OR

10. a) What is a reciprocal network? Derive the condition for reciprocity in terms of 'z' parameters.

b) The network shown in Fig. 10 contains a current-controlled current source. For this network find the 'Y' parameters.

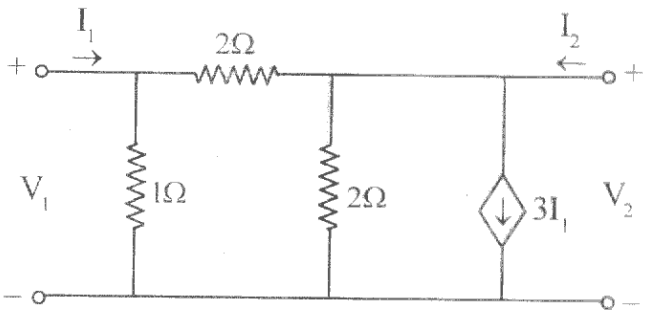

Fig. 10

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Roll No .....

EC - 305

B.E. III Semester

Examination, December 2013

Network Analysis

Time : Three Hours

Maximum Marks : 70

Note: 1. Attempt *five* questions, selecting one question from each unit.

2. All questions carry equal marks.

Unit - I

1. a) Discuss the properties of an ideal current-source and an ideal voltage source. Explain how a voltage source can be converted into an equivalent current source and vice versa.

b) Draw the dual of the network shown in Fig. 1.

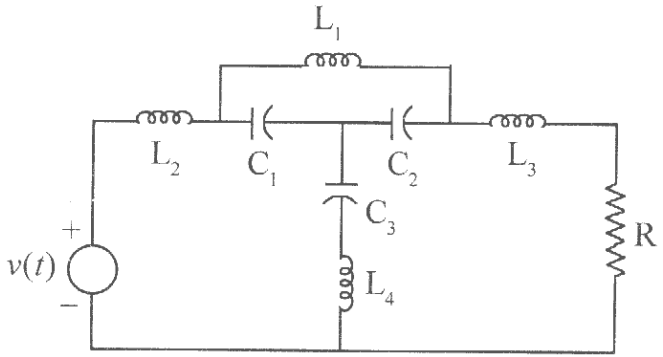

Fig. 1

OR

2. a) Explain series and parallel resonance. What are their similarities and dissimilarities?

   b) Following data refers to two coupled coils 1 and 2, as shown in Fig. 2.

   $\phi_{11} = 0.5\times10^{-3}$Wb ; $\phi_{12} = 0.3\times10^{-3}$ Wb ; $N_1 = 100$ turns; $N_2 = 500$ turns; $i_1 = 1$A.

   Find, K, the coefficient of coupling, the inductances L_1 and L_2 and M, the mutual inductance.

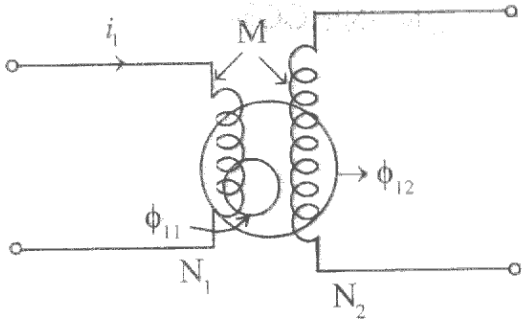

Fig. 2

Unit - II

3. a) For the network shown in Fig. 3, draw the graph and write down the tie-set matrix.

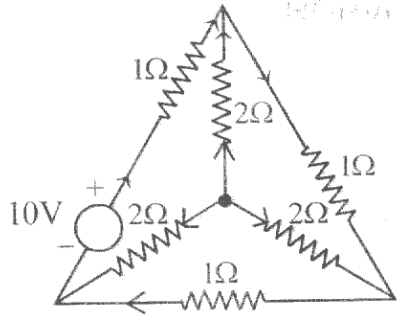

Fig.3

   b) State and explain the following
      i) Reciprocity theorem
      ii) Millman's theorem

OR

4. State and explain 'Maximum power transfer theorem'.
   In the network shown in Fig. 4, determine Z_L so that the power absorbed by it is maximum and the value of the power absorbed.

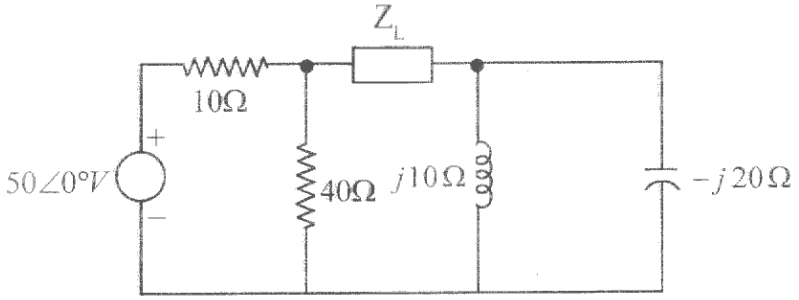

Fig. 4

Unit - III

5. In the network shown in Fig. 5, the voltage source follows the law $v(t) = Ve^{-\alpha t}$, where α is a constant. The switch is closed at $t = 0$.

   a) Solve for the current assuming that $\alpha \neq \frac{R}{L}$

   b) Solve for the current when $\alpha = \frac{R}{L}$.

