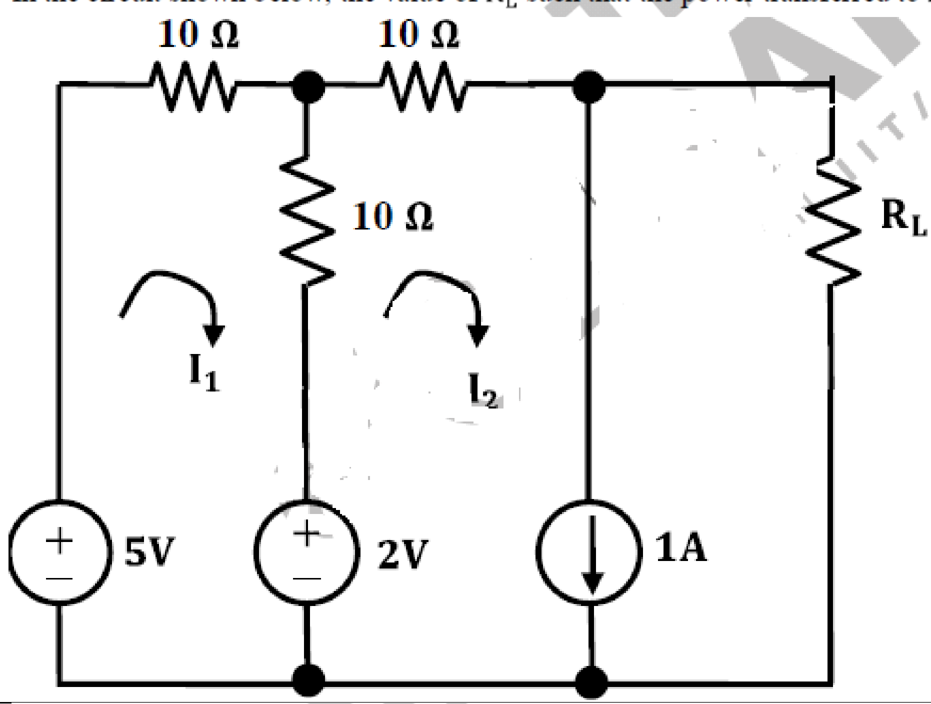
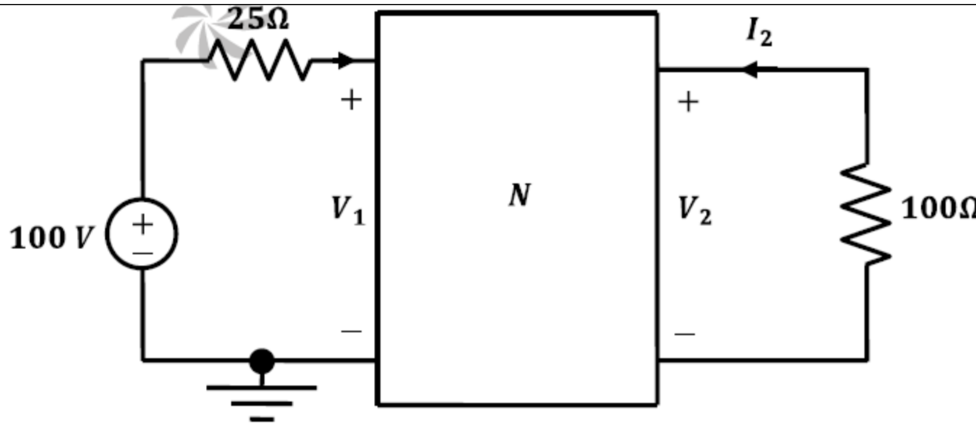
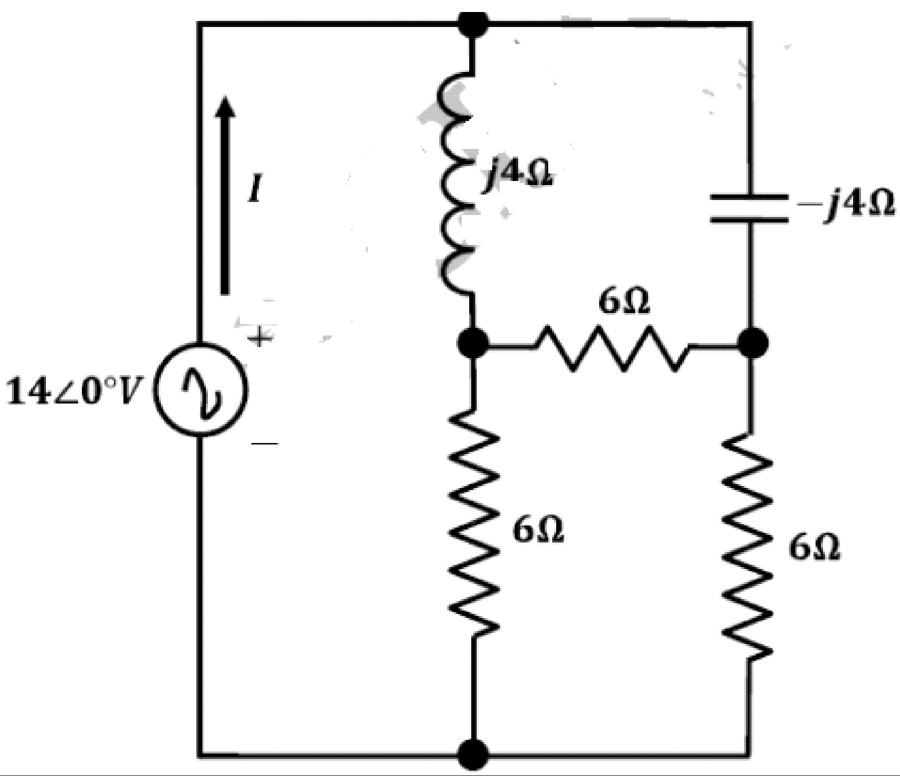
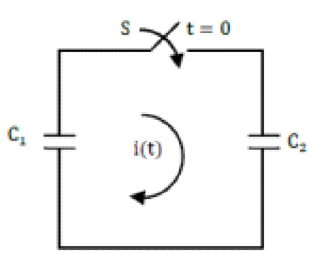
GATE QUESTIONS

