Roll No. ..... Total Pages : 5

307301

December, 2019

B.Tech. (EL/EEE)- III SEMESTER

ELECTRIC CIRCUIT ANALYSIS (ELPC301)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART - A

1. (a) What do you mean by an electric network and an electric circuit? (1.5) CO1

(b) Find the voltage at the terminals of a coil having R = 10 Ω and L = 15H at the instant when the current is 10A and increasing @ 5 A/sec. (1.5) CO2

(c) What is the phase difference between voltage and current in an RC circuit? (1.5) CO3

(d) Derive the condition on Z parameters for a reciprocal network. (1.5) CO4

(e) Explain the concept of source transformation. (1.5) CO1

(f) Time constant of RL circuit is given by L/R. Show that the unit of L/R is second. (1.5) CO2

(g) State the advantages of three phase systems. (1.5) CO3

(h) Express Y_{21} in terms of ABCD parameters. (1.5) CO4

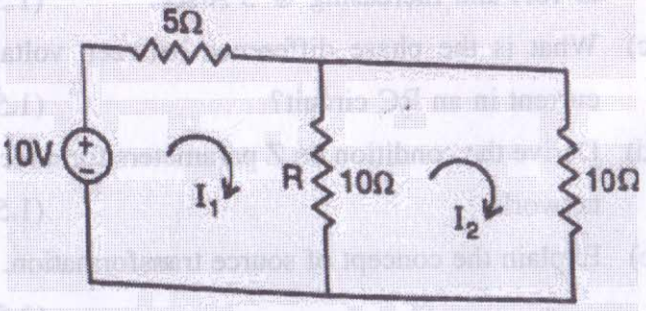
(i) State convolution property of Laplace Transform. (1.5) CO2

(j) Derive the relation between the mutual inductance M and self-inductance of coils L_1 and L_2. (1.5) CO3

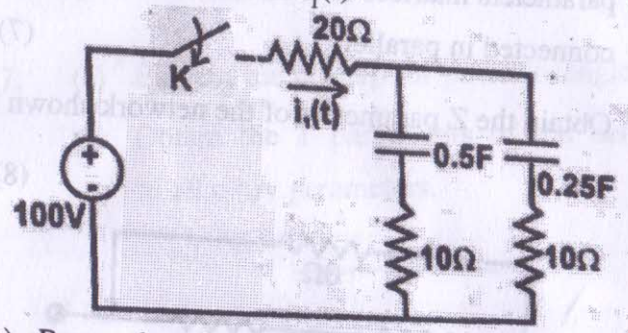
PART - B

2. (a) Derive the condition for maximum power transfer (7) CO1

(b) In the circuit shown below the resistance R is changed from 10 ohms to 5 ohms. Verify the compensation theorem. (8) CO1



3. (a) In the network shown below the switch is closed at t = 0 and there is no initial charge on either of the capacitances. Find $i_1(t)$. (8) CO2

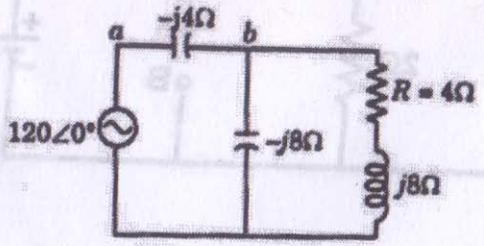


(b) Prove that for an RLC series circuit the resonant frequency is geometric mean of upper and lower half power frequencies. (7) CO2

4. (a) In the circuit shown below the reactance of the capacitor is C_1 is 4 ohms, the reactance of capacitor C_2 is 8 ohms and the reactance of inductor L is 8 ohms. A sinusoidal voltage of 120 V is applied to the circuit. Find

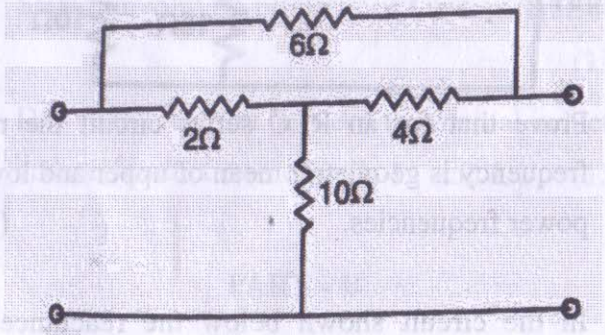
(i) the current in each branch.

(ii) Power loss in the circuit. (15) CO3

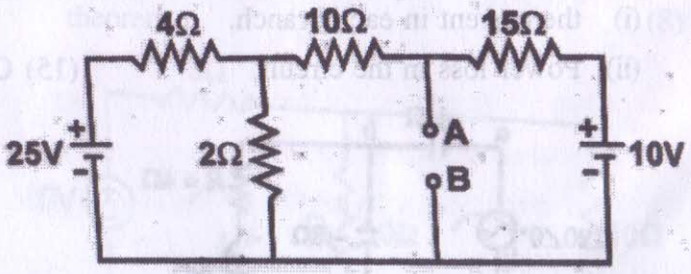


5. (a) Prove that overall Y parameters matrix for parallel connected two port network is simply the sum of Y parameters matrices of each individual to port network connected in parallel. (7) CO4

(b) Obtain the Z parameters of the network shown below (8) CO4



6. (a) Obtain the Thevenin equivalent circuit at terminals B of the active network. (8) CO1



(b) Find the response of a network if $H(s)=\frac{s^2+3s+5}{(s+1)(s+2)}$ and excitation is $x(t) = e^{-3t}$. (7) CO2

7. (a) Explain the concept of power triangle. (5) CO3

(b) Obtain the T parameters of the network in terms of all other parameters. (10) CO4