theorem.

13. Define bandwidth.

14. Define transient response.

15. What are the advantages of 3 phase system over single phase system?

PART - C (5 x 16 = 80 Marks)

16. (a) Calculate a) the equivalent resistances across the terminals of the supply, b) total current supplied by the source and c) power delivered to 16 ohm resistor in the circuit shown in figure.   (16)
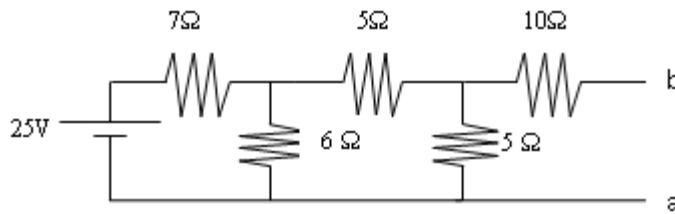

Or

2

41534
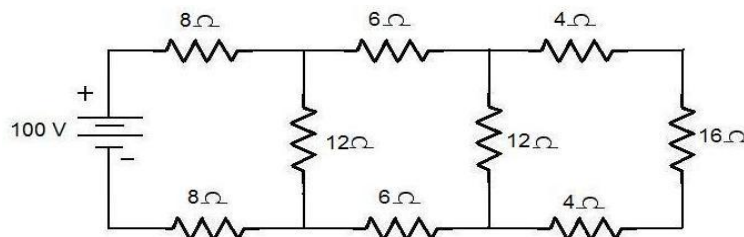
(b) Find the current through branch a-b using mesh analysis for the circuit shown below. (16)
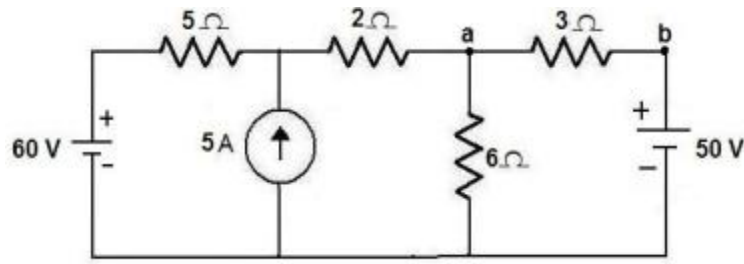
17. (a) Find the thevenin's voltage and thevenin's resistance for the circuit shown in the figure. (16)

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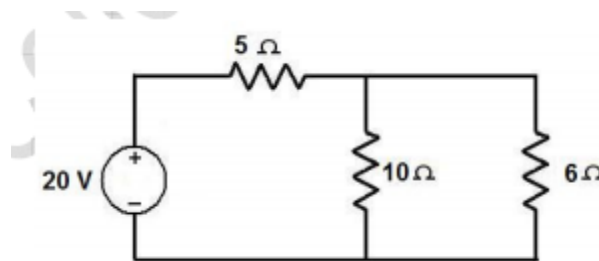
18. (a) Derive bandwidth for a series RLC circuit as a function of resonant frequency. (16)

Or

(b) Derive the formula for mutual inductance in terms of coefficient of coupling and self inductance. (16)

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

Or

41534

(b) A series RC circuit with R=100Ω and C=25μF is supplied with a source of 200 sin (500 t) V. Assume initial change on the capacitor is zero. (16)

20. (a) Prove that the power measured in three phase circuit by the two watt meter method is $\sqrt{3}\ V_L I_L \cos \theta$. (16)

Or

(b) For a balanced star connected system, obtain the expressions for voltage, current and power. Draw necessary phasor diagram. (16)

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41534