



### Passage IV

Figure 1 is a diagram of an *RLC circuit*. The circuit has a power supply and 3 components: a resistor (R), an inductor (L), and a capacitor (C).

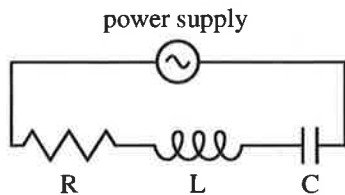


Figure 1

Electric current can flow through the circuit either clockwise (positive current) or counterclockwise (negative current). Figure 2 shows how the electric current in the circuit,  $I$  (in amperes, A), and the power supply voltage,  $V_s$  (in volts, V), both changed during a 20-millisecond (msec) time interval.

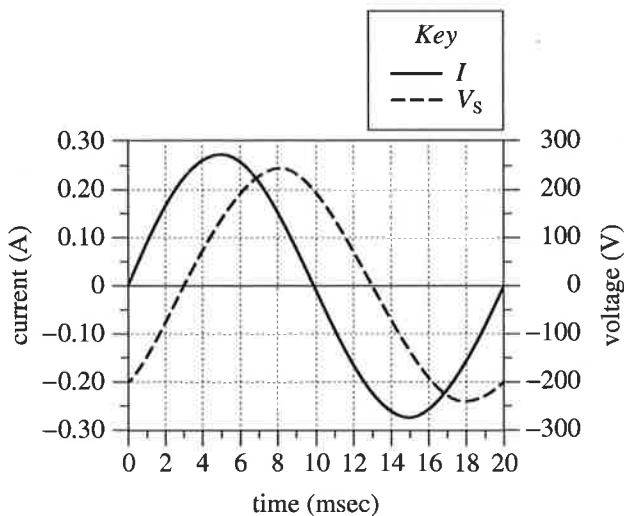


Figure 2

Figure 3 shows how the voltages across the components— $V_R$ ,  $V_L$ , and  $V_C$ , respectively—each changed during the same 20 msec time interval.

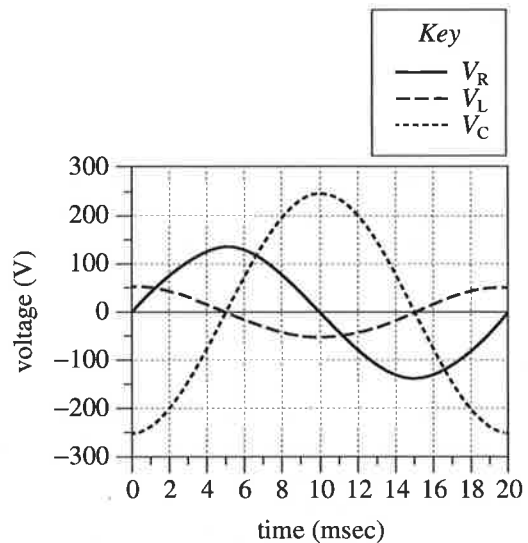


Figure 3

21. According to Figure 2, the maximum positive value of  $V_s$  was approximately:
- 125 V.
  - 200 V.
  - 250 V.
  - 275 V.
22. A *period* is the time required for a wave to complete one full cycle. Based on Figure 3, the period for  $V_L$  was:
- 5 msec.
  - 10 msec.
  - 20 msec.
  - 40 msec.



23. According to Figures 2 and 3, which voltage varied the *least* during the 20 msec interval?

- A.  $V_S$
- B.  $V_R$
- C.  $V_L$
- D.  $V_C$

24. *Polarity* refers to whether a voltage is positive or negative (a voltage of 0 V has no polarity and can be ignored). Based on Figures 2 and 3, which 2 voltages were always *opposite* in polarity?

- F.  $V_R$  and  $V_L$
- G.  $V_R$  and  $V_S$
- H.  $V_L$  and  $V_C$
- J.  $V_L$  and  $V_S$

25. Based on Figure 2, at which of the following times was the current in the circuit flowing counterclockwise?

- A. 0 msec
- B. 5 msec
- C. 10 msec
- D. 15 msec

26. The table below lists the electric charge (in microcoulombs,  $\mu\text{C}$ ) stored on the capacitor at 3 different times during the 20 msec interval.

Time (msec)	Charge ( $\mu\text{C}$ )
7	0.51
10	0.87
13	0.51

Based on Figures 2 and 3, from time = 7 msec through time = 13 msec, did the charge on the capacitor more likely change in sync with  $I$  or with  $V_C$ ?

- F.  $I$ ; over that time interval, both the charge and  $I$  decreased and then increased.
- G.  $I$ ; over that time interval, both the charge and  $I$  increased and then decreased.
- H.  $V_C$ ; over that time interval, both the charge and  $V_C$  decreased and then increased.
- J.  $V_C$ ; over that time interval, both the charge and  $V_C$  increased and then decreased.