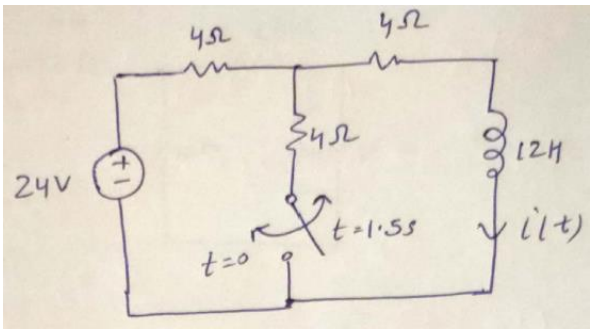
JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY
Electronics and Communication Engineering
Electrical Science-II (15B11EC211)
Tutorial Sheet: 2

Q1. [CO1] The circuit shown in Fig. 1 is at steady state before the switch closes at time t=0. The switch remains closed for 1.5 s and then opens. Determine the inductor current i(t) for t>0.



$$i(t)=\begin{cases}2+e^{-0.5t}A & 0<t<1.5s\\ 3-0.53e^{-0.667(t-1.5)}A & t>1.5\end{cases}$$

Fig. 1

Q2. [CO1] For the circuit shown in Fig. 2, calculate the value of inductor current $i_L(t)$ and $i_{12\Omega}(t)$ for t>0.

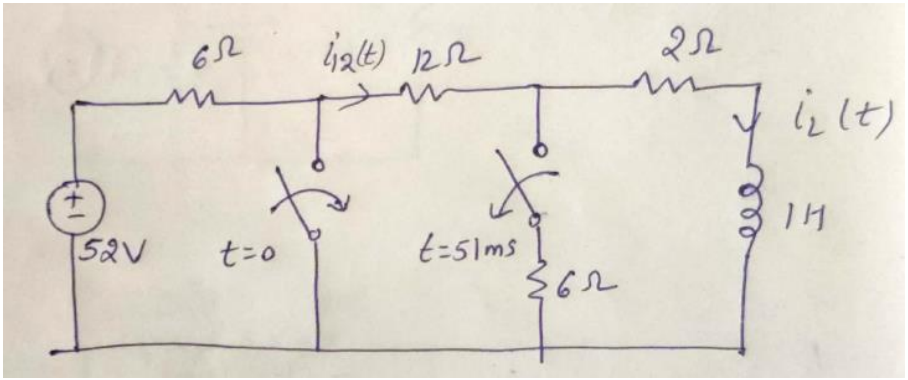
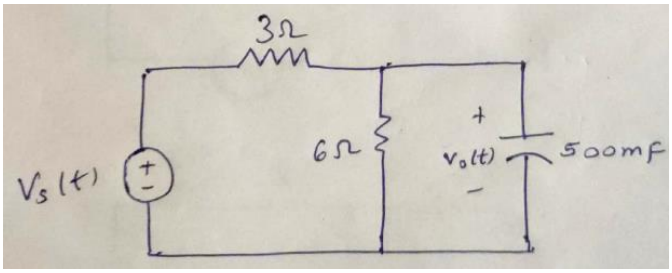


Fig. 2

$$i_L(t)=\begin{cases}2 & t<0\\ 2e^{-6t} & 0<t<0.051\\ 1.473e^{-14(t-0.051)} & t>0.051\end{cases}$$

$$i_{12}(t)=\begin{cases}2.67 & t<0\\ \frac{2}{3}e^{-6t} & 0<t<0.051\\ 1.473e^{-14(t-0.051)} & t>0.051\end{cases}$$

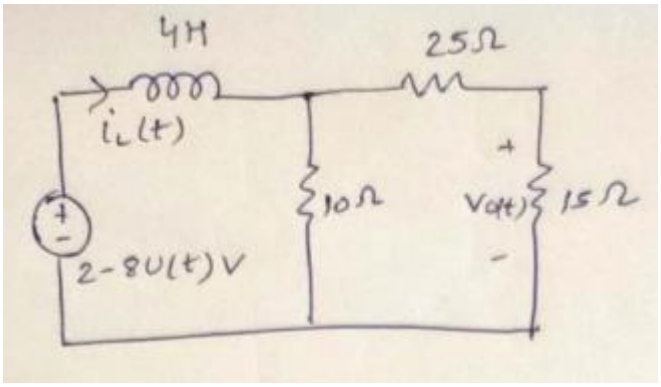
Q3. [CO1] The input to the circuit shown in Fig. 3 is the voltage $V_s(t)$ =3+3 u(t) V. Determine the output voltage $V_o(t)$ across capacitor for t>0.



