Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 53043

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

Third Semester

Electronics and Communication Engineering

15UEC303 - CIRCUIT THEORY

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. If R_1 and R_2 are connected in parallel then the current through R_1 is

   (a) $I_2 * [\ R_2\ /\ (R_1+R_2)\ ]$ (b) $I * [\ R_1\ /\ (R_1+R_2)\ ]$
   (c) $I * [\ R_2\ /\ (R_1+R_2)\ ]$ (d) $I * [\ (R_1+R_2)/\ R_2\ ]$

2. The Thevenin's equivalent circuit contains

   (a) voltage source in series with resistance
   (b) voltage source in parallel with resistance
   (c) current source in series with resistance
   (d) current source in parallel with resistance

3. If $X_L = 23\ \Omega$ and the supply frequency is 50 Hz, then inductance L value is

   (a) 0.053 H   (b) 0.063 H   (c) 0.073 H   (d) 0.054 H

4. The damped frequency of oscillation β is given by

   (a) $\omega_n * \sqrt{(1- \sigma^2)}$ (b) $\omega_n * (1- \sigma^2)$ (c) $\omega_n / (1- \sigma^2)$ (d) $\omega_n * \sigma^2$

5. In a star connected circuit the value of power is given by

   (a) $\sqrt{3}\ V_{ph} * I_{ph} * Cos\phi$ (b) $\sqrt{3}\ V_L * I_L * Cos\phi$
   (c) $3\ V_L * I_L * Cos\phi$ (d) $\sqrt{3}\ V_L * I_L * Sin\phi$

6. What are the classifications of Circuit elements?

7. What is the limitation of superposition theorem? State the steps to solve the super position theorem?

8. Define time constant of RLC and RC circuit.

9. Define series resonance and Write the characteristics of series resonance.

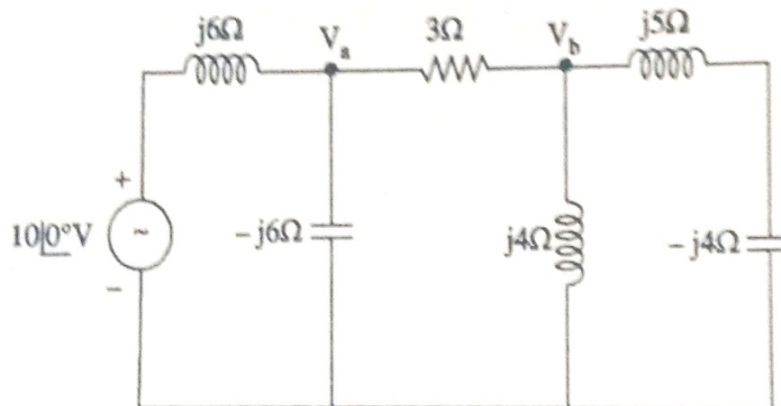10. Define (i) mutual inductance (ii) Define coefficient of coupling.

PART - C (5 x 16 = 80 Marks)

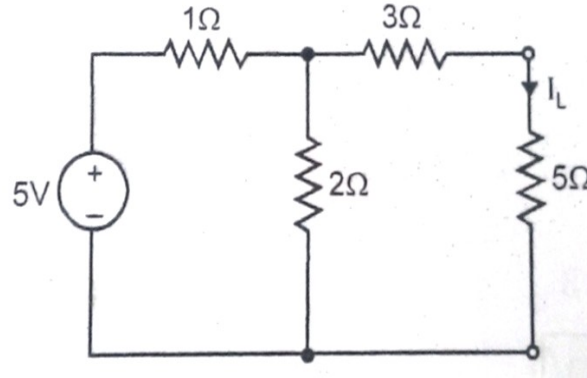11. (a) In the network of figure, find the current delivered by the battery. (16)
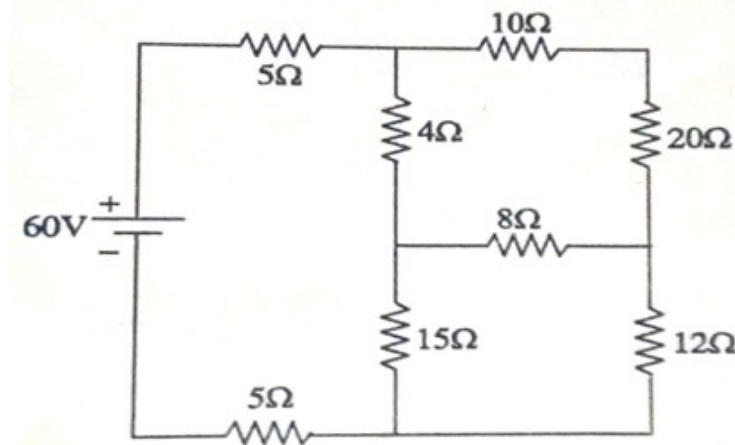
Or

