

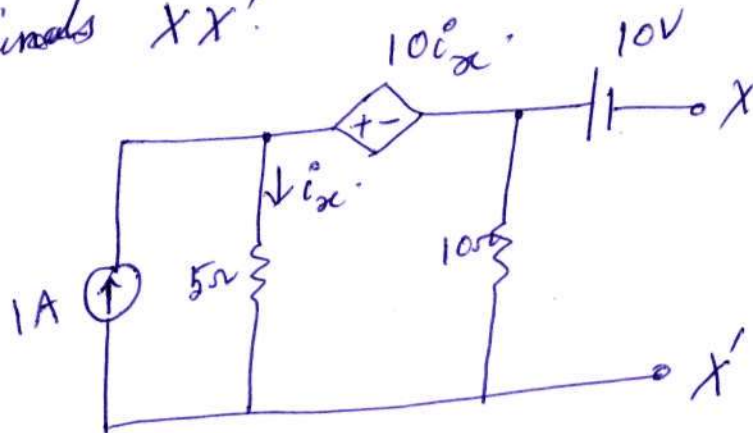
Question Bank-2.

(5)

Sub: Electrical Networks.

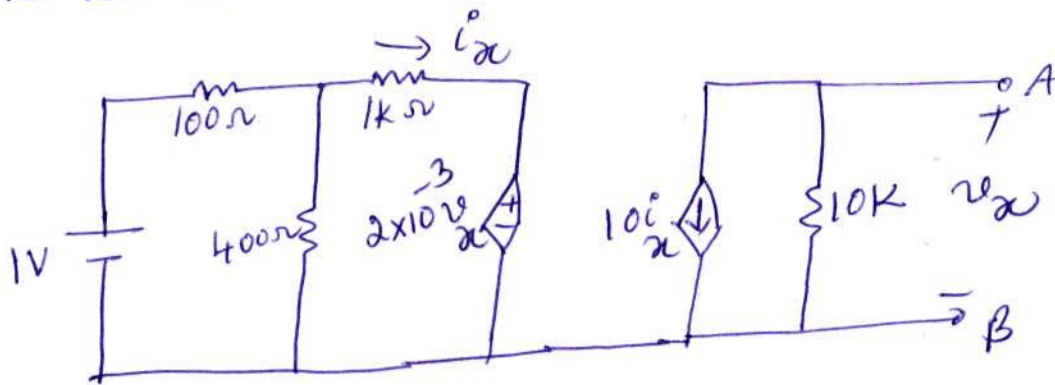
Sem: III (EXTC).

- 1) Find the Thevenin equivalent to the left of the terminals XX' .



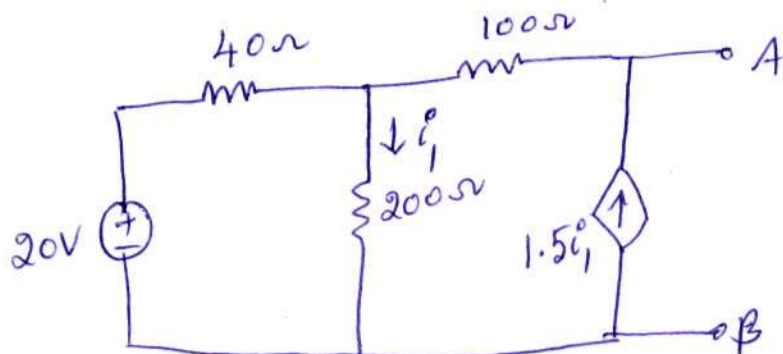
[Ans: $V_{th} = -20V$
 $I_{sc} = 2A$
 $R_{th} = 10\Omega$]

- 2) Find the Thevenin equivalent across AB .