$$V_o(t) = \begin{cases} 2 & t < 0 \\ 4 - 2e^{-6t} & t > 0 \end{cases}$$

Fig. 3

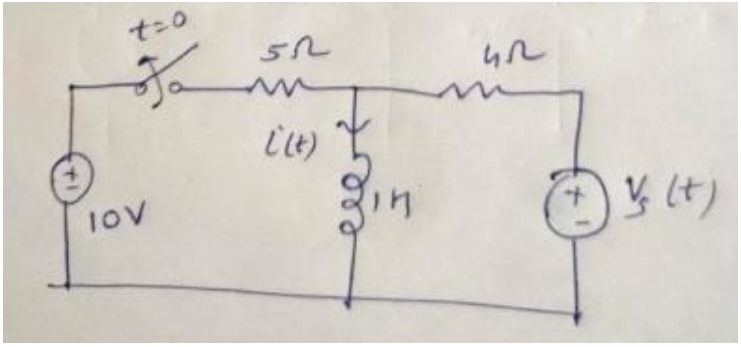
Q4. [CO1] Determine the voltage $V_o(t)$ in the circuit shown in Fig. 4.



$V_o(t) = -2.25 + 3e^{-2t}$ V

Fig. 4

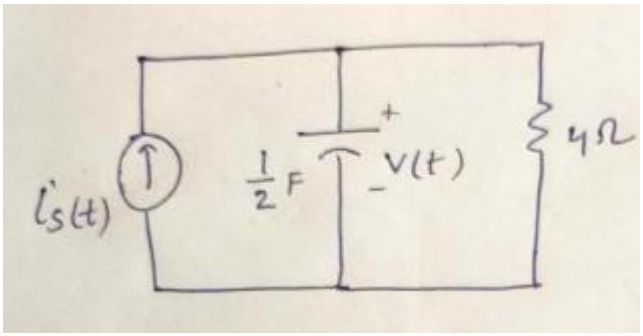
Q5. [CO1] For the circuit shown in Fig. 5, find the current i(t) for t>0, when $V_s(t) = 10e^{-2t}u(t)$ V. Assume the circuit is in steady state at t=0.



$i(t) = -3e^{-4t} + 5e^{-2t}$ A for t>0

Fig. 5

Q6. [CO1] Find the response v(t) for t>0 for the circuit shown in Fig. 6. The initial voltage v(0)=0 and the current source is $i_s(t) = (10\sin 2t)u(t)$ A.



$$V(t) = \frac{160}{17}e^{-1/2t} + \frac{40}{17}\sin 2t - \frac{160}{17}\cos 2t \text{ V}$$

Fig. 6

Q7. [CO1] For the given circuit shown in Fig. 7, determine the response of inductor current $i_L(t)$ and voltage $V_{24}(t)$ across 24Ω resistor for t>0.

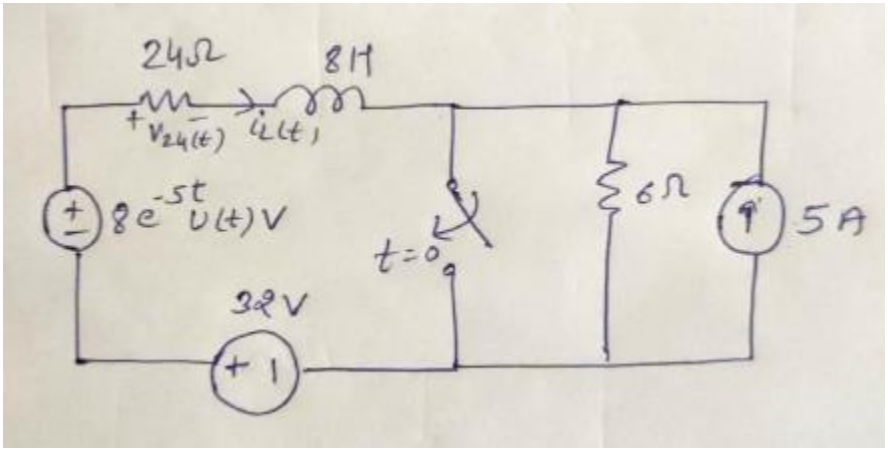


Fig. 7

$$i_L(t) = \frac{4}{3} - \frac{1}{2}e^{-5t} - \frac{23}{30}e^{-3t} \text{ A} \qquad V_{24\Omega}(t) = 32 - 12e^{-5t} - \frac{92}{5}e^{-3t}$$