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

Question Paper Code: 50433

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

Third Semester

Electronics and Communication Engineering

15UEC303 - CIRCUIT THEORY

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If a network contains *B* branches, and *N* nodes, then the number of mesh current equations would be _____.

   (a) *B – (N-1)* (b) *N – (B-1)* (c) *B – N – 1* (d) *(B + N) – 1*

2. The number of branches in a tree is _____ the number of branches in a graph.

   (a) less than (b) more than (c) equal to (d) double

3. In a series RLC circuits, if *C* is increased, what happens to the resonant frequency?

   (a) It increases (b) It decreases
   (c) It remains the same (d) It is zero

4. What is the phase angle of a series RLC circuit at resonance?

   (a) It zero (b) 90 degree (c) It 45 degree (d) 30 degree

5. The maximum possible mutual inductance of two inductively coupled coils with self inductances L_1=25 mH and L_2 = 100 mH is given by

   (a) 125 mH (b) 75 mH (c) 50 mH (d) 25 mH

PART - B (5 x 2 = 10 Marks)

6. A circuit consists of two resistances, R_1 and R_2, in parallel. The total current passing through the circuit is I_T. Find the current passing through R_1 and R_2.

7. State super position theorem.

8. Write the expression for quality factor and bandwidth of parallel RLC circuit.

9. If the Z parameters of a two-port network are $Z_{11} = 5\ \Omega$, $Z_{22} = 7\ \Omega$ and $Z_{12} = Z_{21} = 3\ \Omega$ then find the A, B, C, D parameters.

10. Define symmetrical system and phase sequence.

PART - C (5 x 16 = 80 Marks)

11. (a) Calculate the current through 6 Ω resistance of the given network by application of Kirchhoff's law show in figure 2. (16)

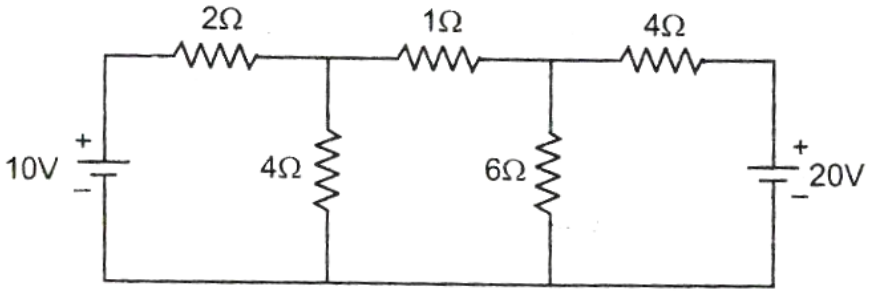
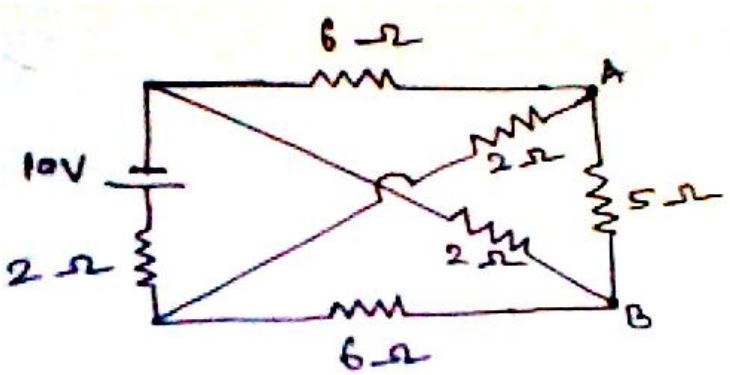


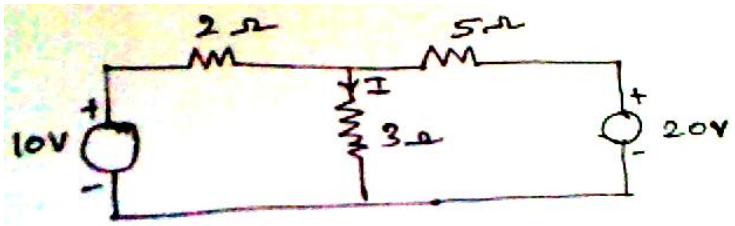
Figure 2

Or

(b) Calculate the voltage across AB in the network shown in figure and indicate the polarity of the voltage using star-delta transformation. (16)



12. (a) Calculate the current I shown in figure using Millman's theorem. (16)



Or

(b) Use Thevenin's theorem to find the current through the 5Ω resistor in figure 6. (16)

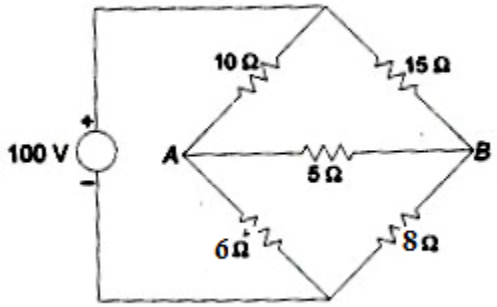


Figure 6

13. (a) A series circuit with $R=10\Omega$, $L=0.1H$ and $C=50\mu F$ has an applied voltage $V=50\angle 0^0$ with a variable frequency. Find 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

(b) For a series RLC circuit, find expressions for lower frequency limit, upper frequency limit and quality factor. Also find expressions for power at lower frequency limit, upper frequency limit and resonance. (16)

14. (a) Explain DC transient response of RL and RC circuits. (16)

Or

(b) Find the Z parameter for the circuit shown in figure 7. (16)

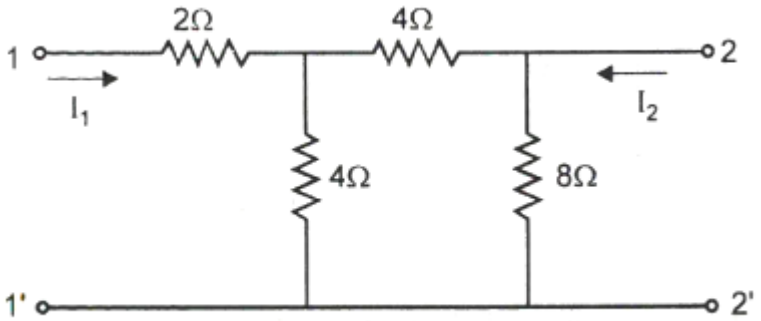


Figure 7

15. (a) Derive the expression for the coefficient of coupling in coupled circuits with neat diagram. (16)

Or

(b) What is meant by a tuned circuit? With neat sketches and expressions explain single tuned and double tuned circuits. (16)