



- 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. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.
 10. Use of non programmable calculator is permitted.

1. a) Reduce the network into a single current source across the terminals A and B of 'Fig 1 (a)'. 6

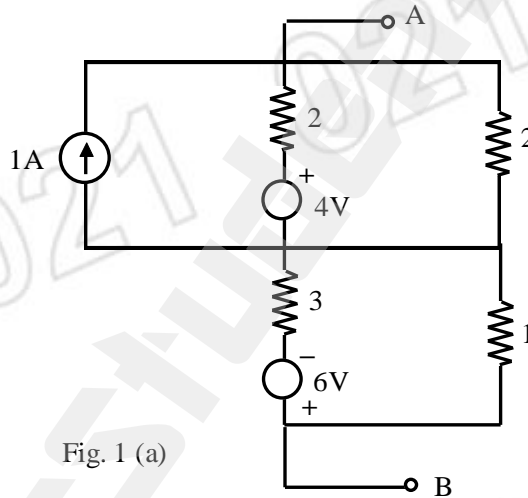


Fig. 1 (a)

- b) Find the current flowing through 1-Ω as shown in 'Fig. 1 (b)'. 7

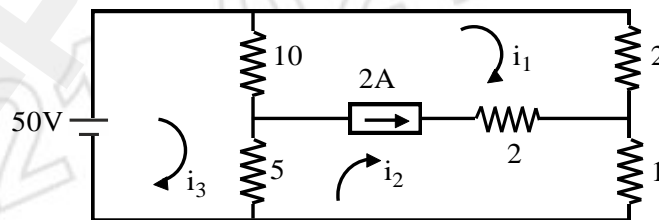


Fig. 1(b)

OR

2. a) Write the mesh equilibrium equations in matrix form for the network shown on 'Fig. 2 (a)'. 7

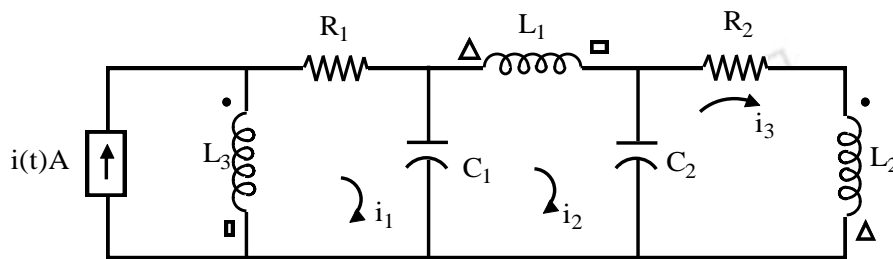


Fig. 2(a)

$\Delta \rightarrow M_{12}$; $\square \rightarrow M_{31}$; $\bullet \rightarrow M_{23}$

- b) Find the magnitude of voltage source ' V_1 ' using Mesh Analysis, which results in an effective voltage of 20V across 5Ω resistance. Refer Fig. 2 (b). 6

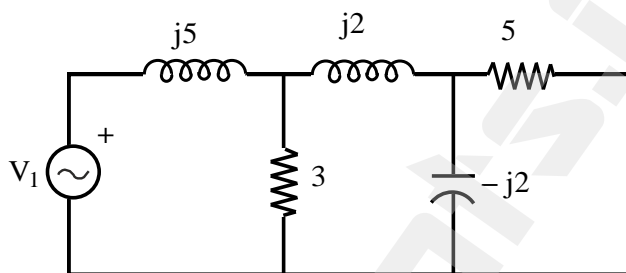


Fig. 2(b)

3. a) Find ' v ' if branch AB should not carry any current as shown in 'Fig. 3 (a)' by NODAL METHOD. 7

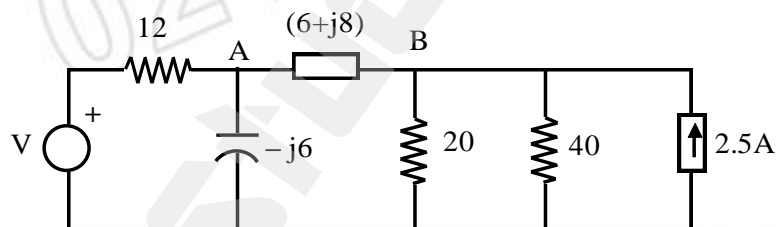


Fig. 3(a)

