B.E. (Electrical Engineering (Electronics & Power)) Third Semester (C.B.S.)

Network Analysis Paper - IV

P. Pages : 7 **TKN/KS/16/7313**

Time : Three Hours * 0 9 8 2 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Prove that the series combination of ideal current source and ideal voltage source is equivalent to ideal current source. **3**

b) Explain 'E-Shift' using suitable example. **3**

c) Write the mesh equations in matrix form for the network shown in Fig 1. 'b'. **7**

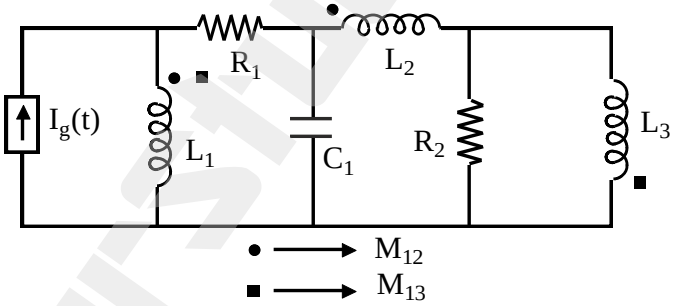

Fig. 1(b)

OR

2. a) Find the loop currents for the network shown in fig. 2. (a). **6**

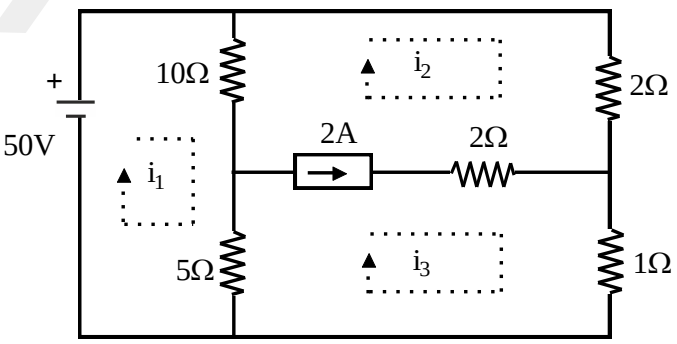

Fig. 2(a)

b) Calculate the power lost in the circuit fig. (2-b) by writing down mesh equations. **7**

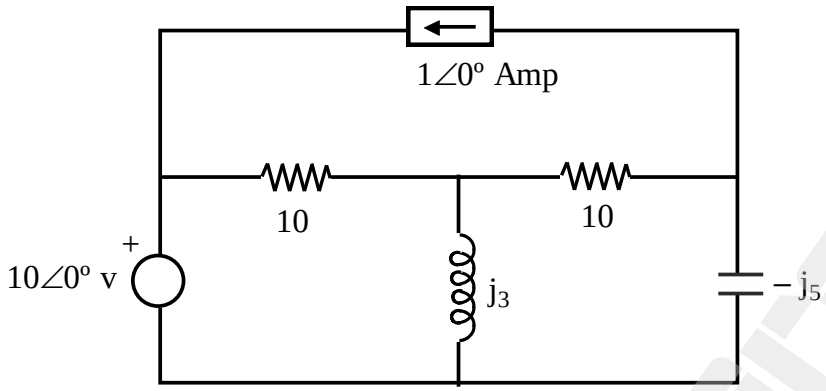

Fig. 2 (b)

3. a) Using Nodal Analysis Determine :- **8**

i) Node voltages V_A and V_B.
ii) Power dissipated in Inductor
iii) Current supplied by source
iv) Power factor of source
ref fig 3 (a)

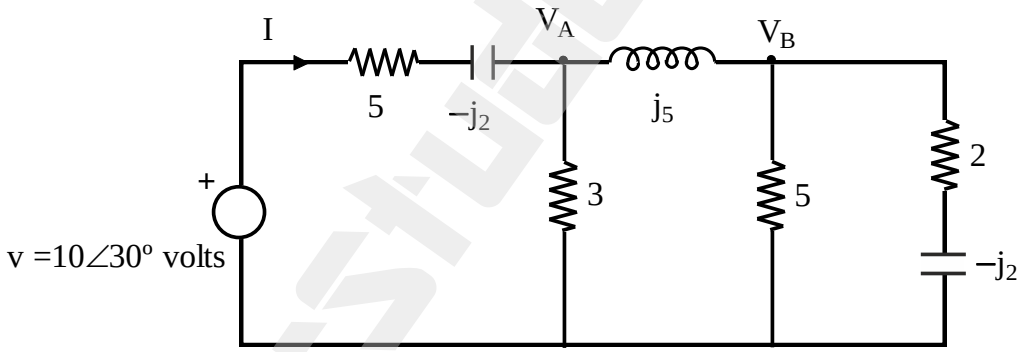

Fig. 3 (a)

