ELECTRICAL FUNDAMENTLS FPRMULAS

UNITS:-THE STANDERD USED FOR THE MESURMENT OF PHYSICAL QUANTITY IS CALLED THE **UNIT** OF THAT QUANTITY.

TYPES OF UNITS:-

1. **BASIC UNITS:-**

NAME	SYMBOL
1. LENTGTH…….	METER (m)
2. MASS…….	KILOGRAM (kg)
3. TIME……...	SECOND(s)
4. ELECTRIC CURRENT……..	AMPERE (Amp)
5. THERMODYNAMIC TEMPRATURE….	KELVINE (K)
6. LUMINOUS INTENCITY……..	CANDELA(C)
7. AMOUNT OF SUBSTANCE……..	MOL.

2. DERRIVED UNITS:- IT CONTAINS MORE THAN ONE BASIC UNITS.
EXAMPLE: - 1.VELOCITY…….m/sec.

**********PREFIX**********

PREFIX	NAME	MENING
1. T	TERA	10^12
2. G	GIGA	10^9
3. M	MEGA	10^6
4. K	KILO	10^3
5. h	HECTO	10^2
6. da	DECA	10^1
7. d	DECI	10^-1
8. c	CENTI	10^-2
9. m	MILI	10^-3
10. micro	MICRO	10^-6
11. n	NANO	10^-9
12. p	PICO	10^-12

COULOMBS LAW:-

1. **Q = It**

   Where Q = charge in coulombs.
   I = CURRENT
   t= time.

2. $$F = \frac{Q1 * Q2}{D^2}$$

   Where F = Force in N

FORCE:-

F = ma

Where F = Force in N
m = MASS IN kg.
a = acceleration.

WORK DONE IN JOULE:-

W = FS

S = DISTENCE MOVED BY BODY.

ELECTRIC POWER:-

1. **P = VI**

2. **P = I^2 * R**

3. $$P = \frac{V^2}{R}$$

ELECTRIC ENERGY:-

ELECTRIC ENERGY = POWER * TIME

********************AC FUNDAMENTAL*************************

1. INSTENIOUS VOLTAGE (vi)

Vi = Vp sin wt

Vp = peak voltage
wt= angular velocity w.r.t.time.

2. AVERAGE MEAN VALLUE:-

Va = 0.637 * Vp

3.ROOT MEAN SQURE(Vrms):-

Vrms = Vp * 0.707

4. FREQUENCY (f):-

$$Frq = \frac{N * P}{120}$$

N = ROTOR SPEED IN RPM
P = NO. OF. POLES OF M/C.

5. INDUCTOR:- CURRENT LAG THE VOLTAGE BY 90 DEGREE.

INDUCTIVE REACTANCE:-

$$XL = 2 * 3.14 * f * L$$

XL = INDUCTIVE REACTANCE
F= FREQUENCY
L = INDUCTANCE IN HENRIES.

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

6. CAPACITOR: - CURRENT LEAD THE VOLTAGE BY 90 DEGREE.

CAPACITIVE REACTANCE:-

$$XC = \frac{1}{2 * 3.14 * f * C}$$

XC = CAPACITIVE REACTANCE
F= FREQUENCY
C = CAPACITANCE IN FARADE

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

7. POWER FACTOR:- THE POWER IN PHASE WITH THE ACTIVE COMPONENT OF CURRENT (ICOS Q(Q=THETA)) ONLY GETS CONVERTED INTO USEFUL OUTPUT & IS THEREFORE TRMED AS ACTIVE POWER.ITS UNIT IS Kw.

POWER FACTOR = COS Q

****************STAR DELTA ***************************

A. <u>STAR:-</u>

$$\textbf{1. } V_p = \frac{V_L}{\sqrt{3}}$$

Vp = PHASE VOLTAGE
VL = LINE VOLTAGE

2. Ip = I(L)

Ip = PHASE CURRENT
I(L) = LINE CURRENT

1. <u>3PHASE POWER</u>:-

P = root 3 * V (L) * I (L) *COS Q

2. <u>1PHASE POWER</u>:-

P = 3 * Vp * Ip *COS Q

B. DELTA:-

$$\textbf{1. } I_p = \frac{I(L)}{\text{Root } 3}$$

Ip = PHASE CURRENT
I (L) = LINE CURRENT

2. Vp = V (L)

Vp = PHASE VOLTAGE
VL = LINE VOLTAGE

3. 3PHASE POWER:-

P = root 3 * V(L) * I(L) *COS Q

3. 1PHASE POWER:-

P = 3 * Vp * Ip *COS Q

********************TRANSFORMER***********************

PRINCIPLE: - IT WORKS ON PRINCIPLE OF **MUTUAL INDUCTION.**

$$\frac{V1}{V2} = \frac{N1}{N2}$$

********************AC MOTORS***********************

1. SYNCHRONOUS SPEED (Ns):-

$$Ns = \frac{120 * f}{P}$$

P = NO.OF POLES

F= FREQ.

2. SLIP(S):- DIFFERENCE BETWEEN SYNCHRONOUE SPEED & ROTOR SPEED.

$$S\% = \frac{[Ns - Nr]}{Ns} * 100$$

Ns = SSNCHRONOUS SPEED
Nr = ROTOR SPEED

2. MOTOR TORQUE & POWER:-

TORQUE:-

1. **T = F * r**

F = FORCE
r= REDIOUS

2. $$T = \frac{9.55 * P}{N}$$

P = POWER
N = RPM

MOTOR OUTPUT POWER:-

1HP = 0.735 KW

1KW = 1.33HP

1HP = 75 KG. m/sec.

MOTOR INPUT POWER:-

1 PHASE POWER (P) = V (L) * I(L) * COS Q

3 PHASE POWER (P) = root 3 *V (L) * I(L) * COS Q

VL = LINE VOLTAGE

I (L) = LINE CURRENT

3. INDUCTION MOTOR LOSSES & EFFICIENCY:-

$$\text{1. \%EFFICIENCY} = \frac{\text{ROTOR OUTPUT POER}}{\text{STATOR INPUT POWERE}} * 100$$

$$\text{2. \%EFFICIENCY} = \frac{\text{ROTOR OUTPUT POER}}{\text{OUTPUT POWER + LOSSES}} * 100$$

3. MOTOR OUTPUT POWER = STATOR INPUT POWER + LOSSES

*******************EQUIVALENT RESISTANCE*********************

1. **RESISTANCE IN SERIESE :-**

$$Req = R1+R2+R3+\ldots\ldots\ldots\ldots\ldots..+Rn.$$

2. **RESISTANCE IN PARALLEL:-**

$$\frac{1}{Req} = \frac{1}{R1} + \frac{1}{R2} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + \frac{1}{Rn}$$

**********************THANK YOU ****************************