- b) Define DUALITY. Construct the dual for the network shown in 'Fig. 3 (b)'. 6

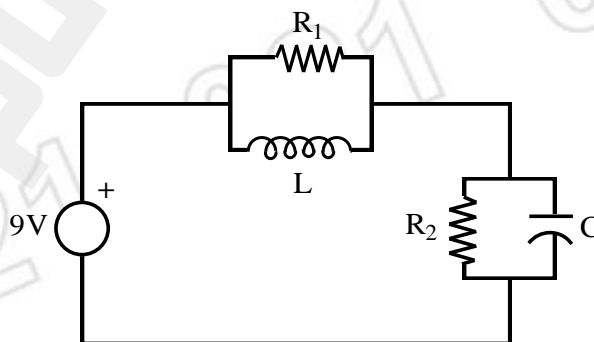


Fig. 3(b)

OR

4. a) Write the nodal equations in matrix form as shown in 'Fig. 4 (a)'. 7

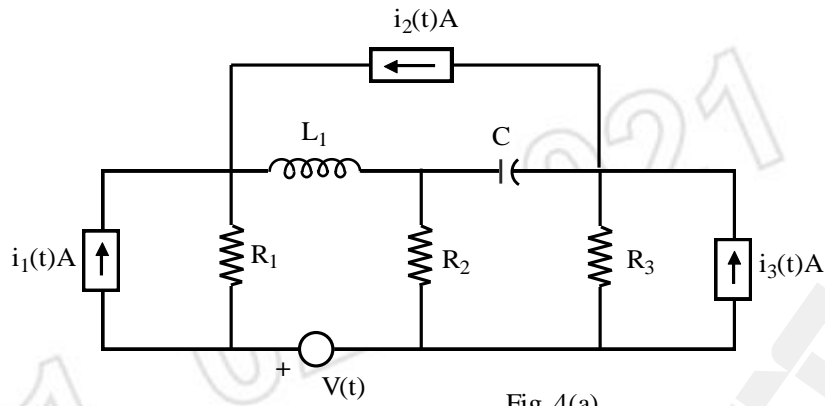


Fig. 4(a)

- b) Find ' V_{ba} ' for the network shown in 'Fig. 4 (b)' using NODAL ANALYSIS. 6

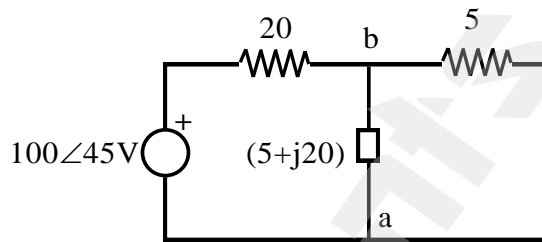


Fig. 4(b)

5. a) Find the change in current 'I' in the network shown in 'fig. 5 (a)', when reactance $j2\Omega$ is increased to $j5\Omega$. Use COMPENSATION THEOREM. 8

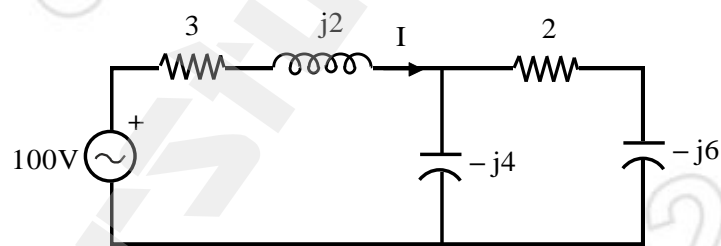


Fig. 5(a)

- b) Find current 'I' in the network of 'Fig. 5 (b)' by 'SUPERPOSITION THEOREM'. Given : $WL=WC=1$. 6

