Seventh Lecture

Electrical installation

1- Defenitions:

A watt: Is 1 ampere flowing under the electromotive force of 1 volt.

An Ampere: Is technically 1 coulomb per second flowing past a given point.

1 coulomb $= 6.28 \times 10^{10}$ Electron

= 1 amp.

Ohms Law = I.R

(Volt)= (amp.) × Resistance

A circuit : Is a continuous path forming a closed loop of a conductor in witch electricity can flow .

Frequencies : 60 HZ (in U.S.A….etc.)

50 HZ (Europe, Iraq. .etc)

Power : Is the ability to do work

P(power or KW) = v ×I

$= R I^2$

$$P = \frac{\text{Energy (kw./hr.)}}{\text{Time (hr.)}}$$

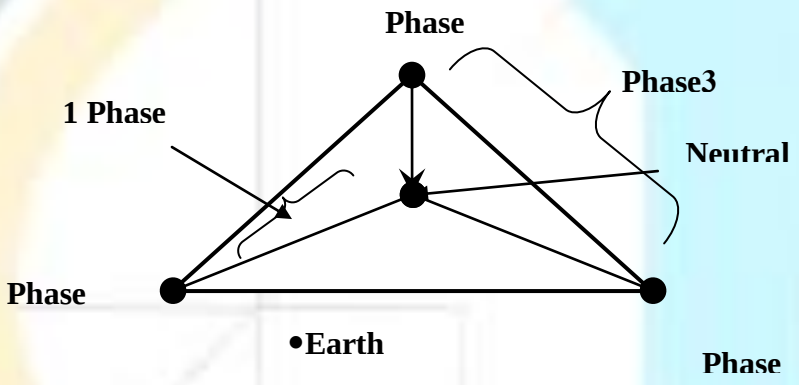
4- Types of Electrical loads :

a. Lights
b. Motors
c. Convenience outlets
d. Heating Elements
e. Electronic devices
f. Special Process Equipments

3- Types of Electrical supply:

a. Single phase (Neutral + Live+ Earth)
220V/ 240 V

b. 3 phase supply (Neutral + Live+ Earth)
380V and over



c. High Voltage Supply

Diversity Factor is usually around 60%

4- Types of Basic Wiring Systems:

a. Sheathed (usually tough rubber –RRS. or p y c

b. Conduit : Metal , Plastic or inflated tube to form a passage for wires ,up to 62 m m. Consideration to bends and Junction Boxes.Over 25 m m can be rectangular channels in screed ,and some times , have a screwed cover.

c. Mineral Wiring –(ie.Seimen) –directly buried in walls and floors .

d. Trays- galvanized Metal with Perforations.

e. Communications systems : (telephone, intercoms , networks..etc.)

Eighth Lecture

Emergency Lighting : Is lighting fixture working in case of emergency or when electric supply fails .

Types : a- self changer

b- central batteries plant.

(will require separate wiring .Services to batteries should be considered).

Lighting protection :

Max. recorded 2 million amp.

Average about 20.000 amp.

For calculation of lightening protection points on the building:(P.P)

First 100 m^2 → , we need 1 P.P.

Then for every 300 m^2 , we need 1 P.P.

The result should be brought up to correct decimal (i.e (1,2,3..etc.)

Conductor from P.P. should be linked to ground and placed externally in a safe zone.

Uninterrupted Power Supply (U P S) – As in emergency lighting but further Consideration should be given .

Stand – by - Generators – consideration to zoning connection , fueling , Maintenance and noise.

Critical protection :

a. Metal wire
b. Cartridge
c. Circuit Breaker
d. Special conductors.

Symbols : Various symbols are used by various contries . Standard I.S.O. symbols are becoming common.

a. Power symbols

- Cooker Control

-Distribution Boards

- Electric Meter

- Main control

- Power Point

-Switched Power Point

- switch

- 2 Way Switch

-Pull or Pendant Switch

- Heating Element

- Boiler

b. Lightening symbols

- Discharge Lamp

- Filament Lamp

- Lightening Colums

- Wall Light Braket Height above F.F.L.

- Fan

c. Communication Symbols

- **Bell**
- **Bell Push**
- **Clock**
- **Control Board**
- **Fire Alarm**
- **Telephone (internal)**

  (external)
- **Arial**

(note Burshular , fire ..etc.) should be noted (as above)

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