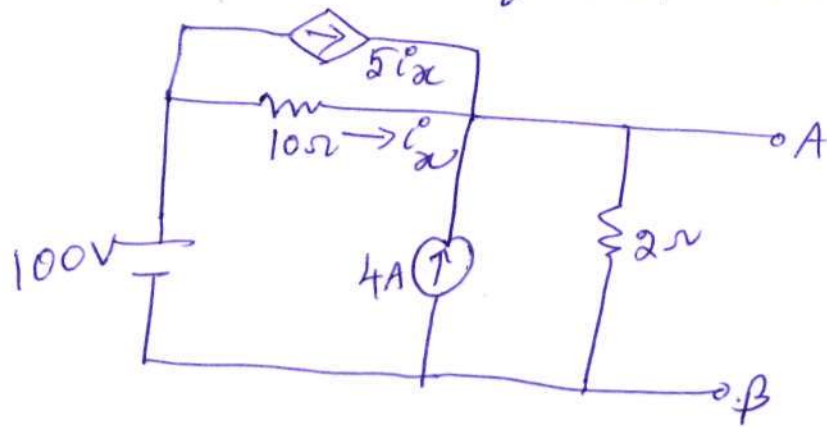
[Ans: $V_{th} = -90.909V$
 $I_{sc} = -7.407mA$
 $R_{th} = 12.273k\Omega$]

- 3) Find the Thevenin equivalent of the network below.



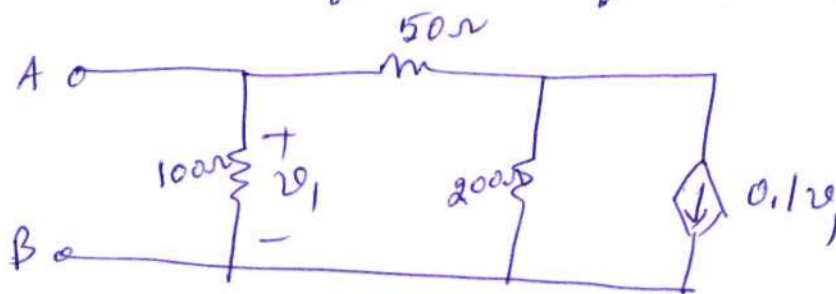
[Ans: $V_{th} = 38.5V$
 $I_{sc} = -1A$
 $R_{th} = 38.5\Omega$
 175.8Ω]

7) Find the Norton equivalent across A & B.



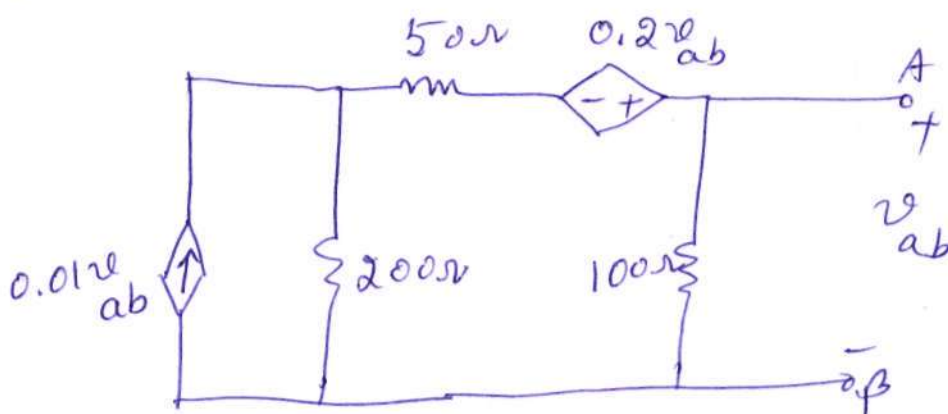
[Ans: $I_N = 64A$
 $V_{oc} = 58.18V$
 $R_N = 0.909\Omega$]

5) Find the Norton equivalent of the network below.



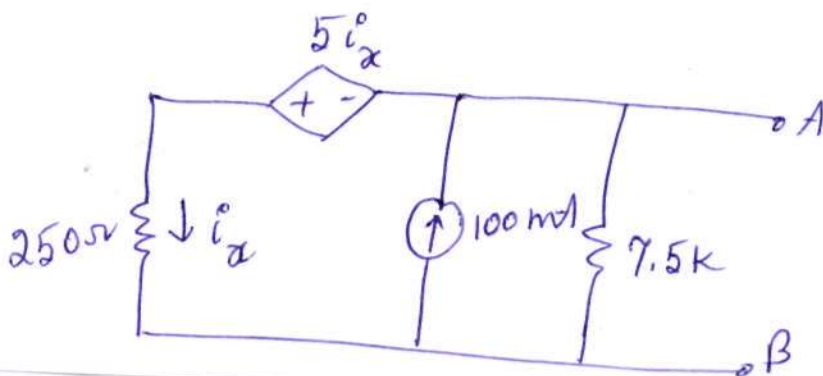
[Ans: $R_N = 8.69\Omega$
 $R_N = 10.638\Omega$]

6) Find the Thevenin equivalent of the network.



