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Question Paper Code: 41343

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

Third Semester

Electronics and Communication Engineering

14UEC303 - CIRCUIT THEORY

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Super mesh analysis is based on
    (a) KCL and Ohms Law   (b) KVL and Ohms Law
    (c) KCL and KVL   (d) KVL, KCL and Ohms Law

2. A practical current source equivalent consists of
    (a) An ideal current source in series with a resistance
    (b) An ideal current source in parallel with a resistance
    (c) A dependent current source in series with a resistance
    (d) A dependent current source in parallel with a resistance

3. A circuit has 7 nodes and 5 independent loops. The number of branches in the network is
    (a) 2   (b) 11   (c) 12   (d) 10

4. Maximum power is transferred when load impedance is
    (a) Equal to source resistance   (b) Equal to half of the source resistance
    (c) Equal to zero   (d) Equal to double of the source resistance

5. A Power factor less than 1 indicates the circuit comprises of
    (a) Pure resistive elements
    (b) Pure inductive elements
    (c) Pure capacitive elements
    (d) Equal value of capacitive and inductive elements

6. Transient behavior occurs
   (a) Only in resistive circuits
   (b) Only in inductive circuits
   (c) Only in capacitive circuits
   (d) Both inductive and capacitive circuits

7. Dot convention in coupled circuits is used
   (a) To measure the mutual inductance
   (b) To determine the polarity of the mutually induced voltage in coils
   (c) To determine the polarity of the self-induced voltage in coils
   (d) To measure the self-inductance

8. The reading of the wattmeter connected to measure the reactive power in a three phase circuit is given by zero, the line voltage is $400V$ and line current is $15A$, then the power factor of the circuit is
   (a) 0   (b) 0.8   (c) 1   (d) 0.5

9. Which parameters are widely used in transmission line theory?
   (a) Z parameters   (b) Y parameters
   (c) ABCD parameters   (d) h parameters

10. The number of possible combinations generated by four variables taken two at a time in a two port network is
    (a) Four   (b) Two   (c) Six   (d) Zero

PART - B (5 x 2 = 10 Marks)

11. State the limitations of ohm's law.

12. State reciprocity theorem.

13. Give the applications of tuned circuits.

14. Define mutual inductance.

15. What is low pass filter?

PART - C (5 x 16 = 80 Marks)

16. (a) Find the mesh currents for the following electric circuit shown in Figure -1.   (16)
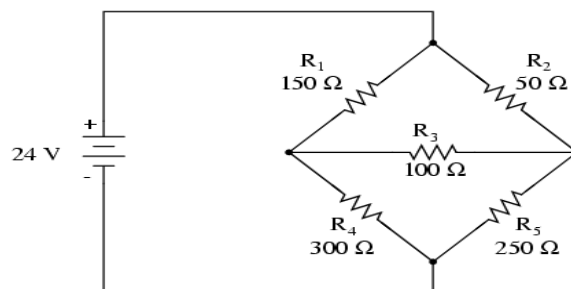

Figure 1

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Or

(b) Determine the current in the 5 *ohm* resister for the circuit shown in Figure -2 using super nodal analysis. (16)
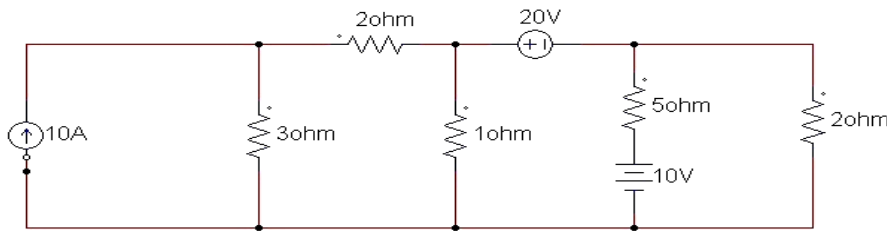

Figure 2

17. (a) Determine the current in 2 *ohm* resister for the electric circuit shown in Figure- 3 using superposition theorem. (16)
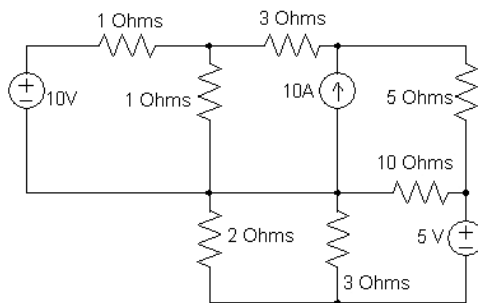

Figure 3

Or

(b) Determine the load resistance to receive maximum power from source and also find the maximum power delivered to the load shown in figure-4. (16)
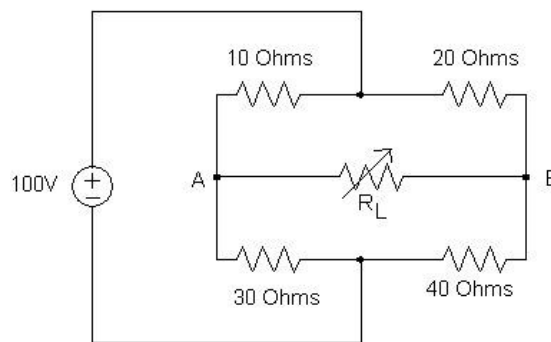

Figure 4

18. (a) A series circuit with $R = 10$ *Ohms*, $L = 0.1$ *H*, $C = 50$ *micro farads* has an applied voltage of 50 *V* with a variable frequency. Determine the resonant frequency, the value of frequency at which maximum voltage occurs across the inductor and the value of frequency at which maximum voltage occurs across the capacitor. (16)

Or

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(b) Derive the sinusoidal response of a series RLC circuit. (16)

19. (a) For the circuit shown in figure-5, $L1 = 4\ H$, $L2 = 9H$, $K = 0.5$, $i_1 = 5\ cos(50t\text{-}30°)A$, $i_2 = 2\ cos(50t\text{-}30°)A$. Find

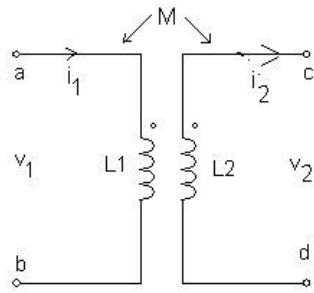   (i) V_1 (ii) V_2 (ii) total energy stored in the system at $t = 0$. (16)

Figure 5

Or

(b) Illustrate the power measurement by two wattmeter method in a three phase system.

(16)

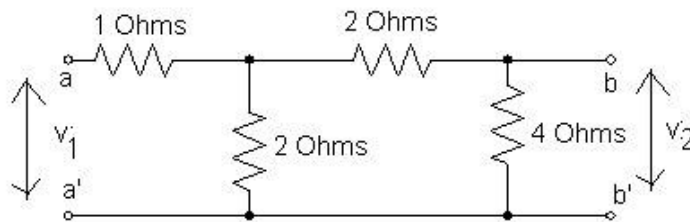20. (a) Find the h parameters for the network shown in figure-6. (16)

Figure 6

Or

(b) The Z parameters of a two port network are $Z_{11} = 10\ ohms$; $Z_{22} = 15\ ohms$; $Z_{12} = Z_{21} = 5\ ohms$. Find the equivalent T network and $ABCD$ parameters. (16)

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