:BEEE:- 1MARK

(1) Primary winding of a transformer means the winding which receives electrical energy is called primary winding

(2) Secondary winding of a transformer means the winding which delivers electrical energy is called secondary winding

(3) Mutual Inductance is a property associated with Transformers (or) 2 or more coils with magnetic coupling.

(4) Transformer:- A Transformer is a static electrical machine transforms electric energy (power) from a certain voltage & current levels to another voltage & current levels without changing frequency.

The voltage can be raised or lowered with a proportional increase or decrease in the current

(5) Faraday's first law:- When a conductor carrying current cuts a magnetic flux, an emf is induced. This is known as Faraday's first law.

(6) Unit of inductance is Henry.

(7) Inductor stores energy in electromagnetic field.

(8) Relative permeability for air is 1

(9) The primary & secondary winding of transformer are linked each other by Mutal Induction.

(10) Frequency does not change during transformation action in transformer.

(11) Impedance in case of a series RC circuit is $Z = R + j(-X_C)$

(12) Magnetic Flux:- The total number of magnetic lines of force in the magnetic field is called Magnetic flux.

Units: Weber (Wb) $1 Wb = 10^8$ flux lines

(13) Flux density:- Magnetic flux per unit area is called Magnetic flux density.

$$\text{Flux density} = \frac{\text{Flux}}{\text{Area}}$$

Units: Wb/m^2 (or) Tesla. $B = \phi/A$. (or) $B = \mu H$

(14) MMF :- (Magneto Motive Force) :

The amount of work requires to carry a unit pole once through the entire magnetic field is called Magneto motive force.

(or)

The force behind the flow of flux or production of flux in a magnetic circuit is called MMF

$$MMF = NI \text{ (or) } MMF = Hl$$

N = No. of turns in winding

I = current flowing through winding

H = Magnetic field strength

l = current flowing through the coil

Units :- Ampere - Turns (A-T).

(15) Magnetic field strength :- (H) :-

Magneto motive force per unit length is called magnetic field strength.

$$\text{Magnetic field strength} = \frac{MMF}{\text{length}}$$

$$\boxed{H = \frac{NI}{l}} \quad \boxed{= \frac{B}{\mu}}$$

units :- Amperes Turns / metes (AT/m)

16. Reluctance:- The opposition that the magnetic circuit offers to the flux is called Reluctance.

$$\text{Reluctance} = \frac{\text{MMf}}{\text{flux}} \qquad S = \frac{HI}{\phi}$$

$$S = \frac{HI}{BA} \qquad [\because \phi = BA]$$

$$\therefore \quad S = \frac{l}{\mu A} \qquad \mu = \mu_o \mu_r$$

$$\boxed{S = \frac{l}{\mu_o \mu_r A}}$$

Units:- Ampere Turns / weber (AT/wb)

(17) ohm's law of magnetic circuit:-

$$\phi = \frac{\text{mmf}}{\text{reluctance}}$$

$\phi \propto MMF$

$MMF = \phi I$

(18) Diagram of electric equivalent of Magnetic circuit:

(19) Permeability (μ):- Permeability of material means its conductivity for the magnetic flux."

$$\mu_r = \frac{\mu}{\mu_0} \Rightarrow \mu = \mu_0 \mu_r$$

units = H/m

The permeability of magnetic material is very high.

(20) Permeance:-

(21) relation between B & H is

$$B = \mu H$$

(22) Coefficient of coupling:-

The coefficient of coupling is defined as the ratio of mutual Inductance actually present btwn the 2 coils to the maximum

[Or]

The c. of c btwn two coils is defined as the fraction of magnetic flux produced by current in one coil that links the other coil.

$$\text{Coefficient of coupling } (K) = \frac{\text{Total Flux}}{\text{Flux linking both coils}} = \frac{\phi_{12}}{\phi}$$

(23) Maximum value of coefficient of coupling is one.

(24) Transformer:- Qstn (4) is a device which steps up & step down the coil & work on M.I

(25) Types of Transformer are:-

1. Step-up Transformer:- secondary winding voltage is greater than Primary winding voltage.

2. Step-down Transformer:- secondary winding voltage is less than primary winding voltage.

(26) EMF equation of 1-phase transformer is

$$E_1 = 4.44 f \phi_m N_1$$

(27) Transformation ratio of a transformer:-
Secondary voltage to the Primary voltage is ~~x~~ ratio.

$$\frac{V_2}{V_1} = \frac{N_2}{N_1}$$

(28) Primary winding — Qstn (1)

(29) ~~Q~~stn (1)

(30) Step-up Transformer. Secondary winding voltage is greater than primary winding voltage (or) The transformer which increses the voltage.

