

defining equation for an inductor is

$$V = L \frac{dI}{dt}$$

where  $L$  is called the *inductance* and is measured in henrys (or mH,  $\mu$  H, etc.). Putting a voltage across an inductor causes the current to rise as a ramp (for a capacitor, supplying a constant current causes the voltage to rise as a ramp).

The symbol for an inductor looks like a coil of wire; that is because, in its simplest form, that is all it is. Variations include coils wound on various core materials, the most popular being iron (or iron alloys, laminations, or powder) and ferrite, a black, nonconductive, brittle magnetic material. These are all ploys to multiply the inductance of a given coil by the 'permeability' of the core material. The core may be in the shape of a rod, a toroid (doughnut), or even more bizarre shapes, such as a 'pot core' (which has to be seen to be understood; the best description we can think of is a doughnut mold split in half, if doughnuts were made in molds).

Inductors find heavy use in radio frequency (RF) circuits, serving as RF 'chokes' and as parts of tuned circuits. A pair of closely coupled inductors form the interesting object known as a transformer.

### **Part I. Comprehension Exercises**

#### **A. Put T for true and "F" for false statements. Justify your answers.**

- ..... 1. The relationship between voltage and current is a crucial point in electronics.
- ..... 2. Resistors and capacitors provide for useful current versus voltage.
- ..... 3. Thermistors are light sensitive devices.
- ..... 4. Capacitors are of different types.
- ..... 5. Each capacitor has various applications.
- ..... 6. In order to produce coils with different rates of inductance, various core materials are employed.

#### **B. Choose a, b, c, or d which best completes each item.**

- 1. Ohm's law states that the current in a circuit is .....
  - a. inversely proportional to the resistance of the circuit and is directly proportional to the electromotive force in the circuit
  - b. directly proportional to the resistance of the circuit and is inversely proportional to the electromotive force in the circuit
  - c. directly proportional to the resistance and the electromotive force in the circuit

- d. inversely proportional to the resistance and the electromotive force in the circuit
2. It is true that resistors .....
- a. separate signals
  - b. generate waves
  - c. dissipate power
  - d. store energy
3. The current through a capacitor is .....
- a. independent of frequencies
  - b. proportional to the voltage
  - c. independent of the variations of voltage
  - d. proportional to the rate of change of voltage
4. It is true that .....
- a. resistors may be used in bypass applications
  - b. capacitors may be used for filtering
  - c. resistors are identical with condensers
  - d. capacitors are identical with thermistors
5. If you change the voltage across a farad by one volt per second, you are .....
- a. supplying an ampere
  - b. supplying a farad
  - c. increasing the voltage
  - d. increasing the current
6. We may deduce from the text that 1 volt across 1 henry produces a current that .....
- a. decreases at 1 amp per second
  - b. increases at 1 amp per second
  - c. is constant up to a critical point
  - d. is zero up to a critical point

**C. Answer the following questions orally.**

1. What is the function of a diode?
2. What is a resistor made up of?
3. How are capacitors basically made?
4. Which part of a capacitor is called a dielectric?
5. Why does aluminized Mylar film act as a capacitor?
6. How do you describe a pot core used in an inductor?
7. What are some applications of inductors?

**Part II. Language Practic**

**A. Choose a, b, c, or d which best completes each item.**

- 1-A voltage or current that varies at a constant rate is referred to as
- a. ramp
  - b. a rise
  - c. a drop
  - d. a tap