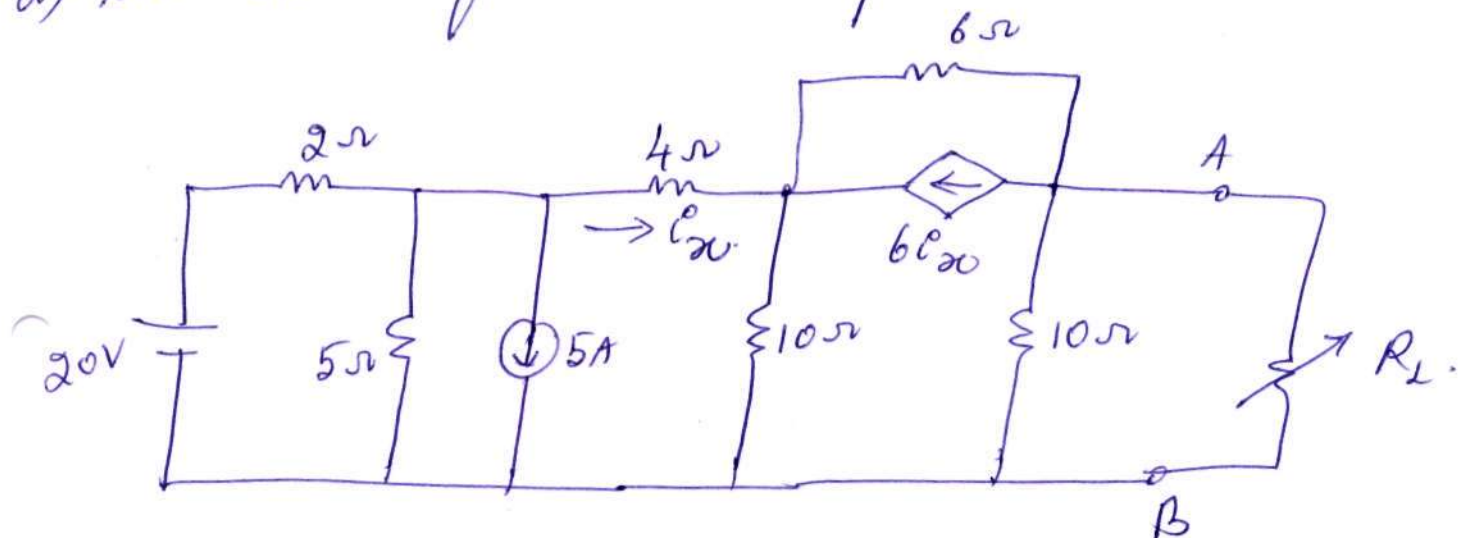
[Ans: $R_{th} = 192.3\Omega$]

4) Find the Thevenin and Norton equivalents of the network below.



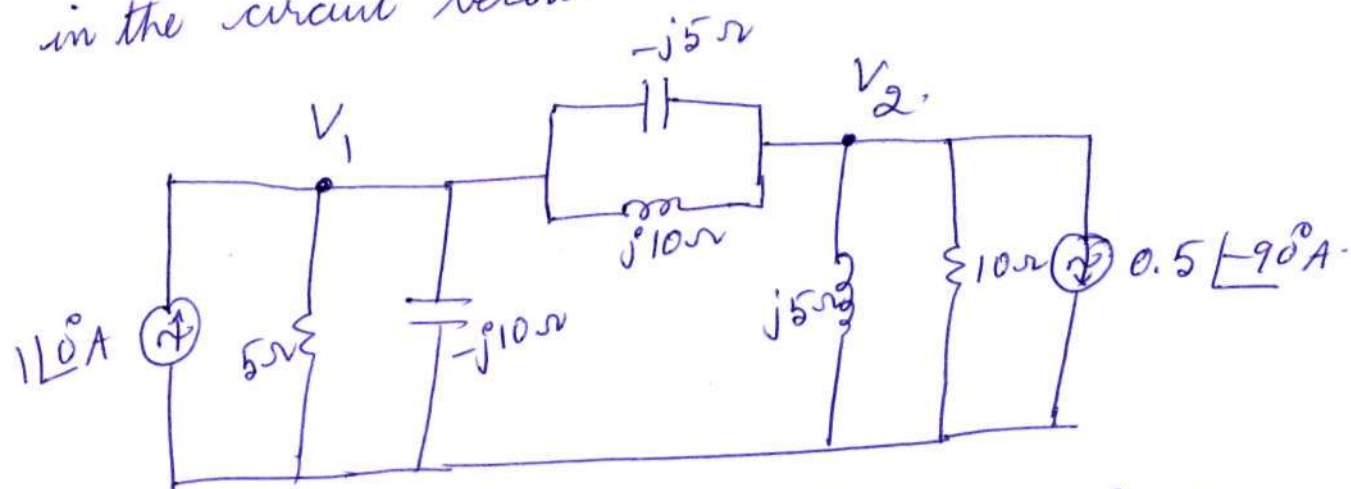
[Ans: $V_{th} = 23.73V$
 $V_{th} = \cancel{3.846V}$
 $R_{th} = \cancel{38.46\Omega}$
 $I_N = 100mA$]