b) Construct dual of network shown in fig 3. (b). **6**

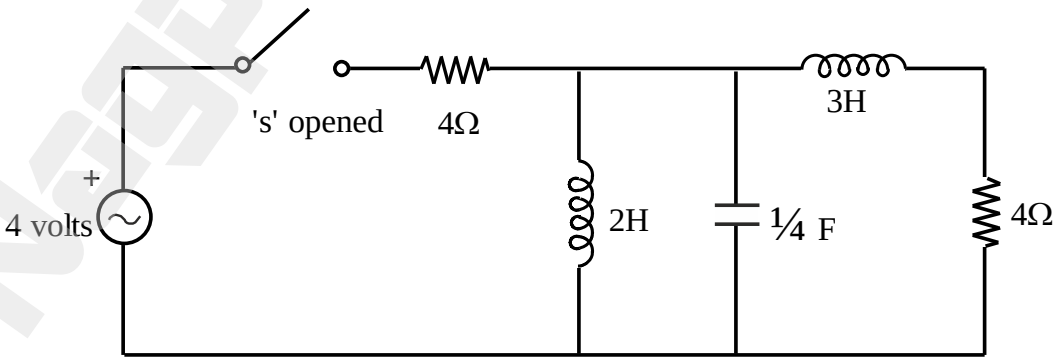

Fig. 3 (b)

OR

4. a) Find the unknown voltage 'V' which makes voltage drop across (3+j4)Ω, Zero use Nodal Analysis refer fig 4 (a). **8**

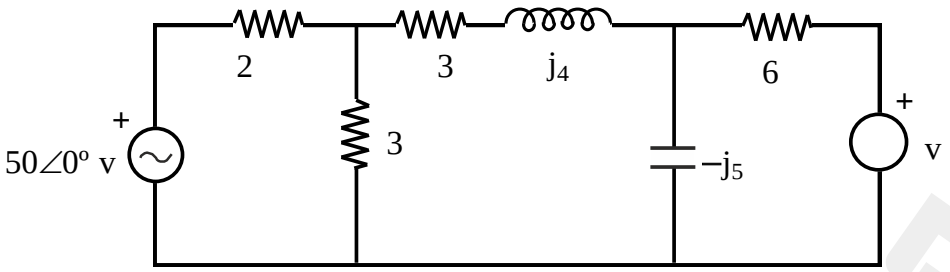

Fig. 4 (a)

b) Construct dual of the network shown in fig 4 (b). **6**

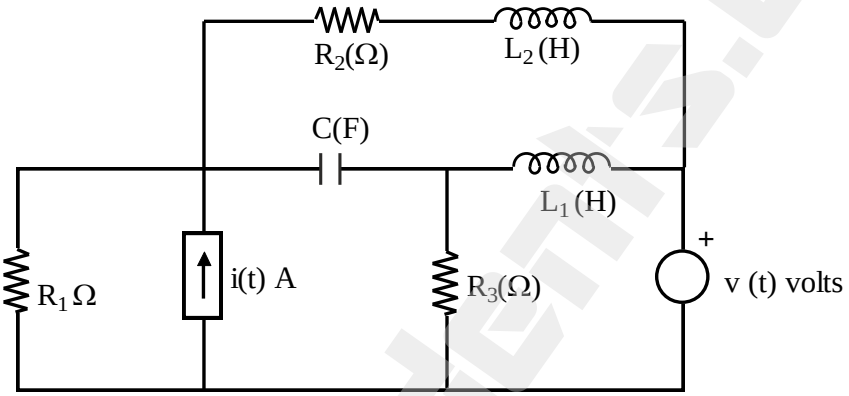

Fig. 4 (b)

5. a) Obtain Thevenin's and Norton's equivalent network between terminals A and B as shown in fig 5 (a). **7**

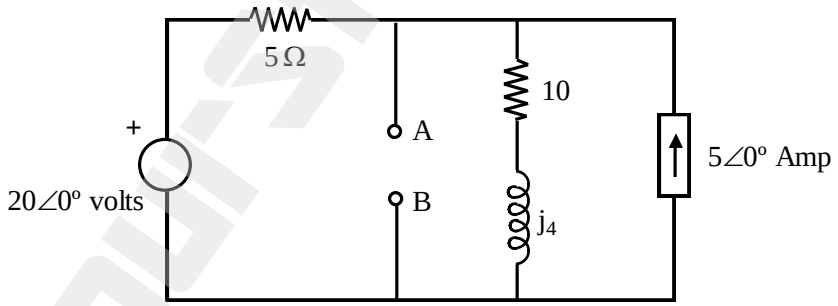

Fig. 5 (a)

b) Find change in current's and modified (new) current's in all the elements if the load impedance Z_L is increased by 30% refer fig. 5 (b) use Compensation Theorem. **6**