A.Y.: 2021-2022 (Odd SEM) **Scheme: CBCGS-HME 2020**

Class: S.E. E&TC Subject: Network Design

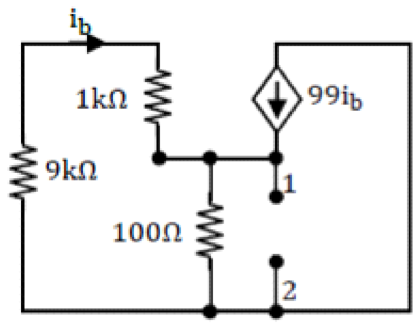
1 mark sample questions

1)	In the circuit shown below, the value of R_L such that the power transferred to R_L is maxin 
2)	In the circuit shown below, the network N is described by the following Y matrix: $Y = \begin{bmatrix} 0.1\,S & -0.01\,S \\ 0.01\,S & 0.1\,S \end{bmatrix}$. The voltage gain $\frac{V_2}{V_1}$ is

<table>
<tr><td></td><td>
</td></tr>
<tr><td>3)</td><td>In the circuit shown below, the current I is equal to

</td></tr>
<tr><td>4)</td><td>In the following figure, C_1 and C_2 are ideal capacitors. C_1 has been charged to 12 V before the ideal switch S is closed at $t = 0$. The current $i(t)$ for all t is.

</td></tr>
</table>

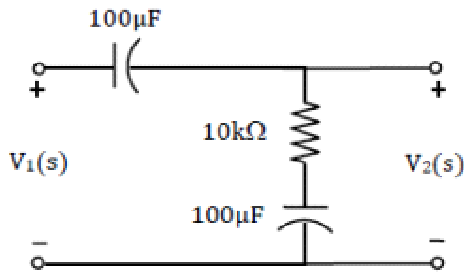
(A) Zero
(B) a step function
(C) an exponentially decaying function
(D) an impulse function

