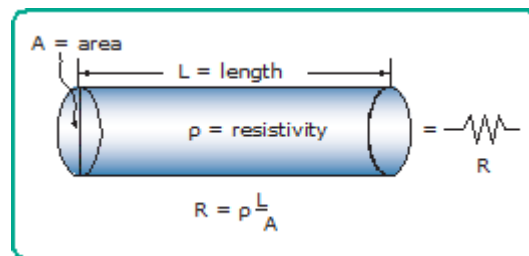


**Resistance - Study Material**

The property of a material which opposes the flow of current is known as resistance. An electrical component which has the resistance property is said to be resistor. It is denoted by the letter R and measured by the unit ohm. (The units used to measure higher value resistance are kilo ohm (kΩ) and mega ohm (MΩ)).

**RESISTANCE****Laws of resistance**

The resistance of a conductor may vary according to the following factors.

1. It is directly proportional to the length of the conductor.
2. Inversely proportional to the cross sectional area of the conductor.
3. Directly proportional to the specific resistance or resistivity of the conductor

$$R = \rho l/A$$

Where  $R$  is the resistance,  $l$  is the length,  $A$  is the area of cross-section, and  $\rho$  is the specific resistivity of the conductor.

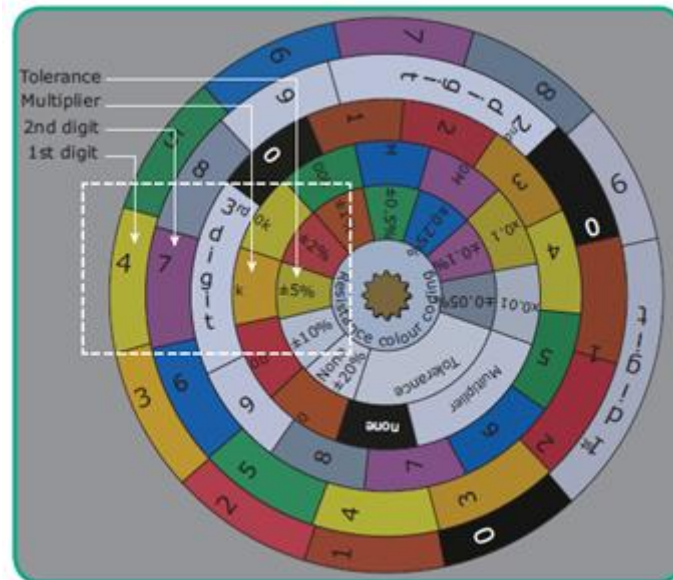
**COLOUR CODING OF RESISTORS**

Printing values in small resistors cannot be viewed clearly. So, in small rating resistors, colour is coated on the body of resistors in circular shape. Each colour is allotted a number. This is called as colour coding.



### Color coding in a resistor

The first colour denotes the value of first digit, second colour denotes the value of second digit and the third colour (called as multiplier) denotes the number of zeros followed by the two digit. The fourth colour denotes tolerance level. If it is gold, the tolerance value of the resistor is 5% and if it is silver the tolerance is 10% of the value. Figure 1.42(a) shows the resistor with colour code. Table 1.1 shows the colour coding of the resistor.



**Colour circle for colour coding of resistors**

**Table 1.1 Colour Coding of Resistors**

Colour	value	Multiplier	Tolerance
Black	0	$10^0$	-
Brown	1	$10^1$	$\pm 1\%$
Red	2	$10^2$	$\pm 2\%$
Orange	3	$10^3$	-
Yellow	4	$10^4$	-
Green	5	$10^5$	-
Blue	6	$10^6$	-
Violet	7	$10^7$	-
Grey	8	$10^8$	-
White	9	$10^9$	-
Gold	-	$10^{-1}$	$\pm 5\%$
Silver	-	$10^{-2}$	$\pm 10\%$
No colour	-	-	$\pm 20\%$