- Find
- Norton's equivalent circuit across AB
 - Thevenin's equivalent circuit across AB
 - value of R_L for maximum power transfer and
 - the value of maximum power.



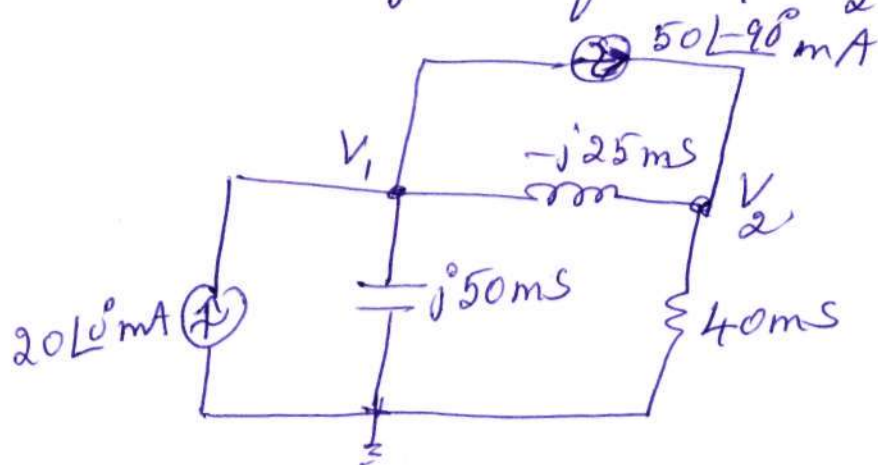
[Ans: $I_{sc} = -0.366 A$, $V_{th} = -2.809 V$, $R_N = R_{th} = 7.66 \Omega$
 $R_L = R_{th} = 7.66 \Omega$ (for max. power transfer).
 $P_{max} = 257.186 mW$].

- 9) Find the time-domain node voltages $v_1(t)$ and $v_2(t)$ in the circuit below:



[Ans: $v_1(t) = 2.24\sqrt{2} \cos(\omega t - 63.4^\circ) V$
 $v_2(t) = 4.47\sqrt{2} \cos(\omega t + 116.6^\circ) V$]

10) Use nodal analysis to find V_1 & V_2 .