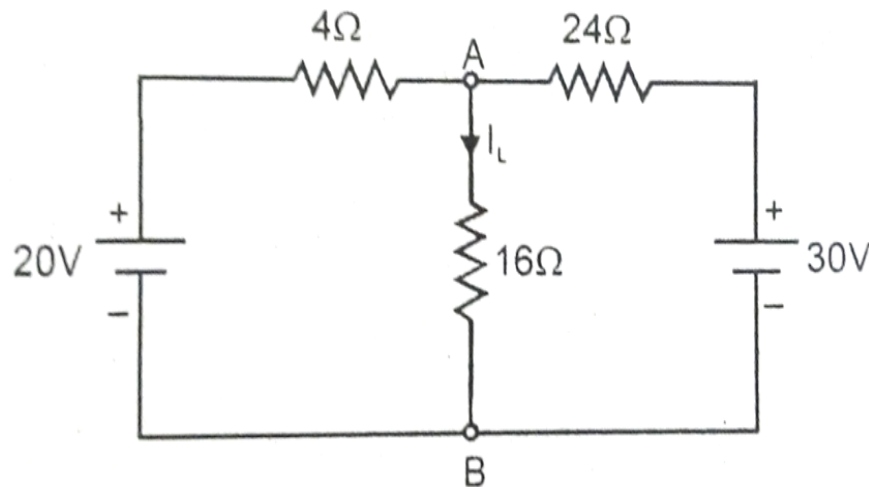(b) Determine V_a and V_b in the circuit shown in figure. (16)

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12. (a) Construct a mathematical model for the current through the 5 Ω resistor in the following network using Thevenin's theorem. (16)

Or

(b) Construct a mathematical model for Superposition theorem, calculate the current I_L flowing through 16 Ω resistor in the circuit as shown in figure. (16)


13. (a) A series RLC circuit with R = 5 Ω, L = 40mH and C = 1μF is connected across a source of 40V with 50Hz. Formulate (a) Resonant frequency (b) Q-factor (c) Half power frequencies (d) Line current (e) Power factor. (16)

Or

(b) The number of turns in two coupled coils is 500 turns, 1500 turns respectively. When 5A current flows in coil 1, the total flux in this coil is 0.6×10^{-3} wb and the flux linking the second coil is 0.3×10^{-3} wb. Determine L_1, L_2, M and K. (16)

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14. (a) A series RLC circuit with R=100 Ω, L=0.1 H and C=100 μF has a DC voltage applied to it at t=0 through a switch. Find the expression for the transient current. Assume initially relaxed circuit conditions.
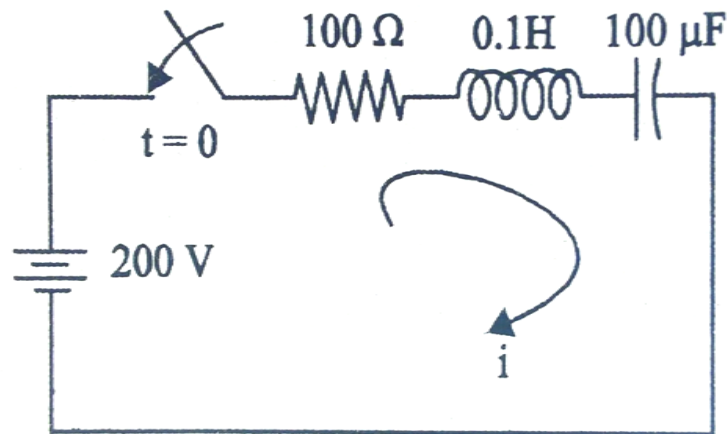
(16)

Or

(b) Formulate a mathematical model for RC Transient response to Sinusoidal input with circuit diagram and a phasor diagram. (16)

15. (a) A three phase balanced delta connected load of (4+j8) Ω is connected across a 400V, 3-phase balanced supply. Determine the phase currents and line currents. Assume the RYB phase sequence. Also calculate the power drawn by the load. (16)

Or

(b) Two wattmeters are connected to read the total power in a 3-phase circuit. Find the condition for which (a) $W_1 = W_2$ (b) $W_1 = -W_2$ (c) $W_1 = 0$. (16)

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