

There are 5 problems. They carry equal marks.

$$(5 \times 6 = 30)$$

1. Consider the network.

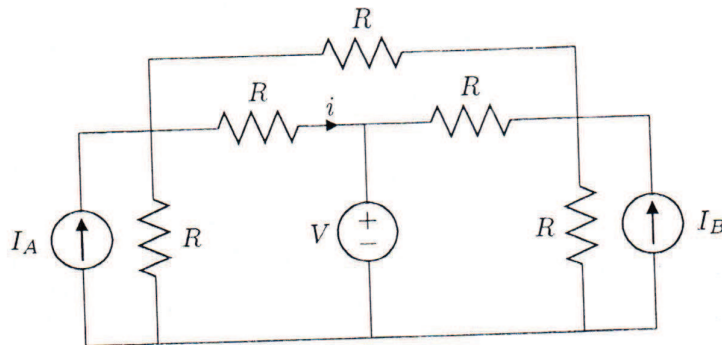


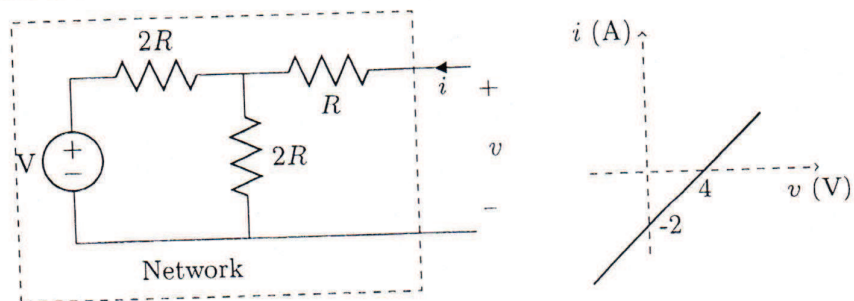
Figure 1

The current  $i$  can be written as

$$i = AV + BI_A + CI_B$$

Find the constants  $A$ ,  $B$  and  $C$ .

2. Consider the network and its terminal characteristics.



- Find the  $V$  and  $R$  of the Network.
- Draw the Thevenin and Norton equivalent of the network.
- Find  $v$  and  $i$  in the network shown here.

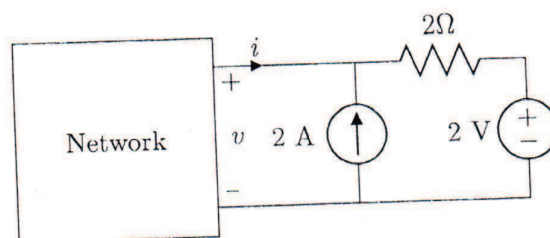
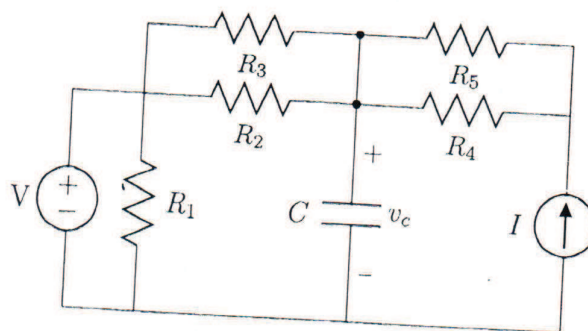


Figure 2

3. Consider the network.



Find  $v_C(\infty)$  and  $\tau$ .

4. Find  $v_C(t)$  and  $i_L(t)$  and plot them for  $t > 0$ . Inductor and capacitor do not have any initial charge.

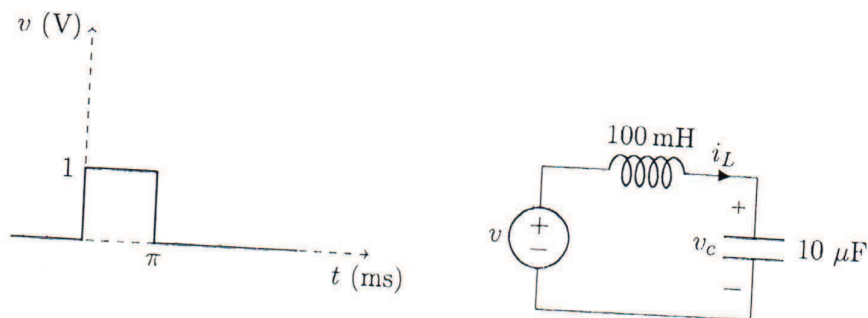


Figure 3

5. Consider the circuit.

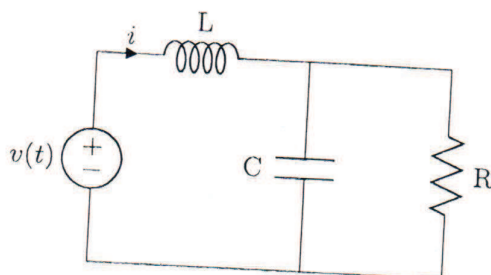


Figure 4

- Assume the circuit is in sinusoidal steady state with  $v(t) = V_m \cos(\omega t)$ . Let  $i(t)$  be  $I_m \cos(\omega t + \phi)$ . Find  $I_m$  and  $\phi$ .
- For a given  $R$ ,  $C$ , and  $\omega$ , find  $L$  such that  $i$  is in phase with  $v$ .