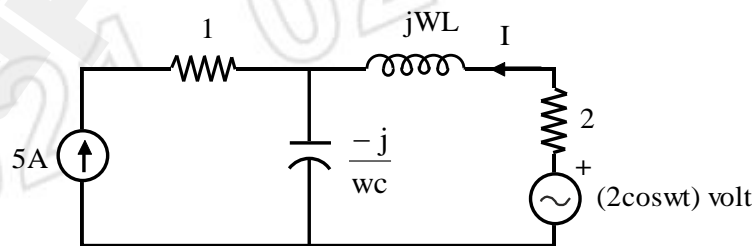


Fig. 5(b)

OR

6. a) Find ' R_L ' and ' X_L ' for the maximum power transfer of the network shown in 'Fig. 6 (a)'. 8

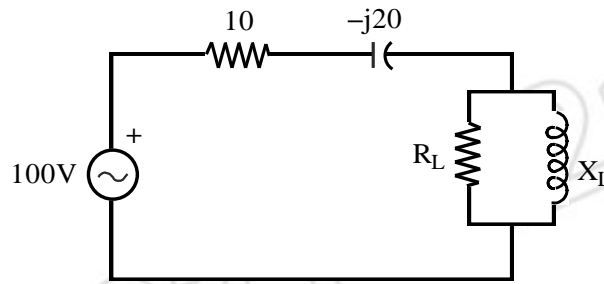


Fig. 6(a)

- b) Verify 'RECIPROCITY THEOREM' for the network shown in 'Fig. 6 (b)'. 6

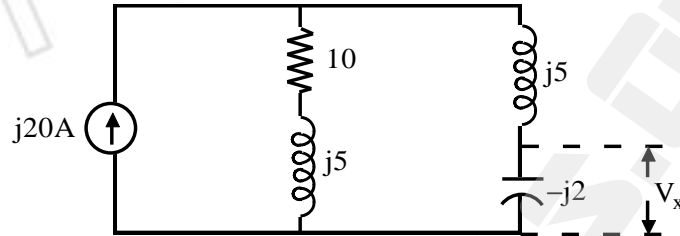


Fig. 6(b)

7. a) For the circuit shown in 'Fig. 7 (a)', Find current ' $i(t)$ ', when the switch -k is moved from position-1 to position-2 at $t=0$. The switch-k was at position-1 for a long time to get the steady state values. Use LAPLACE TRANSFORM method. 7

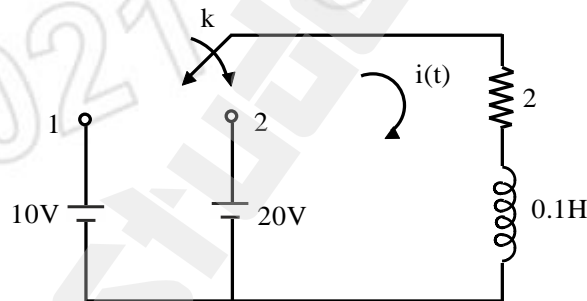


Fig. 7(a)

- b) Find the Laplace transform of the isosceles triangular wave shown in 'Fig. 7 (b)'. 6

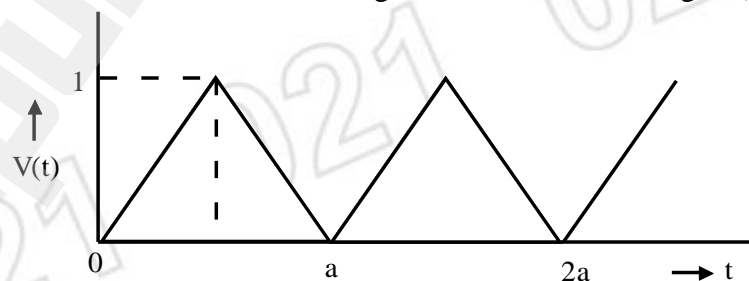


Fig. 7(b)

OR

8. a) For the network shown in 'Fig. 8 (a)', determine current flowing through inductor as a function of time for $t > 0$. At $t = 0$, the switch-k is OPENED. The steady state was previously established before $t = 0$. 7