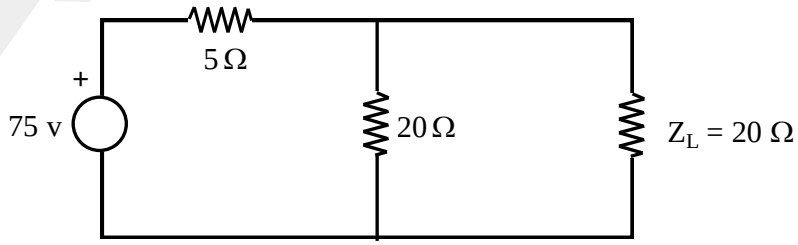

Fig. 5 (b)

OR

6. a) What is the value of Z_L so as to transfer maximum power through it and hence find the maximum power transferred refer fig 6 (a). **7**

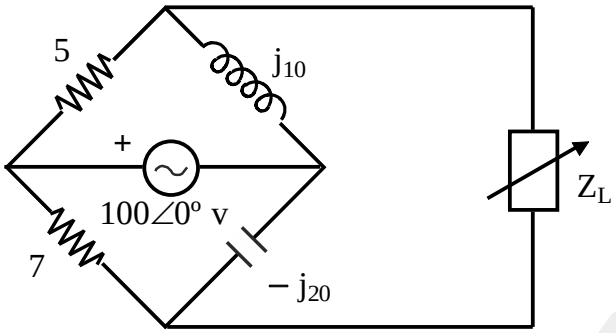

Fig. 6 (a)

b) Determine voltage V_{AB} for the network shown in fig 6 (b). Use superposition Theorem. **6**

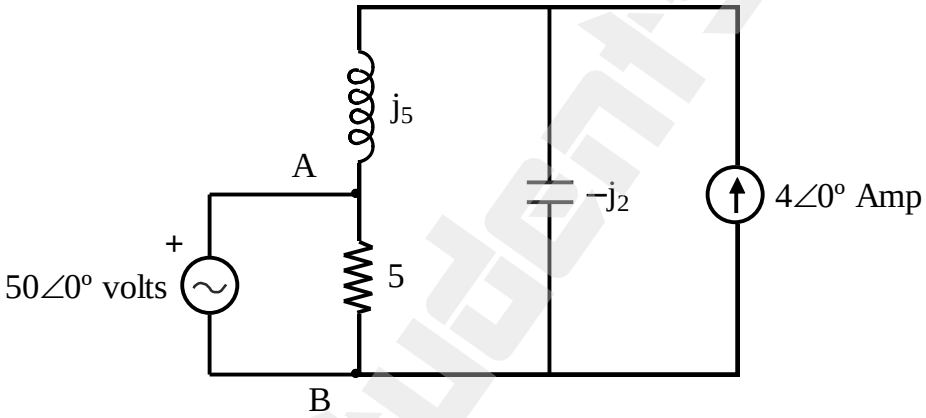

Fig. 6 (b)

7. a) In the network shown in fig 7 (a), a steady state is reached with switch 'K' closed At t = 0, switch 'K' is opened. **7**
Determine :

i) V_K at $t=0^+$ and

ii) $\frac{dv_k}{dt}$ at $t=0^+$.

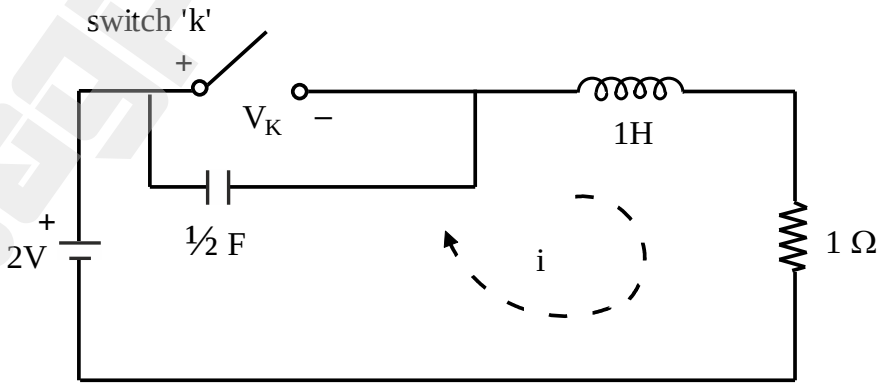

Fig. 7 (a)

b) In the network shown in fig 7 (b), a steady state is reached with 'K' opened. At t = 0, switch 'K' is closed Find : **7**

$V_a(0^-), V_b(0^-), V_a(0^+), V_b(0^+)$.

