

Name M. Hilal Ichan

ID 6966

Programm B. Tech Electrical

Subject Power System / Distribution

Submitted to Eng. Sajid Nawaz

Q01 (A)

(Ans) Overhead Transmission Line →
 Overhead Power transmission Lines are classified in the electrical power industry by the range of voltage - Extra high voltage (EHV) transmission. (345 kv, up to above 800 kv) used long distance very high Power transmission - ultra high voltage (UHV) higher from the stock.

(OR)

An overhead power line is a structure used in electric power transmission and distribution to transmit electrical energy across large distances.

* One or more uninsulated electrical cables suspended by towers or poles.

* Classified Over-head Transmission →
 There are three types of over-head Transmission Line.
 i Short transmission Line.
 ii Medium transmission Line.
 iii Long transmission Line.

* Short Transmission Line

In the Capacitance effect are small because the length of the overhead line is small up to 50 km and line voltage is also comparatively low (less than 80 kv).

* Medium Transmission Line

In this the length is about 50 to 150 km and the line voltage is btw 80 kv to 200 kv this line is considered as medium transmission line.

* Long transmission Line.

when the length as an overhead line is more than ^(100 to 240 km) 150 km and the line voltage is more than 240 km long transmission line. in a long transmission line parameters are uniformly distributed.

Question (02) Part (B).

Answer (B)

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Three Phase Transmission Lines.

The three phase transmission lines and distribution system consist of over-head lines and underground cables.

* Three phase electric power is a common method of alternating current electric power generation transmission and distribution, it is a type of polyphase system and is the most common method of electrical grids worldwide to transfer power.

* it is also used to power large motor and heavy loads.

* A three phase system may be arranged in star (Y) or delta (Δ) also denoted as wye in some countries.

* As a matter of convenience we generally analyse 3-phase system.

Question: 02 (Part A).

Answer \Rightarrow

Constant of Transmission Line

The four line parameters resistance (R), inductance (L), capacitance (C) and conductance (G) are known as primary constant of the transmission line.

* The transmission network is to transfer electrical energy from generating units at various locations to the distribution system which will finally supply the consumer.

* Transmission line in power system show the electrical properties as resistance, inductance, capacitance and conductance the inductance

* Capacitance are the effect of magnetic field around the conductor.

- (*) These are two type parameters constants present in transmission system one is the Primary transmission Line constant.
- (*) Secondary transmission Line constant.

The difference b/w the two lies in the waveguide present in the secondary and absent in primary.

(*) Primary Line Constant.

*) Simple transmission in which a physical characteristic is related to just one wire maybe 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



Question for Part (B)

Answer Part (B)

Skin Effect \Rightarrow

The tendency of an alternating electric current (A.C.) to become distributed within a conductor such that the current density is largest near the surface of the conductor and decreases exponentially with greater depths in the conductor. The electric current flow mainly at the 'skin' of the conductor below the outer surface and level called the skin depth.

- * The alternating current at 60 Hz in copper, the skin depth is about 8.5 mm. at high frequency, it also important at main frequency (50-60 Hz)

The steady direct current will distribute itself uniformly

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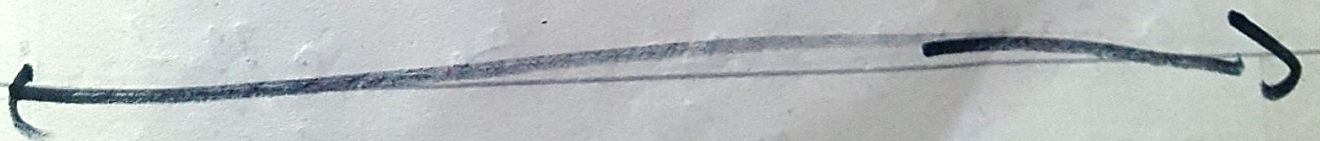
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over the whole cross section of a conductor but a.c. does not distribute.

* In fact in A.C. system no current flow through core entire current is concentrated.

* This Phenomena is called Skin Effect and it causes the resistance to increase slightly. Particularly when the diameter of the conductor is large.



Question NO-3 part (A)

Line Support:-

The main requirement of the line supports is low cost, low maintenance expense and long life. The line supports are made up of wood, concrete, steel or aluminium. It is mainly classified into four types.

Types OF Line Supports.

- * Wooden poles
- RCC poles
- Steel tubular poles
- Steel towers

Wooden Poles:

- * Made of chemically treated wood.
- * Used for distribution lines especially in areas where good quality wood are available.
- * Very economical but capable to decay.
- * To protect from decay, poles have zinc or aluminium cap at the top and Bitument coating at the Bottom.

RCC Poles:-

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- * Made of reinforced concrete cement
- * Stronger than wood poles but more costly
- * Very long life and need little maintenance
- * Bulky and heavy.
- * Widely used for distribution lines upto 33kV
- * Can be manufactured at site.

3 Steel Tubular Poles:

- * Stepped pole manufactured from a single tube, the diameter being reduced in parallel steps.
- * More costly than RCC and wood poles.
- * Have light weight, high strength to weight ratio and long life.
- * Widely used for lines upto 33kV.

4 Steel Towers:

- * 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.

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Question NO-3 (B)

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Ans-B Insulator: Types:

- Pin type insulator
- Suspension type
- Post type
- Strain insulators

1. Pin type Insulators:

- Small, simple in construction and cheap.
- Used on lines upto and including 33kV.
- For higher voltages they tend to be more heavy and costly.

2. Suspension type insulator.

- Used for lines above 33kV.
- Also known as disc or string insulator.
- Consists of porcelain disc mounted one above the other.
- The conductor is suspended below the point of support by an insulator string.
- Mechanical stresses are reduced.

3. Post Insulators:

- Used for supporting bus bars and disconnecting switches in sub-station.

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- In extra high voltage sub-station, polycor post insulators are used.
- Similar to pin insulator but has a metal base and metal cap so that more than one unit can be mounted in series.

4. Strain Insulators:

- Special mechanically strong suspension insulators.
- Similar to suspension type insulators.
- Used to take the tension of the conductor at the line terminations and at portions where there is a change in direction of line.