5) The impedance looking into nodes 1 and 2 in the given circuit is



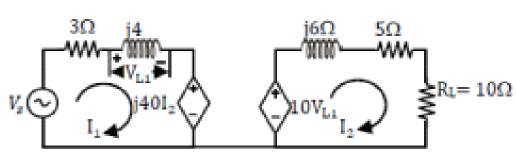
(A) 50 Ω
(B) 100 Ω
(C) 5 kΩ
(D) 10.1 kΩ

6) The transfer function $\frac{V_2(s)}{V_1(s)}$ of the circuit shown below is



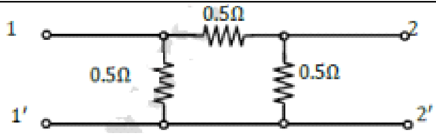
(A) $\frac{0.5s+1}{s+1}$
(B) $\frac{3s+6}{s+2}$
(C) $\frac{s+2}{s+1}$
(D) $\frac{s+1}{s+2}$

7) In the circuit shown below, if the source voltage $V_s = 100\angle 53.13^0$ V then the Thevenin's equivalent voltage in volts as seen by the load resistance R_L is



(A) $100\angle 90^0$
(B) $800\angle 0^0$
(C) $800\angle 90^0$
(D) $100\angle 60^0$

8) .For the two-port network shown below, the short−circuit admittance parameter matrix is



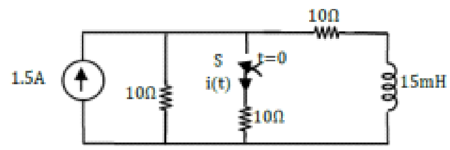
(A) $\begin{bmatrix} 4 & -2 \\ -2 & 4 \end{bmatrix}$S

(C) $\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$S

(B) $\begin{bmatrix} 1 & -0.5 \\ -0.5 & 1 \end{bmatrix}$S

(D) $\begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$S

9) In the circuit shown, the switch S is open for a long time and is closed at $t = 0$. The current $i(t)$ for $t \geq 0^+$ is



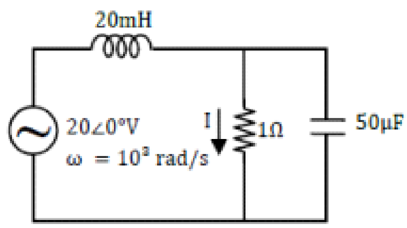
(A) $i(t) = 0.5 - 0.125e^{-1000t}$A

(C) $i(t) = 0.5 - 0.5e^{-1000t}$A

(B) $i(t) = 1.5 - 0.125e^{-1000t}$A

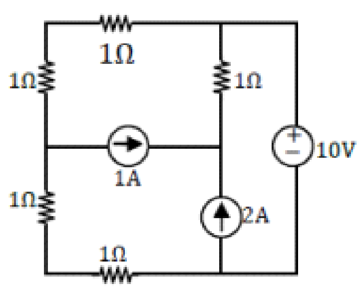
(D) $i(t) = 0.375e^{-1000t}$A

10) The current I in the circuit shown is



(A) –j1 A (B) j1 A (C) 0 A (D) 20 A

11) In the circuit shown, the power supplied by the voltage source is



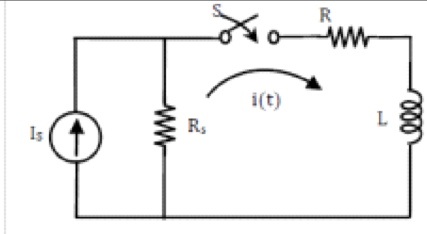
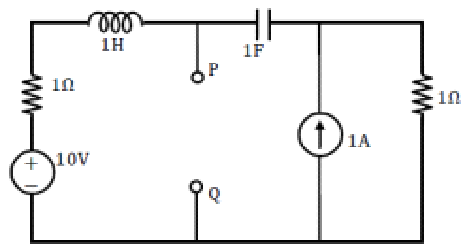
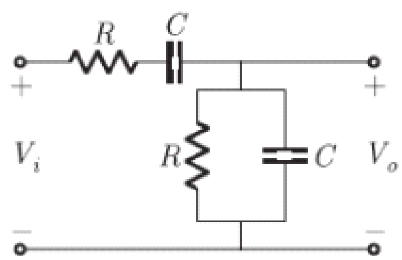
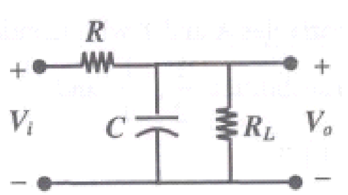
(A) 0 W

