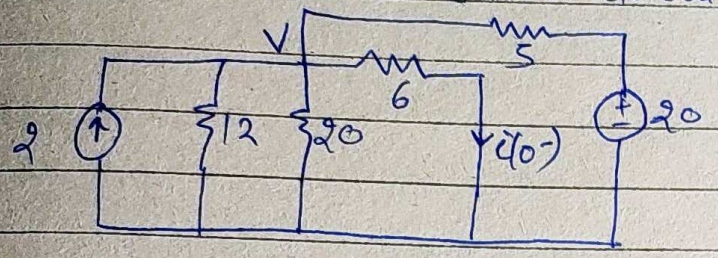
Page No.
Date:

1] inductor will be short circuited at $t=0^-$



KCL at node V:

$$\frac{V-20}{5}+\frac{V}{6}+\frac{V}{20}+\frac{V}{12}=2$$

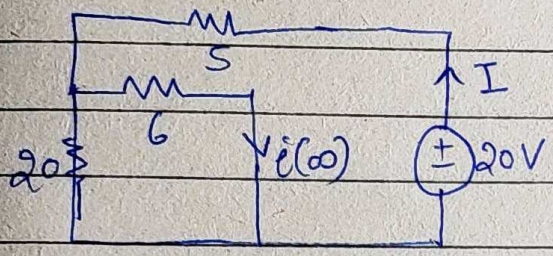
$$V=12V$$

$$i(0^-)=\frac{12}{6}=2A$$

current in inductor doesnot change instantaneously

$$i(0^-)=i(0^+)=2A$$

at $t=\infty$

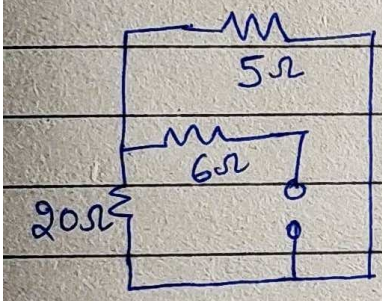


$$I=\frac{20}{\left(\frac{20\times6}{26}\right)+5}=2.08A$$

$$i(\infty)=2.08\times\frac{20}{26}$$

$$i(\infty)=1.6A$$

For time constant:



$$R=\frac{20\times5}{25}+6=10\Omega$$

$$\tau=L/R=\frac{0.5}{10}=0.05sec$$

General eqn for current:

$$i(t)=[i(0^+)-i(\infty)]e^{-t/\tau}+i(\infty)$$

$$=[2-1.6]e^{-t/0.05}+1.6$$

$$=0.4e^{-t/0.05}+1.6$$

voltage across inductor $=L\frac{di}{dt}=0.5\frac{d}{dt}(0.4e^{-t/0.05}+1.6)$

$$=0.5\left[0.4\times\left(\frac{-1}{0.05}\right)e^{-t/0.05}\right]$$

$$\boxed{V(t)=-4e^{-20t}\text{ volts}}$$