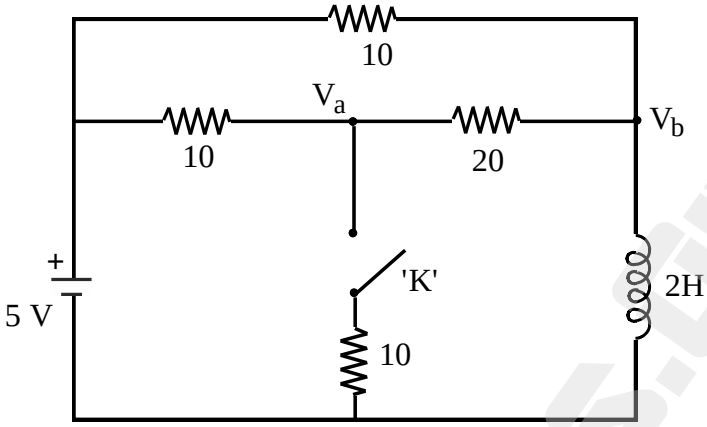

Fig. 7 (b)

OR

8. a) An exponential voltage of $4e^{-3t}$ volts is applied to a series RLC circuit at t = 0. Obtain particular solution for current i (t) use Laplace Transform method At t = 0, switch 'K' is closed refer fig. 8 (a). **7**

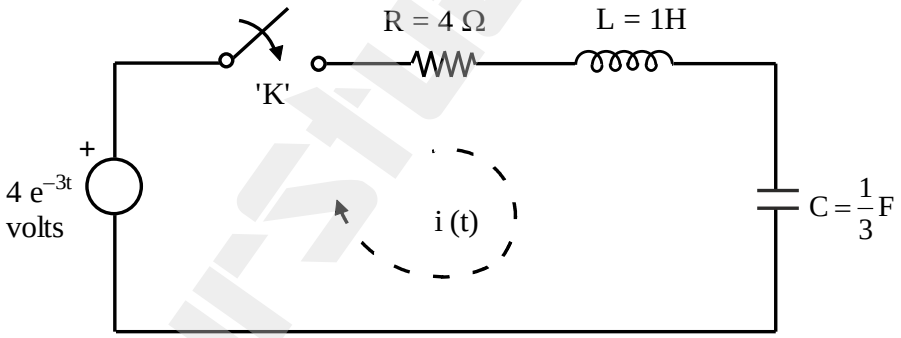

Fig. 8 (a)

b) Obtain Laplace Transform of a train of pulses of height 'K' and width 'a' Time period is 'T' Seconds. **7**

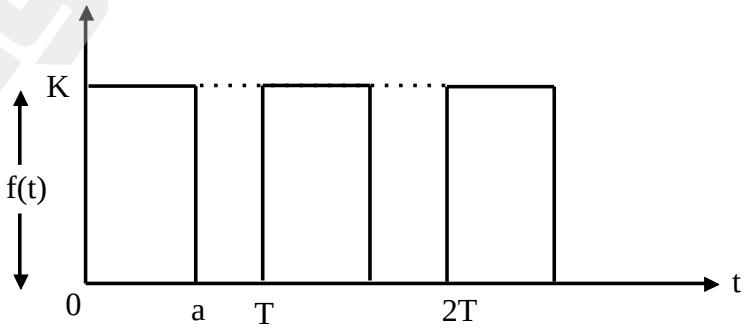

Fig. 8 (b)

9. a) Find current Transfer Function $\alpha_{12(S)}$ for the network shown in fig 9 (a). **5**

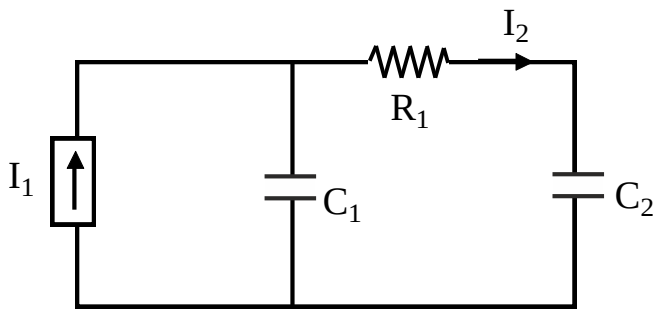

Fig. 9 (a)

b) Find driving point impedance transfer function for the network shown in fig 9 (b). **5**

