Unit-II **TRANSMISSION LINE PARAMETERS**

Session 1- Parameters of resistance

Quiz

1. What is resistance of materials?
2. What are the parameters of a line?
3. What are the parameters affecting resistance?
4. Classify the materials

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Giving detailed explanation on parameters of line

 Resistance

 Inductance

 Resistance



Board activity

Drawing the different conductor configuration

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Ref; <http://www.cvel.clemson.edu/Emc/calculators/TL_Calculator/index.html>

Session 2- Single and three phase transmission lines

Quiz

1. What is inductance?
2. What are the advantages of three systems?
3. What are the parameters affecting inductance?
4. Classify the transmission line arrangements

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Derivation for magnetic flux intensity

 External intensity hx =I/$2πx$

 Internal intensity hx=Ix/2$πr^{2}$

Where

 Ix=current enclosed by the path

 r = radius of the conductor

 Hx= flux density

Board activity

Drawing the different conductor configuration

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Ref; <http://www.cvel.clemson.edu/Emc/calculators/TL_Calculator/index.html>

Session 3- inductance on single phase transmission lines

Quiz

1. What is inductance?
2. List the components of flux linkages in a conductor

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Expression for inductance of a conductor

Total inductance of the input system

LT=4\*10-7\*ln(D/R) H/meter

Where

 D=distance between the two conductor

R=radius of the conductor

Board activity

Deriving the expresiion

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Ref; <http://www.cvel.clemson.edu/Emc/calculators/TL_Calculator/index.html>

Session 4- Types of conductors

Quiz

1. What are stranded conductors?
2. Advantages of bundled conductors
3. Name the materials used for conductors

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Giving detailed explanation on types of conductor

 Solid conductor

 Stranded conductor

Bundled conductor

ACSR conductor 

Board activity

Drawing the different conductor configuration

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Session 5- Symmetrical and unsymmetrical spacing

Quiz

1. What are GMD and GMR?
2. Factors affecting L
3. Name the materials used for conductors

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Giving detailed explanation on GMD and GMR

For symmetrical spacing

 L=uo /2$π[ln⁡(\frac{D}{r})]$

For unsymmetrical spacing

 L=(LA+LB+LC )/3

Where

L=Average inductance

Board activity

Drawing the different conductor configuration

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Session 6- Inductance Difference-Causes

Quiz

1. What causes differences in inductance of three conductors?
2. Symmetrical spacing.
3. Transposition of conductors.

Ref: <http://www.technoend.com/what-is-transposition-of-electrical-transmission-line/>

Presentation

Giving detailed explanation on transposition

TRANSPOSITION:

 To avoid unbalancing effect due to unsymmetrical spacing the position of the conductors are changed at regular interval at equal intervals



Board activity

Solving a problem on inductance of conductors with unsymmetrical spacing.

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Session 7- Concept of GMR and GMD

Quiz

1. What is GMD ?
2. Factors affecting L
3. GMD and GMR of different conductor arrangment

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Explaining the concept of GMD

|  |  |
| --- | --- |
|  GMD |  GMR |
| It is also called as mutual GMD | It is also called as self GMD |
| Geometrical mean of the distance from one end to other | Geometrical mean of distance between all pair of element |
| It is depend upon spacing | Independent of spacing |
| Independent on size and shape | Depend on size and shape |



Board activity

Deriving expressions for inductance in terms of GMD and GMR

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Session 8-Types of conductor on Power Transmission

Quiz

1. What is GMR?
2. Factors affecting L
3. Name the materials used for conductors

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Giving detailed explanation on types of conductor on power transmission

Advantages of conductors

Advantages of bundled conductors

 Reduced skin effect

Reduced corona loss

Advantages of ACSR conductors

 High metallic strength

 Inductace is less

Board activity

Deriving inductance expression in terms of GMD and GMR

Ref: www.egr.unlv.edu/~eebag/TRANSMISSION%20LINES.pdf‎

Session 9- Capacitance of Transmission System

Quiz

1. What causes capacitance?
2. Factors affecting C
3. Modeling of transmission lines

Ref: <http://www.skm-eleksys.com/2011/03/transmission-line-parameters-resistance.html>

Presentation

Giving detailed explanation on parameters of line

 Capacitance

less 

Board activity

Deriving capacitance expression in terms of GMD and GMR

Ref: http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter\_1/1\_13.h

Session 10- Capacitance of Three Phase Transmission System

Quiz

1. What are the different conductor arrangements?
2. Factors affecting C
3. List out the advantages double circuit lines.

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>

Presetation

Giving detailed explanation on parameters of line

 Capacitance



Board activity

Deriving capacitance expression in terms of GMD and GMR

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>

Session 11- interference from communication lines

Quiz

1. What are the different sources of interference?
2. Factors affecting interference
3. Effects of radio interference .

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>

Presentation

Giving detailed explanation on interference on line transmission

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Board activity

Deriving capacitance expression in terms of GMD and GMR

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>

Session 12- Corona-its origin and effects on power systems

Quiz

1. What are the causes of corona?
2. Factors affecting corona
3. Mention the effects of corona on power systems.

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>

Presetation

Giving detailed explanation on corona loss

What is corona effect in power system and why it occurs?

For corona effect to occur effectively, two factors here are of prime importance as mentioned below:-

1) Alternating potential difference must be supplied across the line.

2) The spacing of the conductors, must be large enough compared to the line diameter.



*Corona Effect in Transmission Line*

in terms of GMD and GMR

Ref: <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_13.html>