(C) 10 W

(B) 5 W

(D) 100 W

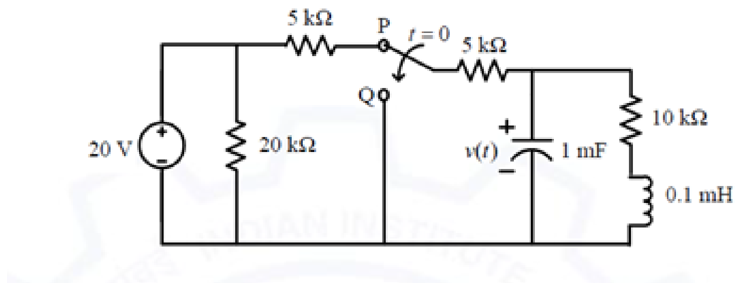
12) In the following circuit, the switch S is closed at t=0. The rate of change of current $\frac{di}{dt}(0^+)$ is given by

	 (A) 0 (C) $\frac{(R+R_s)I_s}{L}$ (B) $\frac{R_sI_s}{L}$ (D) ∞
13)	The Thevenin's equivalent impedance Z_{Th} between the nodes P and Q in the following circuit is  (A) 1 (C) $2+s+\frac{1}{s}$ (B) $1+s+\frac{1}{s}$ (D) $\frac{s^2+s+1}{s^2+2s+1}$
14)	The RC circuit shown in the figure is  (A) a low-pass filter (B) a high-pass filter (C) a band-pass filter (D) a band-reject filter
15)	If the transfer function of the following network is $\frac{V_o(s)}{V_i(s)} = \frac{1}{2+sCR}$ 

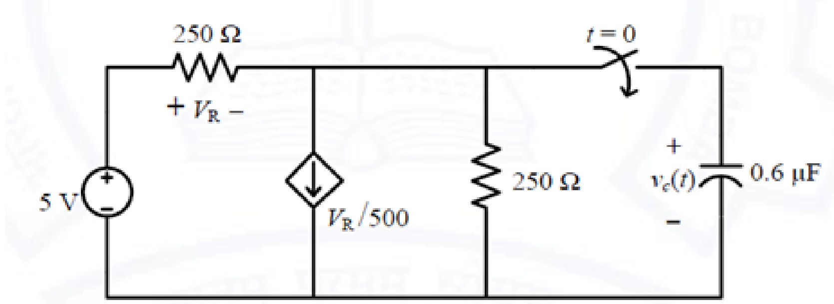
	the value of the load resistance R_L is (A) $R/4$ (B) $R/2$ (C) R (D) $2R$

2 mark sample questions

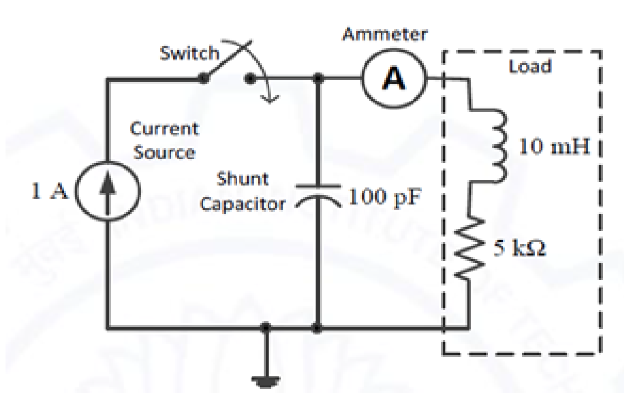
1) The switch p is in position P for a long time and then turn to position Q at t=0. Find the value of dv(t)/dt at t=0+



2) The switch is closed at t=0 while the capacitor is charged to -5 V.(i.e Vc(0) = -5V)

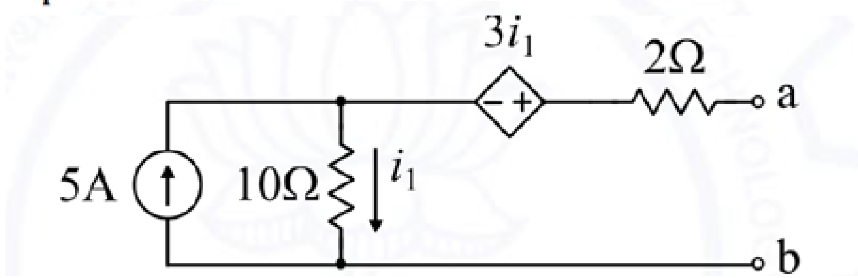


3) **The circuit in the figure contains a current source driving a load having an inductor and a resistor in series, with a shunt capacitor across the load. The ammeter is assumed to have zero resistance. The switch is closed at time $t = 0$.**



