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

Question Paper Code: 51433

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

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 reciprocity theorem is applicable to _____.

   (a) Linear networks only (b) Bilateral networks only
   (c) Linear / Bilateral networks (d) Neither of the two

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. The time constant of a series RC circuit is _____.

   (a) $\frac{1}{RC}$ (b) $\frac{R}{C}$ (c) RC (d) e^{-RC}

5. The maximum value of the coefficient of coupling is _____.

   (a) 100% (b) more than 100% (c) 90% (d) 50%

PART - B (5 x 2 = 10 Marks)

6. Determine the current through resistance R_3 in the circuit shown figure 1.

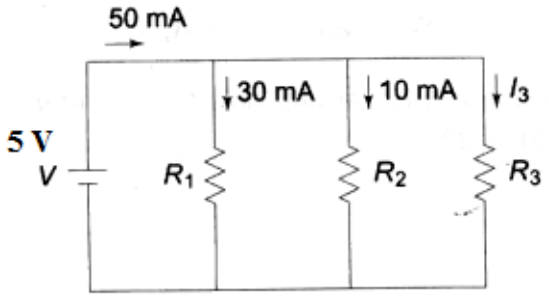

Figure 1

7. State super position theorem.

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

9. Write the transient current equation when RL series circuit is connected to a step voltage of *V* volts.

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)

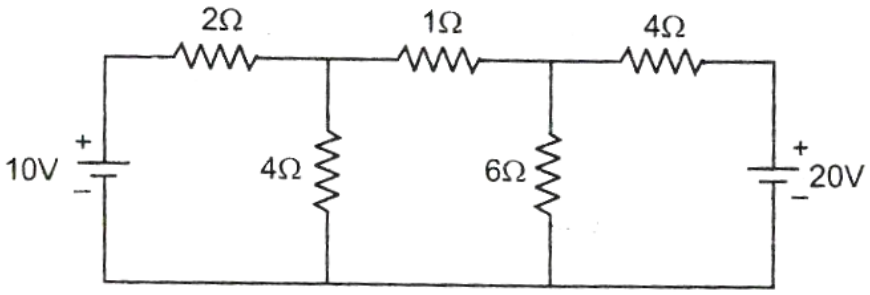

Figure 2

Or

(b) (i) Find the equivalent resistance between points *A*-*B* show in figure 3. (8)

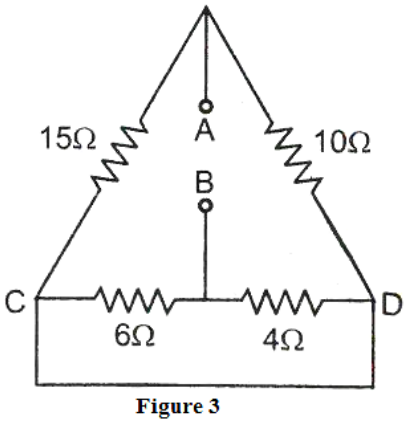

Figure 3

(ii) Find the value of resistor R if the power dissipated in 2Ω resistor is $6W$, in the network shown in figure 4. (8)

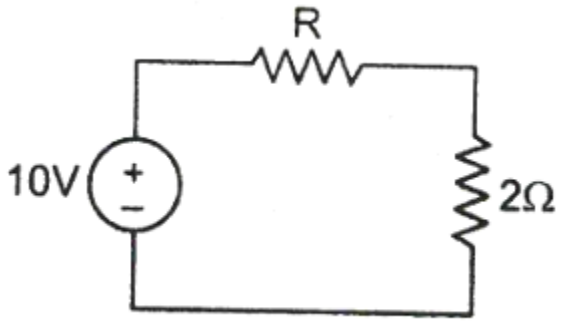

Figure 4

12. (a) For the resistive network shown in figure 5, find the current in each resistor, using the superposition principle. (16)

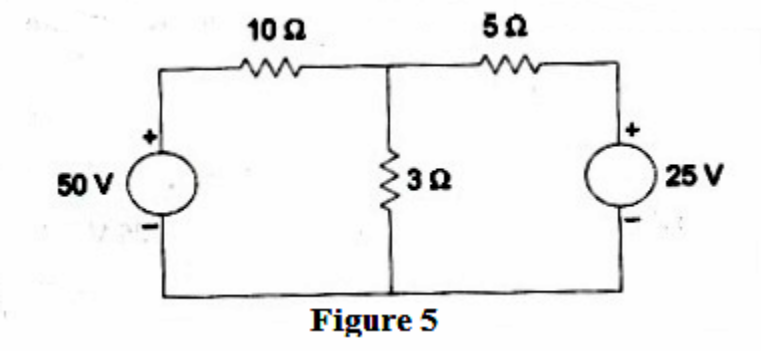

Figure 5

Or

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

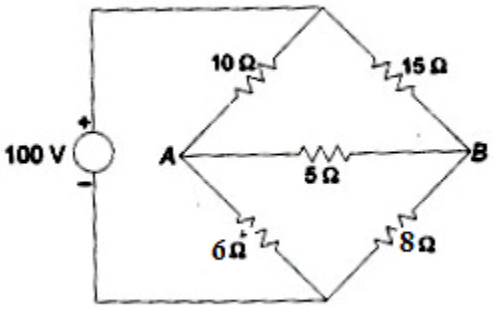

Figure 6

13. (a) A series circuit with R=10Ω, L=0.1H and C=50μF 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) A series RLC circuit consists of a 50Ω resistance, $0.2H$ inductance and $10\mu F$ capacitor with an applied voltage of $20V$. Determine the resonant frequency. Find the Q factor of the circuit. Compute the lower and upper frequency limits and also find the bandwidth of the circuit. (16)

14. (a) Briefly explain about DC response of an RLC circuits. (16)

Or

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

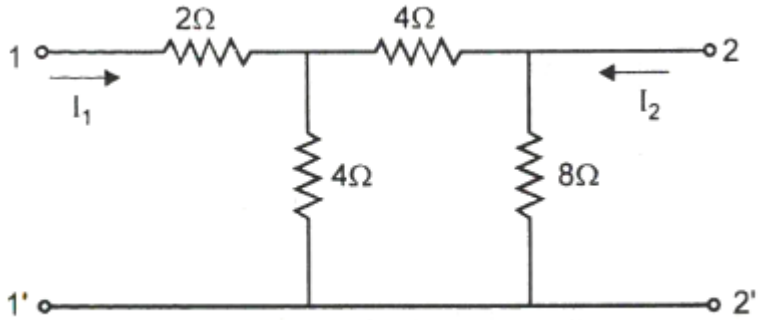

Figure 7

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

Or

(b) (i) A balanced three phase load connected in delta, draws a power of $10.44kW$ at $200V$ at a p.f of 0.5 lead. Find the values of the circuit elements and the reactive Volt Amperes drawn. (10)

(ii) Write short notes on power triangle for three phase load. (6)