(31) Step-down Transformer:- Secondary winding voltage is less than primary winding voltge (or) The transformer which decrese the voltage.

(32) ~~L~~ = 0.08 H
f = 60 Hz
L

$X_L = 0.08$
F = 60 Hz
L = ?

$X_L = \omega L = 2\pi f \times L$
$= 2 \times 3.14 \times 60 \times 0.08$
$X_L = 30.144$ H.

$X_L = \omega L$.
$L = \frac{X_L}{\omega}$
$= \frac{0.08}{376.8}$

(33) Power factor of a Pure inductor is $\cos 90^\circ = 0$ [lagging].

(34) $I_{rms} = 30A$

25 cycles/sec

$f = 25$

$\omega = 2\pi \times 25 = 50\pi$

$I_{rms} = \frac{I_{max}}{\sqrt{2}}$ $\quad I = \sqrt{2} I_{rms} \sin 25t$

$\sqrt{2} I_{rms}$ $\quad \boxed{I = 30\sqrt{2} \sin 50\pi t}$

(35) $E1 = A \sin \omega t$

$E2 = A \sin(\omega t - \phi)$

relation btwn E1 & E2 by

E_1 leads E_2 by ϕ.

(36) Form factor = $\frac{\text{RMS value}}{\text{Avg value}}$

220V, 50Hz

$= \frac{V_m/\sqrt{2}}{\frac{2V_m}{\pi}} = 1.11$

(37) $i = 14.14 \sin(\omega t + \pi/6)$

$I_{max} = 14.14$

$I_{rms} = \frac{I_{max}}{\sqrt{2}} = \frac{14.14}{\sqrt{2}} = \frac{14.14}{1.414}$

$\boxed{I_{rms} = 10A}$

(38) Units of Apparent power is VA.

[$\because$ Apparent Power = VI = V-A]

(39) A sinusoidal current has peak value of 12 A then what is its avg value

A) $V_m = 12$ $\quad \frac{2V_m}{\pi} = Avg$

$= 7.6433 = Avg\ value$

(40) $t = 10\ sec.$ $\quad f = 60\ Hz.$

No. of cycles a sine wave go through 10sec is No. of cycles $(N) = \frac{N}{t} = \frac{60}{10} = 6\ cycles$

$f = N/t$ $\quad =$

$N = ft = 60 \times 10 = 600$

(41) In a pure Inductive circuit, relation between V ~~I by~~ Voltage leads current by 90°.

(42) In a pure capacitor circuit, relation between VI. by _____

Voltage less current by 90°.

(43) In pure resistive circuit, relation btwn VI by V & I will be Inphase.

(44)

$f = N/t \quad N = ft$

$= 10 \times 40$

$= 400\ cycles$

(52) Time period:- The time taken to complete one revolution.

(53) Amplitude:- Maximum value obtained by an Alternating Quantity.

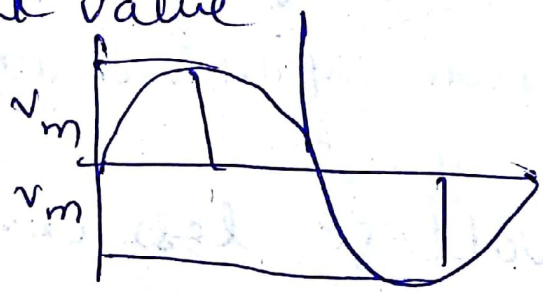
(54) Phase difference:- When two or more alternative quantities have the difference of zero points is called Phase difference.

(45) Peak to peak value

$2V_m$

$= 2 \times 10$

$= 20\,V$



(49)

$I_{rms} = 5\,mA.$

(38) $R = 10\,K\Omega = 10 \times 10^3\,\Omega$

$V_{RMS} = I_{rms} R$

$= 5 \times 10^{-3}\,A \times 10 \times 10^3$

$V_{RMS} = 50 \times 10^0\,V$

$V_{RMS} = 50\,V$

(50) The freq. of applied voltage in a series RL circuit is increased,

$X_L = \omega L = 2\pi f X_L$.

If $f \uparrow$

X_L increases