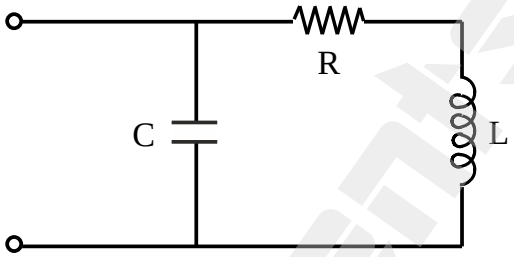

Fig. 9 (b)

c) Define : **3**

i) Voltage Transfer Function

ii) Transfer Impedance Function

iii) Transfer Admittance Function

OR

10. a) $I(S)=\frac{S^2+4S+3}{S^2+2S}$. Find i (t) by pole-zero method. **5**

b) Find pole's and Zero's for the network shown in fig 10 (b) and plot them on 5 - plane. **4**

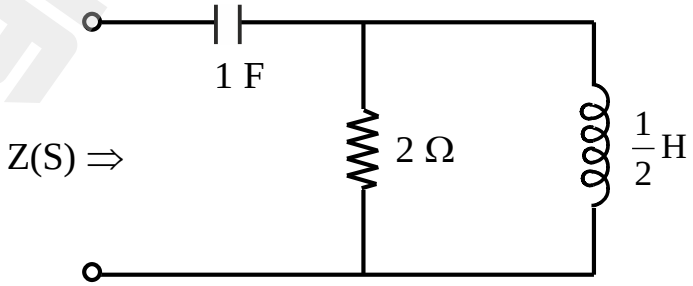

Fig. 10 (b)

c) What are the necessary conditions for a Driving Point Function. **4**

11. a) Find Transmission Parameters for the network shown in fig 11 (a) and show that the network is reciprocal. **7**

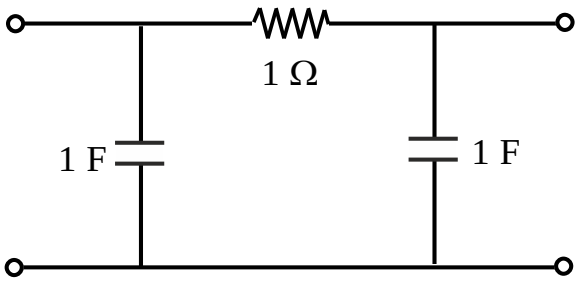

Fig. 11 (a)

b) Derive the condition for reciprocity and symmetry for open circuit parameters. **6**

OR

12. a) A series resonant circuit has a impedance of 500Ω at resonant frequency. Cut off frequencies are 10KHz and 100Hz. **6**
Determine :

i) Resonant frequency

ii) Value of R-L-C

iii) Quality factor

b) A three phase 4 wire, 208V, CBA system as shown in fig 12 b) has a star connected load with $Z_A = 5\angle 0^\circ\,\Omega$, $Z_B = 5\angle 30^\circ\,\Omega$, $Z_C = 10\angle -60^\circ\,\Omega$. Obtain phase current, line currents and current through neutral wire, with $Z_N = 4\angle 50^\circ\,\Omega$. **7**

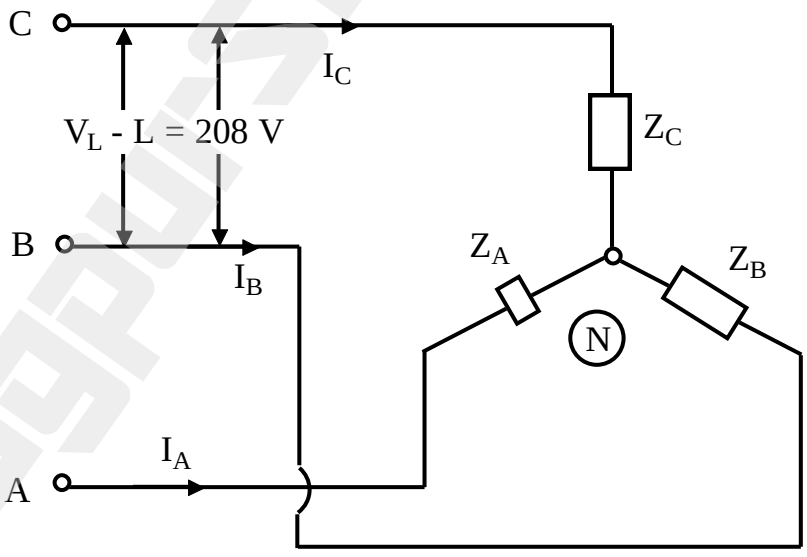

Fig. 12 (b)

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