<table>
<tr><td></td><td>Initially, when the switch is open, the capacitor is discharged and the ammeter reads zero ampere. After the switch is closed, the ammeter reading keeps fluctuating for some time till it settles to a final steady value. The maximum ammeter reading that one will observe after the switch is closed (rounded off to two decimal places) is __________ A.</td></tr>
<tr><td>4)</td><td>

For the network shown, the equivalent Thevenin voltage and Thevenin impedance as seen across terminals 'ab' is



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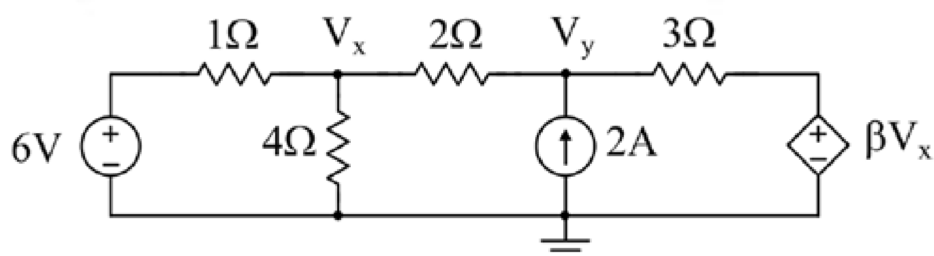
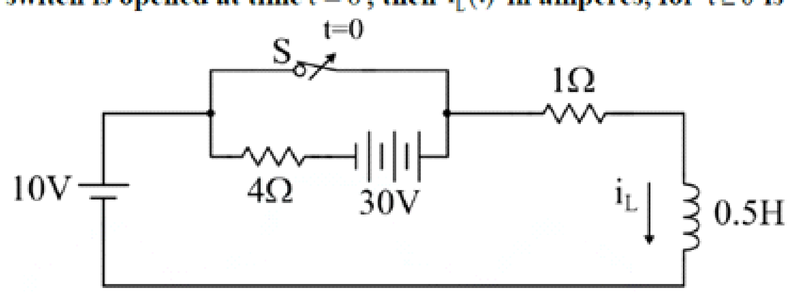
<tr><td>5)</td><td>

In the given circuit, for voltage V_y to be zero, the value of β should be _____. (Round off to 2 decimal places).



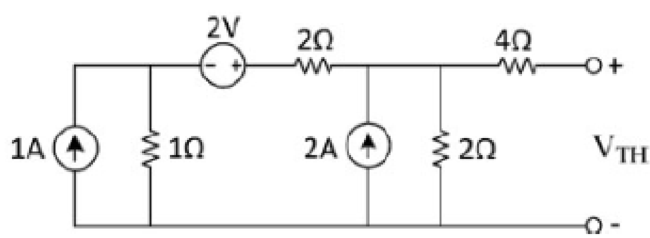
</td></tr>
<tr><td>6)</td><td>

In the circuit, switch 'S' is in the closed position for a very long time. If the switch is opened at time $t = 0$, then $i_L(t)$ in amperes, for $t \geq 0$ is