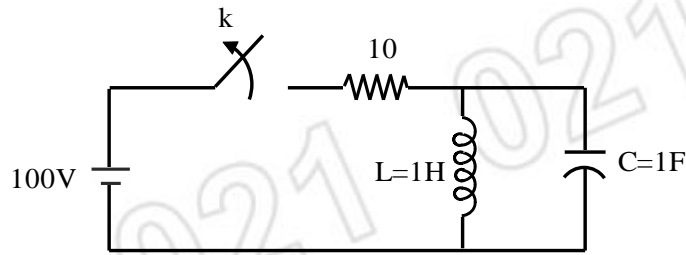


Fig. 8(a)

- b) For the network shown in 'Fig. 9 (b)', switch-k is changed from position-a to position-b at $t = 0$. Find i , $\frac{di}{dt}$ at $t = 0^+$. 6

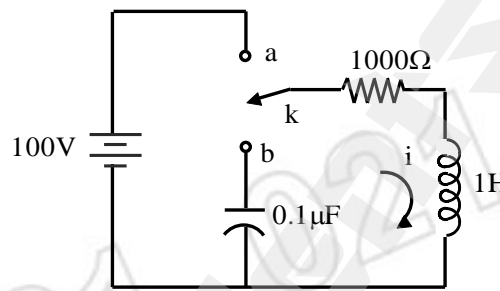


Fig. 8(b)

9. a) For the ladder network shown in 'Fig. 9 (a)', Find: 8
- i) Driving point input impedance, $Z_{11}(S)$
 - ii) Voltage transfer function, $G_{12}(S)$.

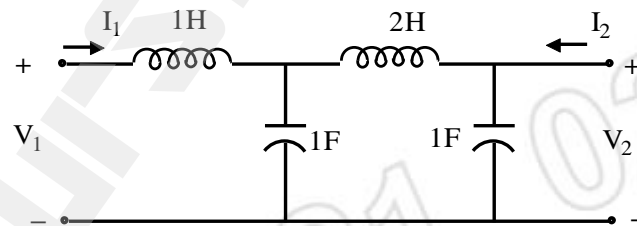


Fig. 9(a)

- b) State the necessary conditions for the driving point impedance and transfer function. 5

OR

10. a) Define poles and zeros of a network function. Plot 'POLE-ZERO' diagram in S-plane for the function 8

$$I(S) = \frac{3S}{(S+2)(S^2+2S+5)}$$

Hence find 'i (t)' from the 'POLE-ZERO' diagram.

- b) Obtain current transfer ratio for the network shown in 'Fig. 10 (b)'. 5

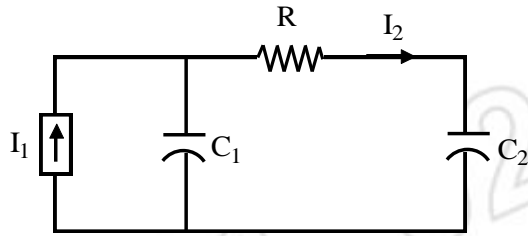


Fig. 10(b)

11. a) Find OPEN CIRCUIT PARAMETERS of the network shown in 'Fig. 11 (a)' and check the reciprocity of the network. 6

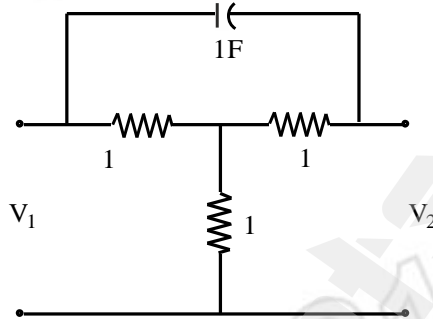


Fig. 11(a)

- b) State and prove the condition of reciprocity in terms of ABCD parameter. 4
- c) Express Y-parameters in terms of inverse transmission of a two port network. 4

OR

12. a) The three phase impedances $(10 + j2)\Omega$, $(20 - j2)\Omega$ and $(4 + j3)\Omega$ are STAR connected to R, Y and B phases respectively to 400-V symmetrical supply. Assume RYB as phase sequence and V_{RY} as reference, find voltage between star point and neutral of the supply. Find the load currents in each phase. 7
- b) Derive the condition of resonance in RLC parallel circuit and plot impedance V_S frequency graph. Mark the region of resonance on it. 7
