23EET101-BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT-I ELECTRICAL CIRCUITS

1. State Ohm's law.

Ohm's law states that the voltage (v) across a resistor is directly proportional to the current (i) flowing through the resistor, at constant temperature. ie, v α i ,v = iR, where R is the resistance (Ω)

2. What is the equation of 25 cycle current sine wave having rms value of 30A?

Given,

$\gamma = 25Hz, I_{rms} = 30A$

Now, we know that:

$i = I_o \sin \omega t$

$i = I_{rms}\sqrt{2} \sin 2\pi\gamma t$

$i = 30\sqrt{2} \sin 2\pi \times 25t$

3. Recall the expression for Power Factor of an AC circuit.

- The power factor of an alternating current is defined as the ratio of the true power flowing through the circuit to the apparent power present in the circuit.

$$\text{Power factor} = \frac{\text{True power}}{\text{Apparent power}}$$

Also, cosΦ = R/Z
R- resistance in the circuit
Z- impedance of the circuit

4. Types of dependent sources

The dependent sources are classified into 4 types

1. voltage dependent voltage source (VDVS)
2. voltage dependent current source (VDCS)
3. current dependent voltage source (CDVS)
4. current dependent current source (CDCS)

5. Mention the limitations of Ohm's law.

1. Ohm's law is applicable when the temperature of the conductor is constant. Resistivity changes with temperature.
2. The relation between voltage and current depends on the sign of voltage.
3. It does not apply to semiconductors, which do not have a direct current-voltage relationship.

6. What is the expression of equivalent resistance for 'n' - number of resistors in parallel connection?

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots\ldots + \frac{1}{R_n} \text{ etc}$$

7. Define RMS Value and give its expression.

The effective value of an alternating current is that the value of direct current which produces the same heat as that produced by the alternating current when passed through the same resistance for the same interval of time .

$$RMS\ value = \sqrt{\frac{Area\ of\ the\ sqaure\ curve\ for\ one\ cycle}{period}}$$

8. What are the three types of power used in AC circuits?

i) Real or Active or True power $P=VI\cos\theta$

ii) Reactive power $Q=VI\sin\theta$

iii)Apparent power $S=VI$

9. Define electrical Potential or Voltage.
This is generally measured between two points and its unit is the volt.If the work done in moving a charge of one coulomb between any two points is 1 joule,then we say that the potential of one point with reference to the second point is 1 volt. V = dW / dQ W is the work done in joules.

10. Define power and energy. Give the expression for electrical power and energy.
Power is the rate of doing work and its unit is Watt. The unit of electric power is defined in terms of the joule per second. One joule per second is the work done when one coulomb of electricity is moved through a potential difference of one volt in one second. Power P = EI = I2R = E2/R Watts. Energy is the product of power and time. If the power remains constant at P during the period of time t seconds,

the energy equals Pt Watt-sec or Joules. Energy W = Pt = EIt = I2Rt = E2t/R Joules.

UNIT-II ELECTRICAL MACHINES

1.Tell about the emf equation of DC Generator.

$$E = \frac{PZ\varphi n}{A}$$

Where **Φ** is flux or pole within Webber
'Z' is a total no.of armature conductor
'P' is a number of poles in a generator
'A' is a number of parallel lanes within the armature
'N' is the rotation of armature in r.p.m (revolutions per minute)
'E' is the induced e.m.f in any parallel lane within the armature
'Eg' is the generated e.m.f in any one of the parallel lanes

2.Recall the purpose of yoke in DC generator.
The yoke acts as path for the magnetic flux. It also provides mechanical support and shape to the dc machine.

3.List out the applications of various types of generators.

1. The separately excited type DC generator is used for power and lighting purposes using the field regulators.
2. The series DC generator is used in arc lamps for stable current generator, lighting and booster.
3. Level compound DC generators are used to supply power to hostels, offices, lodges.
4. Compound DC generators are used for supplying power to DC welding machines.
5. A DC generator is used to compensate for the voltage drop in the feeders.

4. State Fleming Left Hand Rule.
Fleming's Left-hand rule states that if the thumb, forefinger and middle finger of the left hand are stretched into mutually perpendicular directions such that the index finger and middle finger of a stretched left hand directing the magnetic field and electric current respectively then the thumb shows the direction of motion or force acting on the conductor.

5.Tell the function of armature in a dc generator?
Its function is to rotate the conductors in a uniform magnetic field and provide a path of very low

reluctance to the magnetic flux.

6. List out the major parts of a dc generator?
Magnetic frame
Poles
Armature
Commutator
Brushes

7. Show the function of Commutator and brushes in dc generator?
The commutator converts the alternating emf into unidirectional or direct emf.
The brushes are mainly used to collect current from the commutator

8. How do you reduce the hysteresis loss in armature?
The hysteresis losses can be reduced by using low hysteresis steel containing few percentage of silicon.

9. How the purpose of inter poles in modern dc machine?
In modern machines commutating poles or inter poles are provided to improve commutation.

10. Explain the basic principle of a dc generator?
Basic principle of dc generator is Faradays law of electromagnetic induction .i.e. whenever a conductor is moved in a magnetic field, dynamically induced emf is produced in that conductor.