

1 Define Current and Voltage?

⇒ Current :

The rate of flow of electrons from higher potential to lower potential.

$$I = Q/t$$

(or)

$$I = \frac{dQ}{dt}$$

$Q =$ charge

$t =$ time period

$I =$ current

$$Q = It$$

Unit = ampere = (Coulomb / 1 second)

⇒ Voltage :

Amount of work done by charge is

voltage.

voltage is known as potential.

$$V = \frac{dW}{dQ}$$

$W =$ energy (J)

$Q =$ charge (C)

1 volt = 1 Joule / coulomb

Watt = 1 newton meter / coulomb.

2, State Reciprocity theorem?

When the places of voltage and current source in any network are interchanged the amount/magnitude of current and voltage flowing in the circuit remains the same.

3) Define frequency:

The no. of waves that pass a particular place in a particular time is known as frequency.

Units: $\frac{1}{\text{sec}}$ Hz (or) Cycle/sec

4, Discuss the concept of phase and phase difference?

phase $\frac{1}{\text{sec}}$

The position of the moving particle of a waveform is called phase.

It is measured in "Radians" or "degrees"

Phase difference

The time interval by which a wave leads by or lags by another wave is called phase difference or phase angle.

It is defined by ' ϕ '.

a) Define voltage regulation of a transformer?

The voltage regulation of the transformer is the percentage change in the output voltage from no-load to full-load.

b) Explain iron losses of the transformer?

This is caused due to the alternating flux in the core of the transformer is known as iron loss.

→ There are two types of iron losses:

- Eddy current
- Hysteresis

7) State the function of commutator?

The commutator on the DC generator converts the AC into pulsating DC.

8) Define slip in induction motor?

It is defined as the distinction between the flux speed (N_s) and the rotor speed (N).

→ speed of the rotor of an induction motor is always less than its synchronous speed.

→ It is usually expressed as a percentage of synchronous speed (N_s) and represented by the symbol s .

$$s = \frac{N_s - N_r}{N_s} \times 100.$$

N_s — synchronous speed

N_r — Rotational speed.

a) What are the importance of Fuse?

Fuse :-

A safety device which melts to break the circuit if the electrical current flowing through it exceeds a specified value.

Importance of Fuse :-

- Fuse is a protective device
- Fuse protects the wiring of electrical circuit.
- It protects from short-circuit currents ~~without~~.
- Inverse time - current characteristic

b) What are the types of Batteries?

A battery is a device which converts chemical energy to electrical energy and it is made up of a no. of cells.

→ There are two types of Batteries :-

- Primary Batteries.
- Secondary Batteries

11) state KVL and KCL?

Kirchoff's voltage law :-

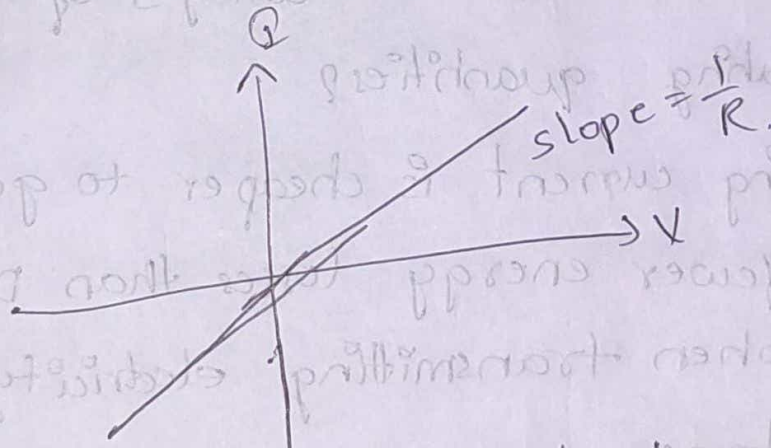
The algebraic sum of voltage in a loop is equals to zero. $\boxed{\sum V = 0}$

Kirchoff's Current law :-

In a loop the sum of total incoming currents is equals to sum of total outgoing currents.

$$\boxed{\sum I_{in} = \sum I_{out}}$$

12) Draw the $V-I$ characteristics of Resistor?



Resistor 'R' satisfies Ohm's law

$$I = \frac{V}{R}$$

So, its $I-V$ characteristic goes through the origin and has slope $\frac{1}{R}$.

13, Define Phase and Phase difference

Phase :- The position of the moving particle of a waveform is called phase

→ It is measured in "Radians or degrees."

