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Semester # 6

Subject # Power transimtson & distribution

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Department # Electrical

Summer Subject

(Q NO 3)

(A) Explain types of Line support?

Ans!

LINE SUPPORTS!

The Line Supports used for transmission and distribution of electrical power are of various types including.

1) wooden poles
2) steel poles
3) Rcc poles
4) Steel tubular poles

The support for an overhead Line must be capable of carrying the load due to.

Conductor
Insulator
Wind Load on the support itself

Kamran # 6990

Page # 2

(1) WOODEN POLES:

- Made of chemically treated wood.

* Used for distribution lines especially in areas where good quality wood are available.

* very economical but susceptible of decay.

* To protect from decay, poles have zinc or alluminum cap at the top and Bitumen coating at the bottom.

(2) **RCC Pole:**

* Made of reinforced concreate element.

* Stronger than wood Poles but more costly

* very long life and need little maintenance

* Bulky and heavy

* widely used for distribution line upto 33kV

* Can be manufactured at site.

Kamran Khan

ID # 6990

Page # 4

Steel tubular Poles:

* Stepped pole manufactured From a Singl tube, the diameter being reduced in parallel steps.

* More costly than Ree and wood poles.

* Havy light weight, High strength to weight ratio and long life.

* widely used for lines up to 33 KV.

Steel Pole

Used for lines OF 66kv and above

Very long life and high degree OF reliability

Can withstand very severe weather conditions.

Overhead HV, EHV, and UHV lines mostly use Self Supporting steel towers.

Name Usman Ishaq
ID 6990
Page 6

Q NO 3/B Write in detail types of insulator?

Ans: Insulator:

An electrical insulator is a material whose internal electrical charge do not flow freely- and which therefore doesn't conduct an electrical current, under the influence of an electric field.

There are several types of insulator but the most commonly used are.

1) Pin insulator
2) Suspension insulator
3) Strain insulator
4) Shackle insulator.

Kamran Khan

ID # 6990

Page # 7

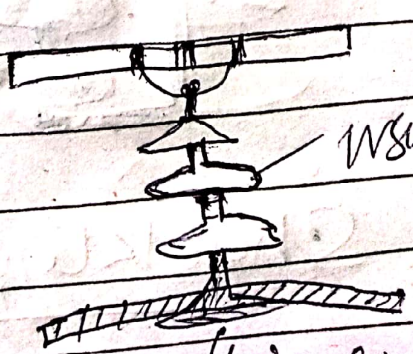
Pin type Insulator:

Pin type insulator are used for the transmission of lower voltages. A single pin type insulator is used to transmit voltages up to 11 KV and higher voltages require two, three- or four piece pin insulators. they are not economically feasible for 33 KV and higher transmission lines. these are typically used for straight-running transmission lines.

Pin types

(II) Suspension type insulator :

The conductor is suspended at the bottom end of this string while the other end of the string is secured to the cross-arm of the tower. Each unit or disc is design of of low voltage 11KV. The number of discs in series would obviously depend upon the working voltage. For instance, if the working voltage is 66 KV, then six discs in series will be provided on the string.

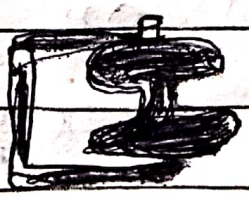


Suspension type insulator.

Kamran Khan
ID # 6990

Shackle Type Insulator:

Unlike, Strain Insulators, Shackle Insulator are designed to support lower voltage these Insulator are Single, round Porcelain part that they are frequently used for Low voltage distribution Lines. Such Insulators can be used either in horizontal portion or in a vertical position they are directly fixed to the pole with a bolt or to the cross arm.

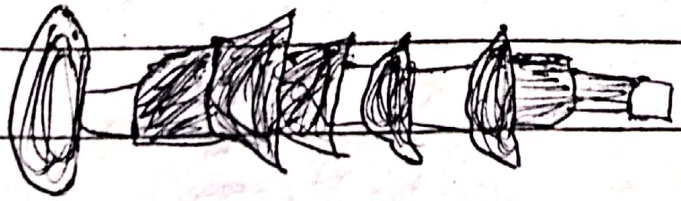


Shackle type

Kamran # Khan
ID # 6990
Page 10

Strain Type Insulator:

How ever for the high voltage transmission lines, Strain insulator consists of an assembly of suspension insulator as the disc of strain insulators are used in the vertical plane when the tension in lines is exceeding high, at long river spans, two or more strings are used in parallel.



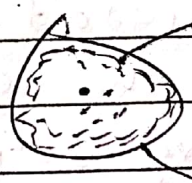
Strain type

Kamran Khan
ID # 6990
Page # 11

(Q NO 2) What do you know about
part B skin?

Ans: Skin effect:

Skin effect is the tendency of an alternating electric current (AC) to become distributed with in a conductor such that the current density is largest near the surface of the conductor, and decreases with greater depths in conductor.



How skin effect produced:

The skin effect is due to opposing eddy currents induced by the changing magnetic field resulting from the alternating current.

How to overcome skin effect:

1. Using good Conductor
2. Decreasing Frequency.

(Q NO 2/part 1) Constant OF transmissio Line

Ans!

An Ac transmission line has resistance inductance and capacitance uniformly distributed along its length. these are known as constant

The Performance OF a transmission line depends to a considerable extent upon these line constant

these constant determine whether the efficiency and voltage regulation OF the line will be good or poor.

there are two category OF constant OF transmission line.

* Primary line constant
* Secondary Line constant.

Primary line Constant!

Primary line constant is related to simple transmission in which

a simple Physical Characteristic is related to just on wire may be copper wire which is responsible for transmission

Secondary Line Constant!

Secondary Line constant is related to the transmission line but is in contrast with the primary and has a waveguide to low.

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Kamran Khan
ID # 8990
Page # 13

(Q No 1)

(A) Classification of overhead transmission lines

Ans # The transmission system is a link between power plant and load, the power system network, An over head transmission line has three constant Resistance (R) Inductance (L) and capacitance (C) The over head transmission classified into three types.

* Short transmission line:

When the length of the line is up to about 50 Km, the Line considers as short transmission line. the Line voltage is completely low < 20KV. the capacitance effect in short overhead Line is neglected. Because due to small length and lower voltage the capacitance effect is very small.

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Kamran Khan
ID # 6990
Page # 14

Medium transmission line:

When the length of the line between 50 km to 150 km and the line voltage is b/w 20 kv to 100 kv, this type of overhead line considered as a medium transmission line. In this type of transmission line the capacitance effect can not be neglect.

They are further divided into three parts Ex,

(1) End Condenser Method
(2) Nominal T Method,
(3) Nominal PI method.

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Kamran Khan
ID # 6990
Page # 15

(Q NO1)
(Part B) Three Phase Short Transmission Line

* For reason associated with economy, transmission of electric power is done by 3-Phase System.

* The System may be regardy as consisting of three Single phase units, each wire transmission on-third of the total power.

* As a matter of convenience we generally analyses 3-Phase System by considering one Phase only.

* There fore expression for the regulation, efficiency etc. drived for a Single Phase Line can also be Applied to a 3 phase System.

* Since only one phase is considered, Phase value of 3 Phase System to be taken.