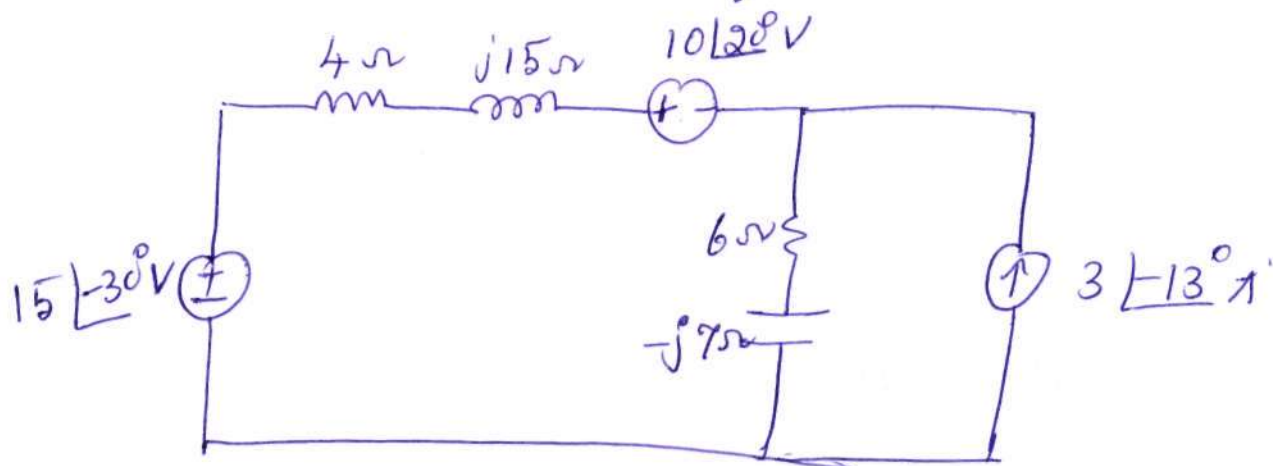


[Ans.:

$$1.062 \angle 23.3^\circ \text{ V}$$

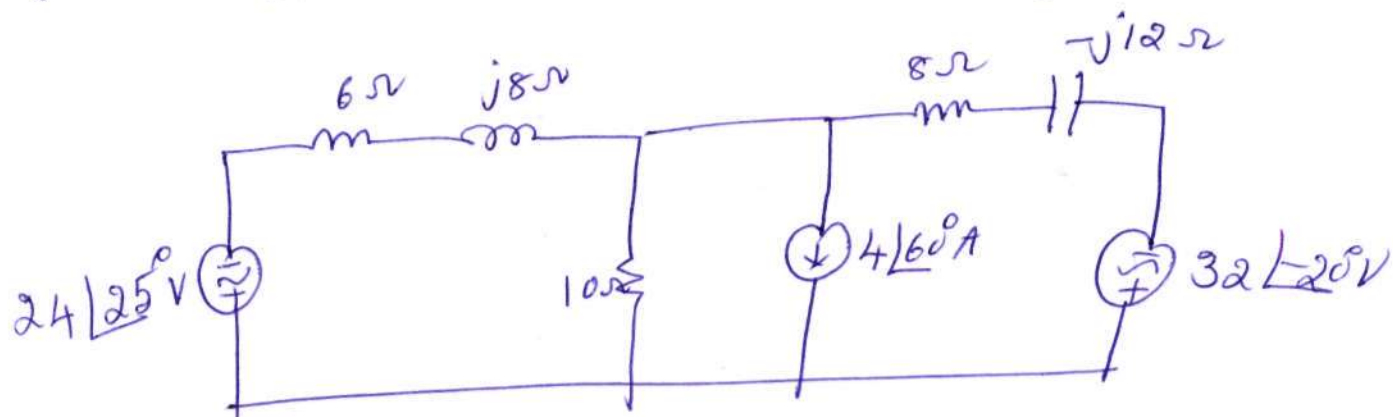
$$1.593 \angle -50^\circ \text{ V}]$$

11) Find the mesh currents for the circuit shown below.



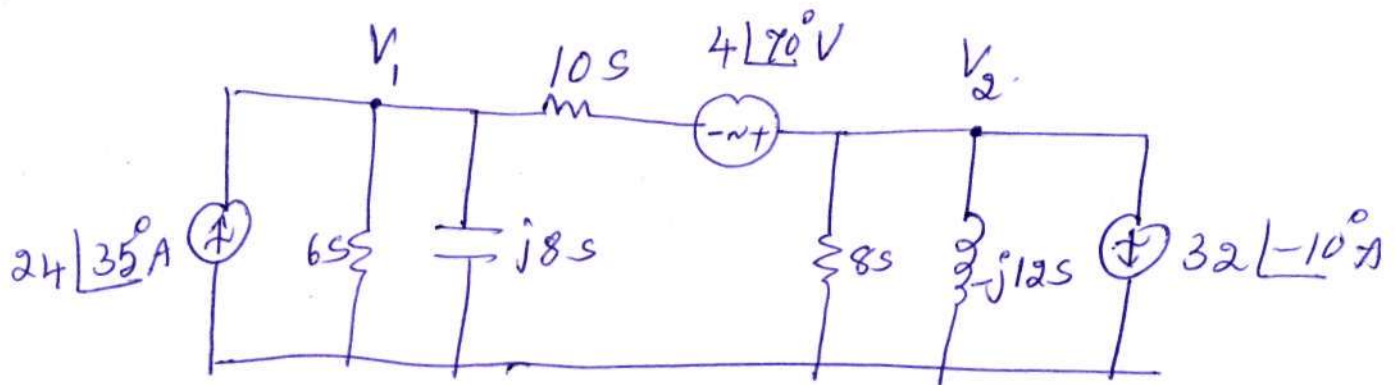
$$[\text{Ans: } I_1 = 1.28 \angle 85.5^\circ \text{ A} \quad I_2 = -3 \angle -13^\circ \text{ A}]$$