Phase difference :-

The time interval by which a wave leads by or lags by another wave is called "phase difference" or phase angle.

→ It is defined by ' ϕ '.

14, What are the advantages of alternating quantities?

Alternating current is cheaper to generate and has fewer energy losses than Direct current when transmitting electricity over long distances.

Advantages

- Easy to interrupt the current.
- Cheap and efficient voltage stepping by use of transformers.
- low maintenance costs of high speed AC motors.

15, Define transformer ratio?

The no. of turns of the primary winding divided by the no. of turns of the secondary coil is known as transformer ratio.

$$\text{Transformer ratio } k = \frac{E_2}{E_1} = \frac{N_2}{N_1}$$

16, Explain about mutual inductance?

The property where by an e.m.f induced in a circuit by a change of flux due to current changing in an adjacent circuit is known as mutual inductance.

SI unit is Henry.

17, State Faraday's law of electromagnetic induction.

Whenever a conductor cuts a magnetic flux, dynamically, induced e.m.f is produced in it.

$$E = Blv \text{ (Volts)}$$

B = Magnetic field.

l = effective length of conductor

v = Velocity of conductor in magnetic field.

18, Explain statically induced EMF and dynamically induced EMF?

The emf induced in a coil due to change of flux linked with it is called statically induced emf.

Eg: Transformer.

Dynamically induced EMF:

The emf induced in a coil due to relative motion of the conductor and the magnetic field is called dynamically induced emf.

Eg: DC generator ~~is also an~~

19, Explain about meter board and

Distribution board:

20, list the types of cables?

Cable : A cable and wire both are same.

→ In a cable it consists of two or more conductors.

→ Cable consists of conductors, conductors with insulation, protective layer for the wire for mechanical support.

Types of cables.

→ Coaxial cable.

→ Fiber optic cable.

→ Category 5 cable

→ Twisted pair

→ Ethernet

→ Ribbon cable

21, State Ohm's law.

The current through a conductor is proportional to voltage across the conductor.

$$V \propto I$$

$$R = \frac{V}{I}$$

$$\boxed{V = IR}$$

22, State superposition theorem.

The voltage across an element in a linear circuit is the algebraic sum of the voltages across that element due to each independent source acting alone.

23, Define instantaneous value.

The value of an alternating quantity (it may be voltage or AC current or AC power) at a particular instant of time in the cycle.

24, Define Form factor?

The ratio between the average value and the RMS value is known as form factor.

$$\text{Form factor} = \frac{I_{\text{rms}}}{I_{\text{avg}}} = \frac{I_m}{\frac{I_m}{\pi}}$$

$$\frac{I_m/\sqrt{2}}{2I_m/\pi} = \frac{\pi I_m}{2\sqrt{2}I_m} = 1.1$$

$$\text{Form factor} = \frac{I_m}{I_{\text{avg}}} = \frac{I_m}{\frac{I_m}{\pi}} = \pi$$

25, Define the efficiency and regulation of transformer?

Efficiency of transformer

It is defined as the intensity or the amount of power loss with in a transformer. Therefore, the ratio of the secondary winding's output power to the primary windings input power.

$$\eta = \frac{\text{Output power}}{\text{Input power.}}$$

Regulation of transformer:

The percentage change in the output voltage from no-load to full load.

$$R = \frac{V(\text{no-load}) - V(\text{full-load})}{V(\text{no-load})} \times 100.$$

Q6, Write the conditions for the ideal transformer?

ideal transformer:

The transformer which is free from all types of losses is known as an ideal transformer.

27, Classify armature windings in DC machine?

Armature winding -

The conductors which are housed and protected within the armature slots are connected properly.

Armature windings are in DC machine -

→ Lap winding ($A = P$)

→ Wave winding ($A = 2$)

28) Write an EMF equation of a dc generator?

EMF equation of a dc generator?

$$E = \frac{NP\Phi Z}{60A} \text{ Volts}$$

29) Explain the importance of Earthing?

Earthing importance:

→ It is used to protect ~~from~~ from an electric shock.

→ To protect buildings, machinery & appliances under fault conditions.

→ Provides to easiest path to the flow of short circuit current.

30, classify the types of wires

wire :-

The bare conductors which are provided with insulation.

eg: Connecting b/w fan & switch.

Types of wires :-

→ Triplex wire

→ Main feeder wire

→ Panel feed wire

→ Non-metallic sheathed wires.

→ single strand wires.