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

Question Paper Code: 43403

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

Third Semester

Electronicsand Communication Engineering

14UEC303 - CIRCUIT THEORY

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Ohm's law is given by

   (a) $V = ZI$ (b) $I = GV$ (c) both (a) and (b) (d) none of these

2. Mesh analysis makes use of the basic equation

   (a) *[V] = [Z] [I]* (b) *[I] = [Z] [V]* (c) *[V] = [Y] [I]* (d) *[I] = [Y] [V*

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. 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) 4.0

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. In two wattmeter method of power measurement, when the power factor of load is zero leading or lagging the two wattmeter will give_____ reading.

   (a) Zero (b) equal
   (c) equal and opposite (d) not equal

9. For a two port network to be reciprocal

   (a) $Z_{11}=Z_{22}$ (b) $y_{21}=y_{22}$ (c) $h_{21}= - h_{12}$ (d) $AD-BC=0$

10. An ideal filter should have

   (a) Zero attenuation in the pass band
   (b) Infinite attenuation in the pass band
   (c) Zero attenuation in the attenuation band
   (d) Infinite attenuation in the attenuation band

PART - B (5 x 2 = 10 Marks)

11. State Kirchhoff's laws for electric circuits.

12. State Norton's theorem.

13. Give the expressions for series and parallel resonance frequency.

14. Write the symmetrical components of three phase system.

15. Write the expression of Y parameters in terms of ABCD parameters.

PART - C (5 x 16 = 80 Marks)

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

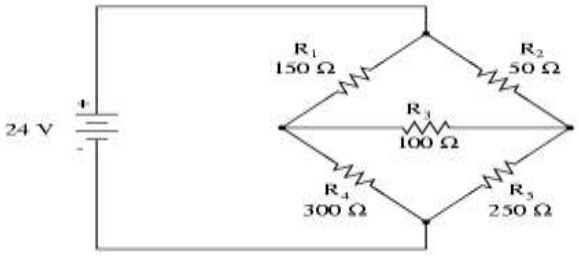

Figure 1

Or

(b) (i) Find V_{BD} by nodal analysis for the circuit shown in the figure 2 (10)

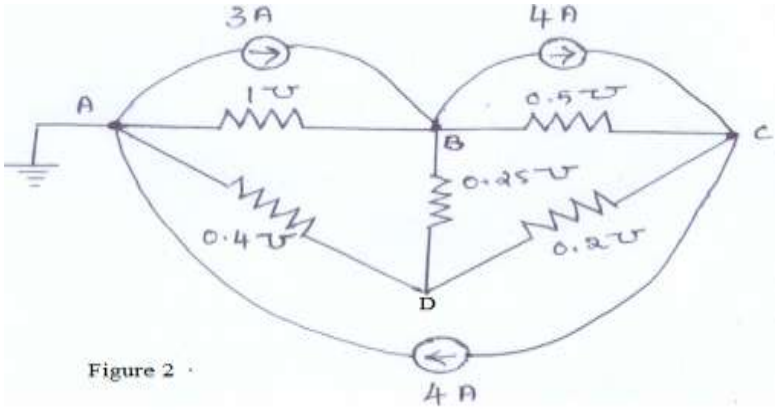

Figure 2

(ii) Obtain the expression for star-delta transformation. (6)

17. (a) Determine the current in the 10-Ω resistor for the circuit shown in Figure 4 by using superposition theorem. (16)

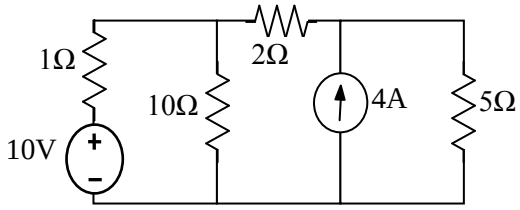

Figure 4

Or

(b) (i) Using Thevenin's theorems find V and I for the circuit shown in figure 4 (14)

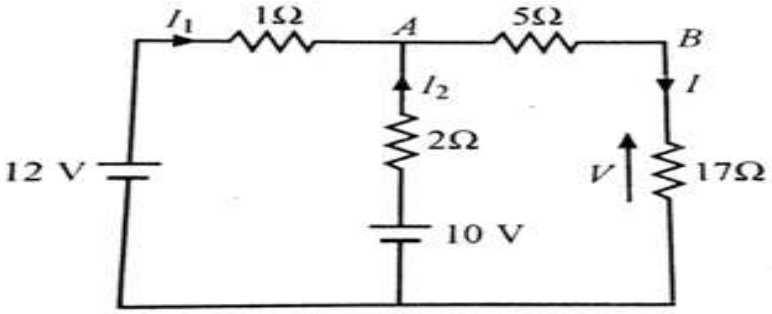

Figure 4

(ii) State reciprocity theorem. (2)

18. (a) A RLC series circuit consists of R = 16 Ω, L = 5 mH and C = 2 μF. Calculate the quality factor, bandwidth and half-power frequencies. (16)

Or

(b) (i) Derive the equation for transient response of RLC circuit for DC input. (12)

(ii) Draw the pole –zero diagram of the given network function

$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)}$$ (4)

19. (a) Two coils connected in series have an equivalent inductance of 0.8 *H* when connected in aiding and an equivalent inductance of 0.4 *H* when connected in opposing. Determine the mutual inductance. Calculate the self-inductance of the coils, by taking $k = 0.55$. (16)

Or

(b) (i) Discuss in detail the relation between phase current, line current in a star and delta connected three phase system. (6)

(ii) Three pure resistances value 200 Ω each are connected to a 3 phase, 440 *V*, 50 *Hz* supply. Determine the line, phase values of current, voltage and active power in both star and delta connections. (10)

20. (a) The current I_1 and I_2 at the input port and output port respectively of a two port network are given by

$I_1 = 6V_1 - V_2$ and $I_2 = -V_1 + 2V_2$

Find the equivalent pie-network and the input impedance when a load of *(4+j7)* Ω is connected across the output port. (16)

Or

(b) (i) Design a low pass filter having cut – off frequency of 2 *KHz*, to operate with a terminal load resistance of 500 Ω. (8)

(ii) Design a high pass filter having a cut-off frequency of 1 *KHz* with a load resistance of 600 Ω. (8)

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