12) Find mesh currents in the circuit shown below



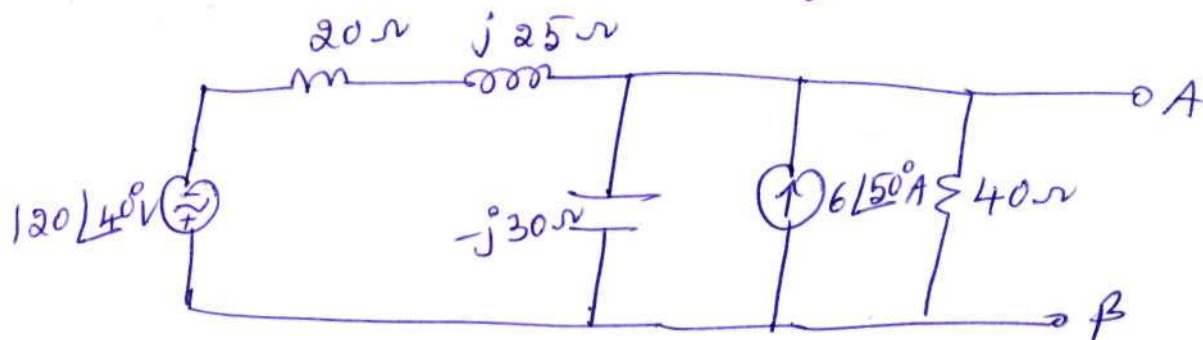
$$[\text{Ans: } I_1 = 1.26 \angle 10.6^\circ \text{ A} \quad I_2 = 4.63 \angle 30.9^\circ \text{ A} \quad I_3 = 2.25 \angle -28.9^\circ \text{ A}]$$

Find nodal voltages in the circuit shown below:



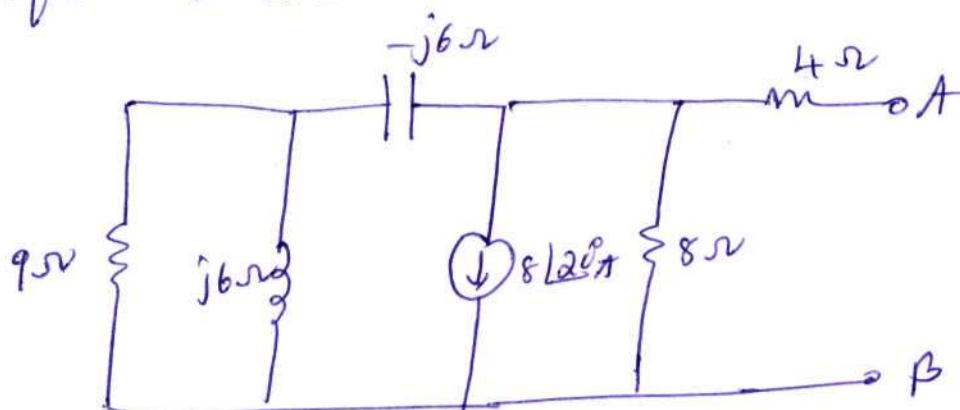
[Ans: $V_1 = -1.26 \angle 20.6^\circ \text{ V}$, $V_2 = -2.25 \angle -18.9^\circ \text{ V}$]

14) Find Thevenin equivalent of the circuit



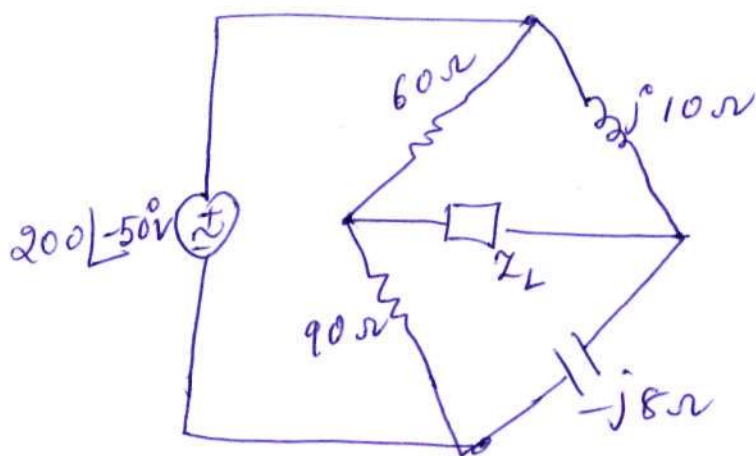
[Ans: $V_{th} = 118 \angle 76.7^\circ \text{ V}$, $Z_{th} = 22 \angle -11.36^\circ \Omega$]

15) Find I_N and Z_{th} for the Norton equivalent of the circuit shown.



