Branch- Electronics 15|01|18

Subject Code - 201 (Electronic Comp & shop Pract.)

II - Test Paper Solutions

Q1] Explain Color Code for Resistor?

Ans:- Resistor is an passive element which opposes the current flowing through it. Resistance is the unique feature of a Resistor, measured in ohms.

• for a Resistor Color coding is used to find the value of its Resistance. The Table shown below is used to find the Resistence.

S.N.	Color	first Band	second Band	Third Band (multiplier)	fourth Band (Tolerance)
1	Black	0	0	$10^0 = 1$	—
2	Brown	1	1	$10^1 = 10$	—
3	Red	2	2	$10^2 = 100$	—
4	orange	3	3	$10^3 = 1000$	—
5.	Yellow	4	4	10^4	—
6	Green	5	5	10^5	—
7	Blue	6	6	10^6	—
8.	Voilet	7	7	10^7	—
9.	Gray	8	8	10^8	—
10.	White	9	9	10^9	—
11.	Golden	—	—	—	± 5%
12.	Silver	—	—	—	± 10%
13.	No Color	—	—	—	± 20%

~~(Q2) Write down the Applications~~

The four Band Color Code is the most common Variation.

→ first two Color Band gives the significant digits, third Color Band Represents the decimal multipliers and fourth Color Band is used to Represent the Percentage tolerance.

Example:- To understand Color Code we take an example.

Color sequence is
Red, Green, Red & Orange.

first significant digit (~~Red~~ Color) = 2
second " " (Green Color) = 5
multipling factor (Red Color) = $10^2 = 100$
% Tolerance (Golden) = ± 5%.

hence Resistance Value will be $R = (25) \times 10^2 \pm 5\%\ \Omega$

$$R = 2500 \pm 5\%\ \Omega$$

Range of R will be

$$2500 - 125 \leq R \leq 2500 + 125\ \Omega$$

$$2375 \leq R \leq 2625\ \Omega$$

$$\Rightarrow 2.375 \leq R \leq 2.625\ K\Omega$$

(Q2) Explain the followings -

① Resistor ② Capacitor ③ Inductor.

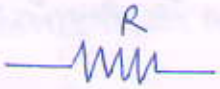
Ans:! ① Resistor:- A Resistor is passive, two terminal electrical component, that limits or Regulates the flow of electrical current in a circuit.

→ In simple words we can say Resistor is a passive devices, which opposes the current flow through it.

→ Resistance is the unique feature of a Resistor.

$V = IR$

$R = \frac{\rho l}{A}\ \Omega$

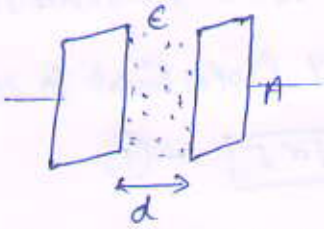
symbol:- 

unit - unit of Resistance is ohm (Ω).

② Capacitor:-

A Capacitor is a passive, two terminal electrical component, that stores Potential Energy in an Electrical field.

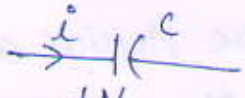
· Physical Construction of a capacitor consists of two conducting plates, in btw them dielectric material is sandwiched.



· Capacitance is the property of capacitor. $C = \frac{Q}{V}\ F$

symbol:- 

unit:- Unit of Capacitance is farad.

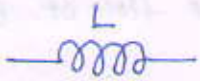
Voltage & Current Relationship:- 

$i = C \cdot \frac{dV_c}{dt}$

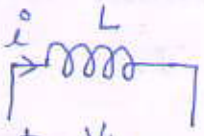
· Capacitance of a Capacitor can be given by

$C = \frac{A\epsilon}{d}$

(3) **Inductor:-** An inductor is a passive element that stores the energy in the form of magnetic field.

- In simplest form, an inductor consists of a wire loop or coil.
- Inductors are used in power supplies, transformers etc.
- **Symbol:-** 

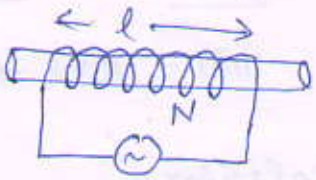
Unit:- Unit of inductance is Henry (H).

