

23. a) (i) Analyze the circuit in Fig. 4 to find $v_x(t)$ using phasor and nodal analysis. (10)

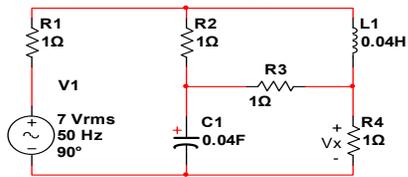


Fig. 4

- (ii) Express the following currents in phasor form : $i_1(t) = 12.\sin(400t + 110^\circ)$ A (4)
 $i_2(t) = -7.\sin(800t) - 3.\cos(800t)$ A.

(OR)

- b) (i) Construct the Thevenin equivalent of the circuit in Fig. 5 across the 6 Ω (10)
 resistance.

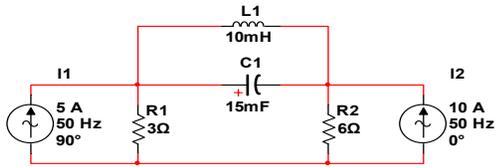


Fig. 5

- (ii) A voltage source $v(t) = 100.\sin(2\pi t)$ volts is connected across a parallel (4)
 combination of 1 M Ω resistor and 20 μ F capacitor. Determine the maximum
 energy stored in the capacitor.

24. a) (i) In the circuit given in Fig. 6, find the values of v_c and v_o at time $t = 0^-$, $t = 0^+$ and (8)
 $t = 1.3$ ms. The switch S1 closes at $t=0$.

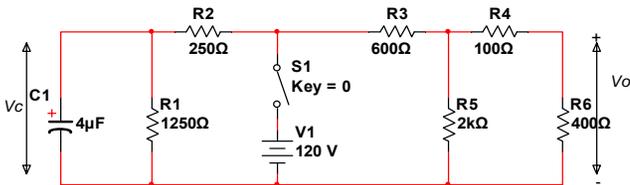


Fig. 6

- (ii) Given a series RLC circuit with $L = 1$ H, $R = 2$ k Ω , $C = 4$ μ F, $i(0) = 2$ mA, (6)
 $v_c(0) = 2$ V, find and sketch $i(t)$.

(OR)

- b) (i) In the circuit given in Fig. 7, the switch has been closed for a long time. Find i_L (8)
 for $t < 0$. Find $i_L(t)$ for all t after the switch opens at $t > 0$.

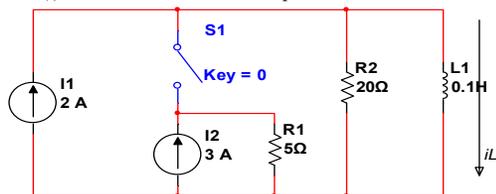


Fig. 7

- (ii) Given a parallel RLC circuit with $L = 7$ H, $R = 5$ Ω , $C = 4$ μ F, $v(0) = 50$ V, (6)
 $i_R(0) = -10$ A, find and sketch $v(t)$.

25. a) (i) Find the resonant frequency of the network shown in Fig. 8. (6)

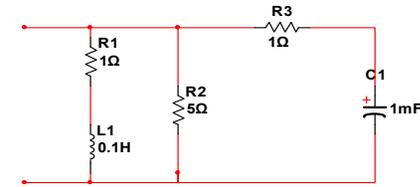


Fig. 8

- (ii) For the circuit shown in Fig. 9, find the average power absorbed by the source, (8)
 the two resistors and the two inductors.

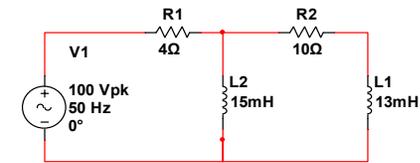


Fig. 9

(OR)

- b) (i) Find the resonant frequency and input impedance of the network shown in (6)
 Fig. 10.

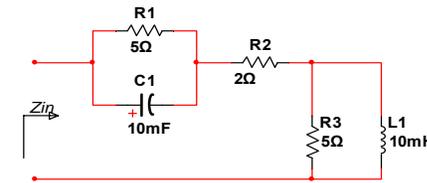


Fig. 10

- (ii) Write the mesh equations for the given coupled circuit, in Fig. 11. (8)

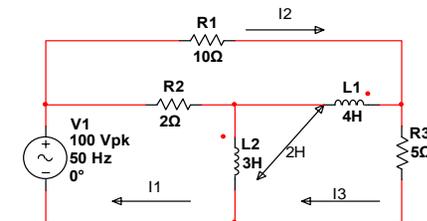


Fig. 11