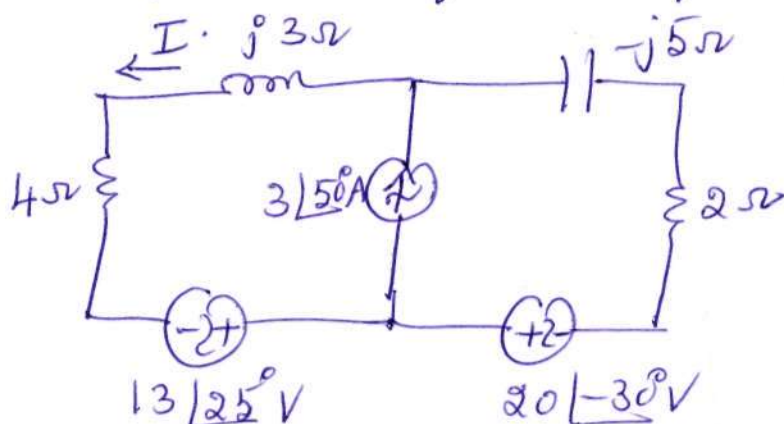
[Ans:
 $-3.09 \angle 5.07^\circ \text{ A}$
 $6.3 \angle -9.03^\circ \Omega$]

- 16) Using Thevenin or Norton theorem, find I if $Z_L = 60 \angle 30^\circ \Omega$.



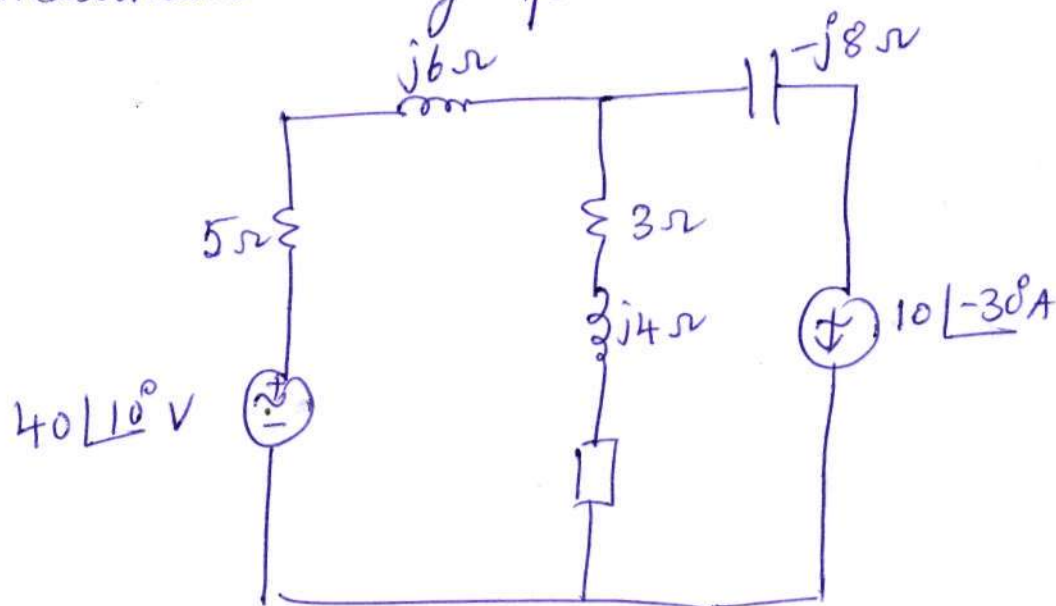
[Ans $10.4 \angle -43.5^\circ A$]

- 17) Use superposition to find I for the circuit below.