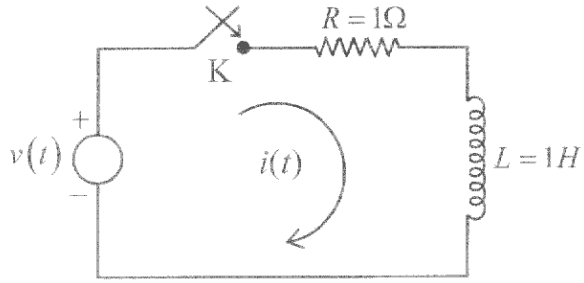

Fig. 5

OR

6. a) Discuss the initial conditions in a network. Outline the procedure for evaluating the initial conditions in network problems.

b) In the network shown in Fig. 6, the switch K is closed at $t = 0$, with zero capacitor voltage and zero inductor current.

Solve for

i) v_1 and v_2 at $t = 0_+$ ii) v_1 and v_2 at $t = \infty$

iii) $\frac{dv_1}{dt}$ and $\frac{dv_2}{dt}$ at $t = 0_+$

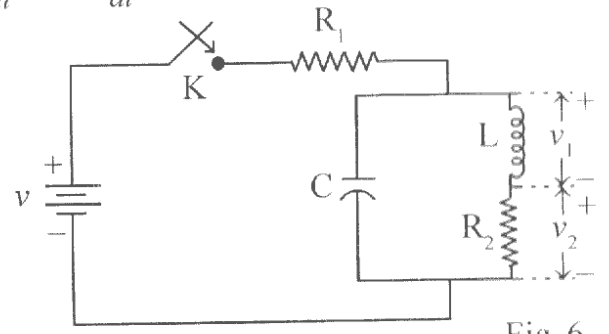

Fig. 6

Unit - IV

7. a) Define 'Unit impulse function' and derive its Laplace transform.

b) In the network shown in Fig. 7, the switch is in position 'a' until a steady state is reached.

At t = 0, the switch is moved to position 'b'. Under that condition, determine the transform of the voltage across the $\frac{1}{2}F$ capacitor using Thevenin's theorem.

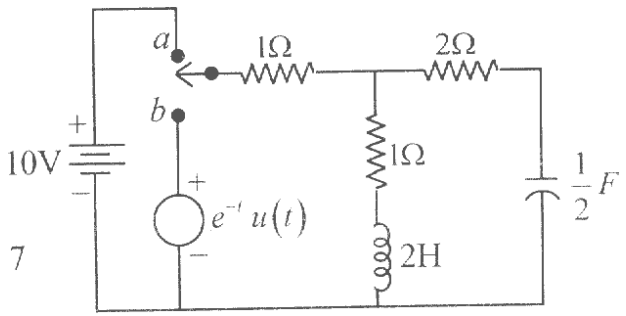

Fig. 7

OR

8. a) Discuss the effect of symmetry for a periodic function to determine the trigonometric Fourier series coefficients.

b) Find the Fourier coefficients for the waveform shown in Fig. 8.

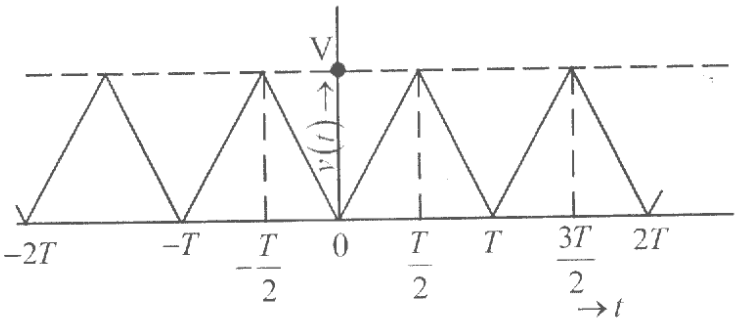

Fig. 8.

Unit - V

9. a) Discuss the restrictions on poles and zeros locations in s-plane for driving points locations.

b) For the network shown in Fig. 9 determine the voltage-ratio transfer function, $\frac{V_2(s)}{V_1(s)}$

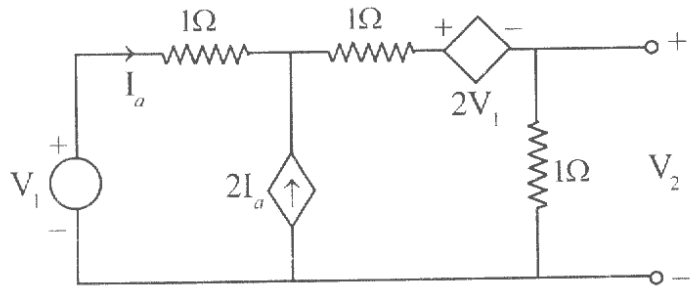

Fig. 9