JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY
Electronics and Communication Engineering
Electrical Science-II (15B11EC211)
Tutorial Sheet: 3

Q1[CO1] Find the differential equation for the voltage v for the circuit of Figure 1

Answer: $\frac{d^2v}{dt^2} + 1001\frac{dv}{dt} + 1001 \times 10^3 v = \frac{dv_s}{dt} + 1000v_s$

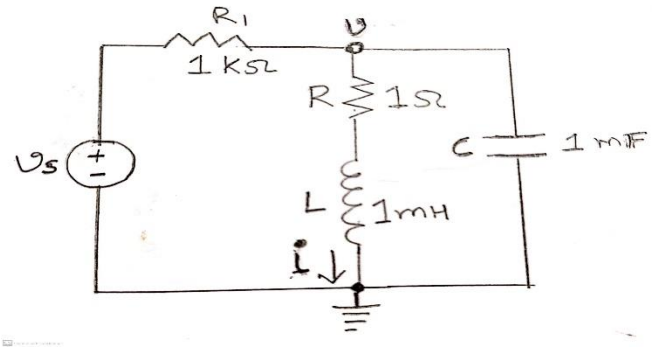

Figure 1

Q2[CO1] Find the natural response v_n (t) of the RLC (Fig.2) circuit, where R = 6Ω, L=7 H, and C= 1/42 F. The initial conditions are v(0) = 0 and i(0) = 10 A.

Answer: -84 (e^{-t}-e^{-6t}) Volts

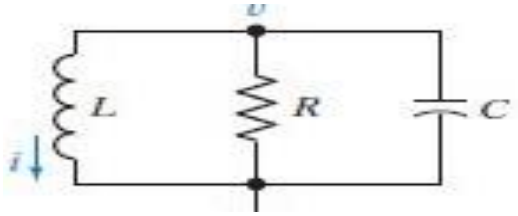

Figure 2

Q3[CO1] A parallel RLC circuit (Fig. 2) has R =10Ω, C =1 mF, L =0.4 H, v(0) =8 V, and i(0) = 0. Find the natural response $v_n(t)$ for t > 0.
Answer: e^{-50t} (8 - 400t) V

Q4[CO1] Consider the parallel RLC circuit when R=25/3V, L=0.1H, C=1mF, v(0)=10V, and i(0)=-0.6A. Find the natural response $v_n(t)$ for t > 0.
Answer: $v_n(t) = 10e^{-60t}$ cos 80t V

Q5[CO1] Determine i(t) for t > 0 for the circuit shown in Figure 3.

Answer: i(t)= 0.2 +0.246 $e^{-3.62t}$ -0.646 $e^{-1.38t}$ A for t > 0.

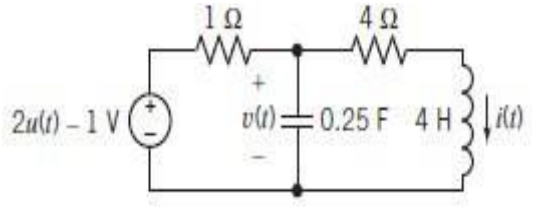

Figure 3

Q6[CO1] Find i(t) fort > 0 for the circuit shown in Figure 4 when R= 3 Ω,L=1H,C=1/2F,and $i_s = 2e^{-3t}$ A. Assume steady state at $t = 0^-$.

Answer: $i = 12e^{-t} – 14e^{-2t} + 2e^{-3t}$

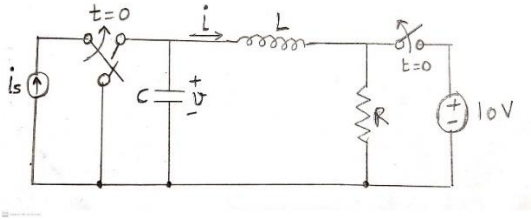

Figure 4

Q7[CO1] Find the forced response for the inductor current i_f for the parallel RLC circuit shown in Figure 5 when $i_s = 8e^{-2t}$ A. Let R = 6Ω, L = 7H, and C = 1/42 F.

Answer: $i_f = -12e^{-2t}$ A

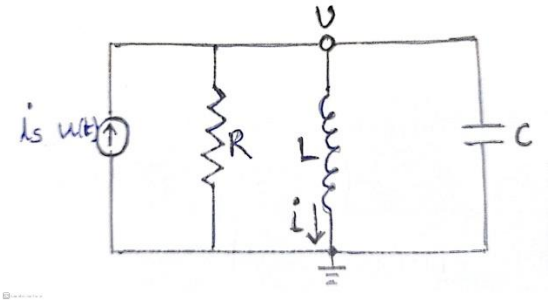

Figure5