</td></tr>
<tr><td>7)</td><td>

In the circuit shown below, the Thevenin voltage V_{TH} is



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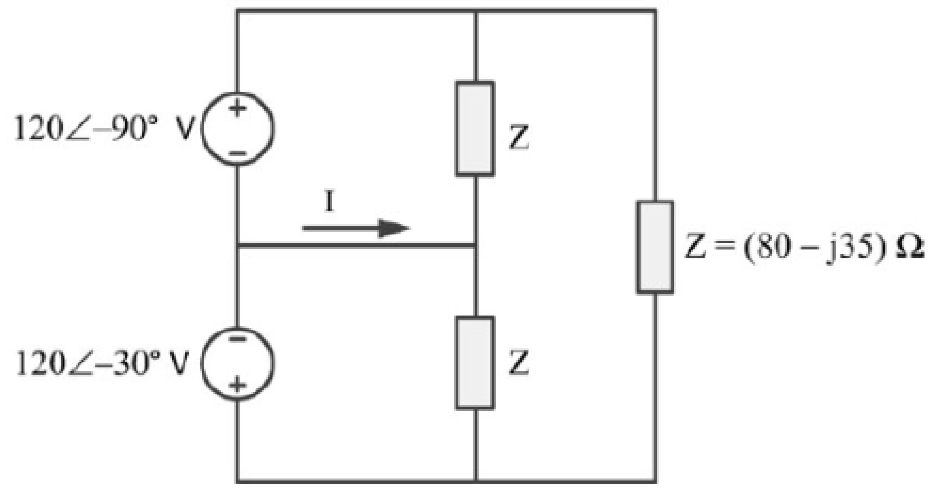
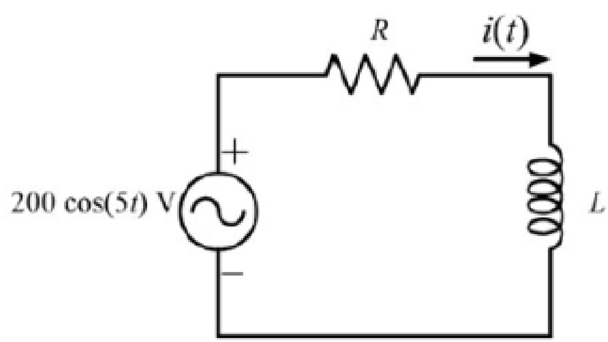
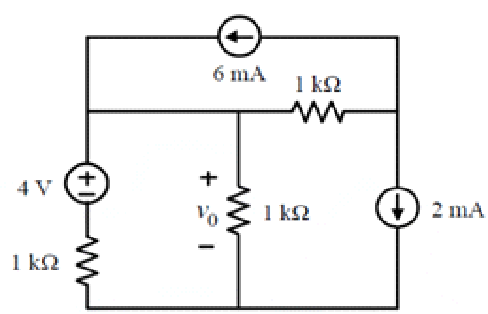
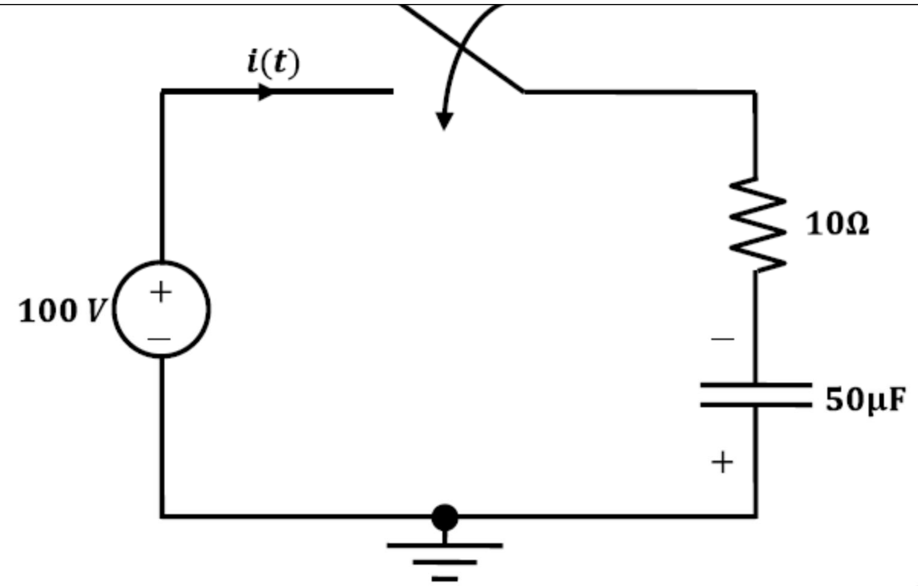
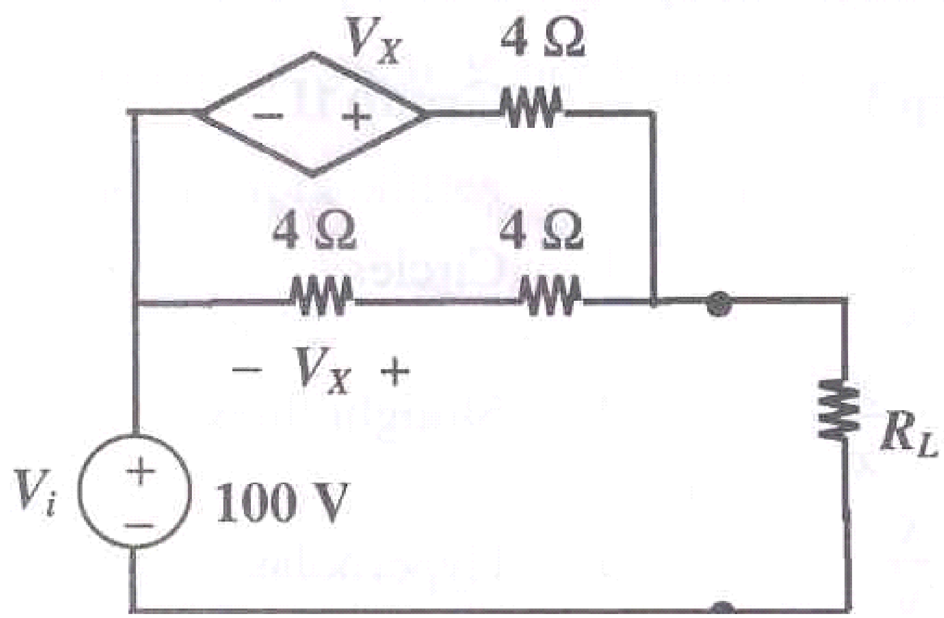
8)	The current I in the given network is 
9)	The current in the RL-circuit shown below is $i(t) = 10\cos(5t - \pi/4)$ A. The value of the inductor **(rounded off to two decimal places)** is ______ H. 
10)	**Consider the circuit shown in the figure.**  **The value of v_0 *(rounded off to one decimal place)* is __________ V.**
11)	In the circuit shown below, the initial charge on the capacitor is 2.5 mC, with the voltage polarity as indicated. The switch is closed at time $t = 0$. The current $i(t)$ at a time t after the switch is closed is