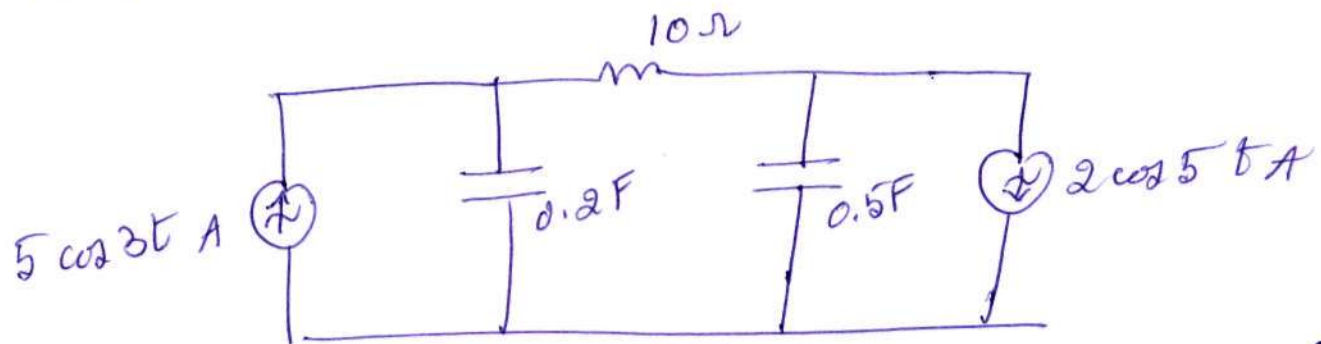
[Ans: $2.27 \angle 65.2^\circ A$]

- 18) For the circuit shown below, what Z_L draws maximum average power and what is the power?



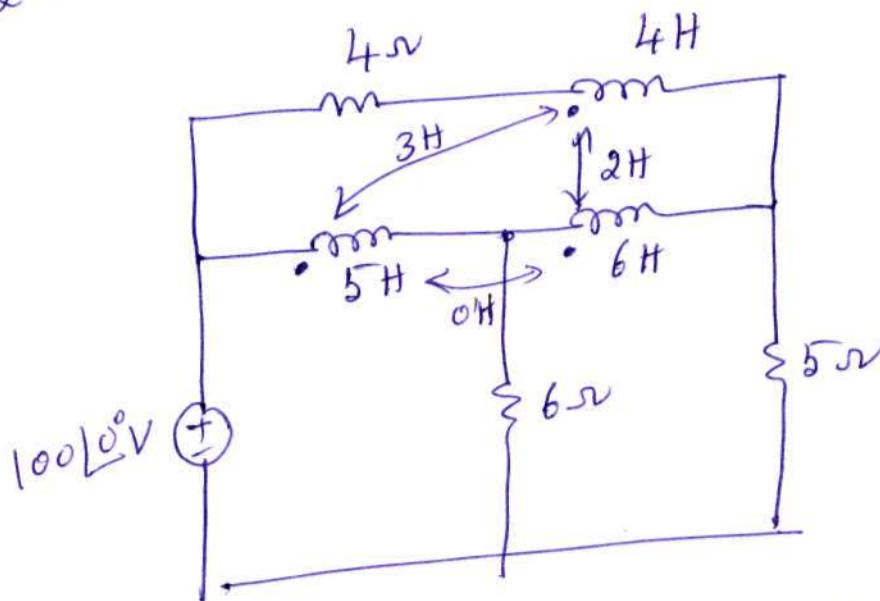
[Ans:
 $12.8 \angle -51.3^\circ \Omega$
 $48.5 W$]

Determine the power dissipated by the 10Ω resistor in the circuit below



[Ans: $10 \left[79.23 \cos(5t - 82.03^\circ) + 811.7 \cos(3t - 76.86^\circ) \right]^2 \text{ mW}$]

20) Write a set of equations in terms of $I_1(j\omega)$, $I_2(j\omega)$ and $I_3(j\omega)$. Find $I_3(j\omega)$ if $\omega = 2 \text{ rad/s}$



[Ans:
$$\begin{bmatrix} 6 + j\omega 5 & -j\omega 2 & -6 \\ -j\omega 2 & 4 + j\omega 5 & -j\omega 4 \\ -6 & -j\omega 4 & 11 + j\omega 6 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} 100 \angle 0^\circ \\ 0 \\ 0 \end{bmatrix}$$

$I_3(j\omega) \text{ at } \omega = 2 \text{ rad/s} = -5 \text{ A}$]