V-I Relation:- 

$$V_L = L \cdot \frac{di}{dt}$$

- The inductance of an inductor depends on its physical dimension & construction.

$$L = \frac{N^2 \mu \cdot A}{l}$$



Q3). Explain the followings -

(1). ohm's law (2). magnetic flux.

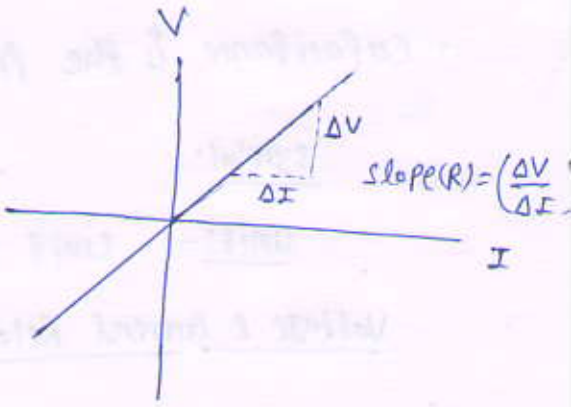
Sol). ⟹ (1) **ohm's law:-**

Ohm's law states that at constant temperature, potential difference (voltage) across the resistor is directly proportional to current flowing through it.

$$V \propto I \quad -(1)$$

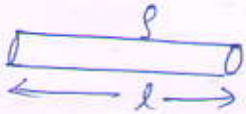
$$\Rightarrow V = R \cdot I \quad -(2)$$

R → is a constant, and known as the resistance of the material.



- R depends upon the physical construction of the resistor as,

$$R = \frac{\rho l}{A}$$



- We must remember that ohm's law is valid when conductivity of the material and operating temperature are constant.

(ii) Magnetic flux:-

The magnetic flux through a surface is the surface integral of the normal component of the magnetic field line B passing through that surface.

(or)

magnetic flux is the number of magnetic field lines passing through a surface (such as a loop of wire).

$$\boxed{\Phi_B = \vec{B} \cdot \vec{A}} \quad -(1)$$

magnetic flux is a scalar quantity.

unit:-

$$\Phi_B = B \cdot A$$

$$\Phi_B = \left(\frac{\text{Newton}}{\text{Amp}}\right) \cdot (\text{meter})^2$$

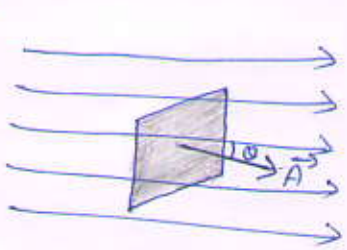
$$\Rightarrow \boxed{\Phi_B = \text{weber}}$$

unit of flux is weber.

eq.(1) can be written as

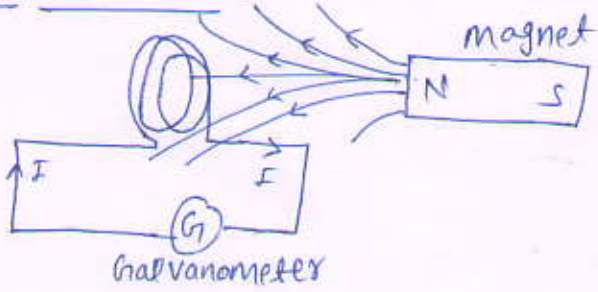
$$\boxed{\Phi_B = BA\cos\theta} \quad -(2)$$

where θ is the Angle b/w magnetic field and Area vector.



Q4] write faraday's Law of Electro-magnetic induction?

Ans:- faraday's first Law:-



"when magnetic flux linked to a coil change, an emf is induced across the ends of the coil and if circuit is completed, current will flow through it".

Faraday's second law:-

"The induced emf is directly proportional to the Rate of change of magnetic flux linked with coil".

Let ϕ_B be the flux linked with a coil. Let there be change $d\phi_B$ in the time 'dt', then induced emf across the coil, $\boxed{e \propto \frac{d\phi_B}{dt}}$ — (1)

$\Rightarrow \boxed{e = N \cdot \frac{d\phi_B}{dt}}$ — (2) $N \Rightarrow$ number of turns.

Considering the Lenz's law $\boxed{e = -N \cdot \frac{d\phi_B}{dt}}$ — (3)

Negative (-ve) sign shows that emf opposes the change in flux.