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, $v \propto i$, $v = iR$, 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, $\cos\Phi = R/Z$
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.