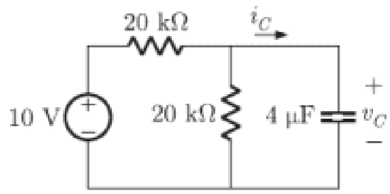


12) In the circuit shown, what value of R_L maximizes the power delivered to R_L?



(A) 2.4 Ω (B) $\frac{8}{3}$ Ω (C) 4 Ω (D) 6 Ω

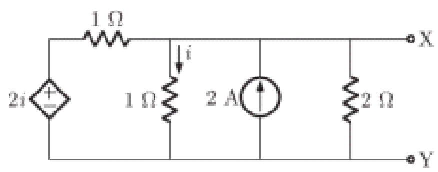
13) In the circuit shown, v_C is 0 volts at $t = 0$ sec. For $t > 0$, the capacitor current $i_C(t)$, where t is in seconds is given by



(A) $0.50\exp(-25t)$ mA (B) $0.25\exp(-25t)$ mA

(C) $0.50\exp(-12.5t)$ mA (D) $0.25\exp(-6.25t)$ mA

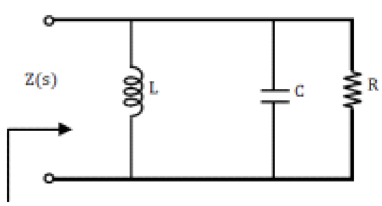
14) For the circuit shown in the figure, the Thevenin voltage and resistance looking into $X-Y$ are



(A) $\frac{4}{3}$ V, 2 Ω (B) 4 V, $\frac{2}{3}$ Ω

(C) $\frac{4}{3}$ V, $\frac{2}{3}$ Ω (D) 4 V, 2 Ω

15) The driving point impedance of the following network is given by $Z(s)=\frac{0.2s}{s^2+0.1s+2}$. The component values are



(A) L = 5H, R = 0.5Ω, C = 0.1F (C) L = 0.1H, R = 2Ω, C = 0.1F

(B) L = 0.1H, R = 0.5Ω, C = 5F (D) L = 0.1H, R = 2Ω, C = 5F