SNS COLLEGE OF TECHNOLOGY

COIMBATORE-35

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Staff in Charge: **S. Bharath** Course Code & Name: **19EEE308 : Smart Grid.**
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TWO MARKS QUESTION BANK

UNIT 2

1. Define inductance of a line.

   It is defined as the loop inductance per unit length of the line .Its unit is henrys per meter.

2. Define capacitance of a line.

   It is defined as shunt capacitance between the two wires per unit line length. Its unit is farads per meter.

3. What is skin effect?

   The steady current when flowing through the conductor ,does not distribute uniformly, rather it has the tendency to concentrate near the surface of the conductor. This phenomenon is called skin effect.

4. Why skin effect is absent in dc system?

   The steady current when flowing through a conductor distributes itself uniformly over thewhole cross section of the conductor .That is why skin effect is absent in dc system.

5. What is the effect of skin effect on the resistance of the line?

   Due to skin effect the effective area of cross section of the conductor through which current flow is reduced. Hence the resistance of the line is increased when ac current is flowing.

6. On what factors the skin effect depend?

   Nature of the material, Diameter of the wire , Frequency and shape of the wire.

7. Define symmetrical spacing.

   In 3 phase system when the line conductors are equidistant from each other then it is called symmetrical spacing.

8. What is the necessity for a double circuit line?

   To reduce the inductance per phase and to increase the efficiency.

9. Mention the factors governing the inductance of a line.

Radius of the conductor and the spacing between the conductors.

10. Define a neutral plane.

It is a plane where electric field intensity and potential is zero.

11. Define proximity effect.

The alternating magnetic flux in a conductor caused by the current flowing in a neighbouring conductor gives rise to a circulating current which cause an apparent increase inthe resistance of the conductor .This phenomenon is called as proximity effect.

12. What is the effect of proximity effect?

It results in the non uniform distribution of current in the cross section, and the increaseof resistance.

13. What is a composite conductor?

A conductor which operates at high voltages and composed of 2 or more subconductors and run electrically in parallel are called composite conductors.

14. What is a bundle conductor?

It is a conductor made up of 2 or more sub conductors and is used as one phase conductors.

15. Mention the advantages of using bundled conductors.

Reduced reactance, reduced voltage gradient , reduced corona loss .reduced interference

16. What is meant by transposition of line conductors?

Transposition means changing the positions of the three phases on the line supports twiceover the total length of the line .the line conductors in practice ,are so transposed that each of the three possible arrangements of conductors exit for one-third of the total length of the line .

17. Define bundled conductors?

The use of more than one conductor per phase is called bundled conductors.

18. What is skin effect?

The phenomenon of concentration of an ac current near the surface of the conductor is known as skin effect.

19. On what factors does the skin effect depends?

The skin effect depends upon the 1, type of the material 2, frequency of the current 3, diameter of conductor& shape of conductor. It increases with the increase of cross-section, permeability and supply frequency.

20. Define voltage regulation.

Voltage regulation is defined as the change in voltage at the receiving (or load) end whenthe full-load is thrown off, the sending-end (or supply) voltage and supply frequency remaining unchanged ..

% voltage regulation= ((Vs-Vr)/Vr)*100 where Vs is the voltage at the sending endVr is the receiving end voltage.

21. Define proximity effect.

The alternating magnetic flux in a conductor caused by the current flowing in a neighbouring conductor gives rise to a circulating current which cause an apparent increase inthe resistance of the conductor .This phenomenon is called as proximity effect.

22. Define transmission efficiency.

Efficiency defined as the ratio of power delivered at the receiving end to the power sent from the sending end .

23. Define Ferranti effect .

The phenomenon of rise in voltage at the receiving end of the open circuited or lightly loaded line is called the Ferranti effect .

24. What are the units of ABCD (generalised) constants of a transmission line ?

A and D are dimensionless B is in ohms and C is in Siemens (mhos)

25. Mention the range of surge impedance in underground cables .

40-60 ohms

26. Mention the range of surge impedance in overhead transmission lines .

400-600 ohms

27. Explain the requirements of planning the operation of a power system.

Planning the operation of a power system requires load studies, fault calculations, the design of means for protecting the system against lightning and switching surges and against short circuits, and studies of the stability of the system.

28. Define steady state operating condition.

A power system is said to be in a steady state operating condition, if all the measured(or calculated) physical quantities describing the operating condition of the system can be considered constant for the purpose of analysis.

29. What is a disturbance and what are the two types of disturbances?

If a sudden change or sequence of changes occurs in one or more of the system parameters or one or more of its operating quantities, the system is said to have undergone a disturbance from its steady state operating condition.

The two types of disturbances in a power system are,

i) Large disturbance ii) Small disturbance

30. What is a small disturbance? Give example.

If the power system is operating in a steady state condition and it undergoes change, which can be properly analyzed by linearized versions of its dynamic and algebraic equations, a small disturbance is said to have occurred.

Example of small disturbance is a change in the gain of the automatic voltage regulator in the excitation system of a large generating unit.

31. What is a large disturbance? Give some examples.

A large disturbance is one for which the nonlinear equations describing the dynamics of the power system cannot be validly linearized for the purpose of analysis.

Examples of large disturbances are transmission system faults, sudden load changes, loss of generating units and line switching.

32. When is a power system said to be steady-state stable?

The power system is steady state stable for a particular steady-state operating condition if, following a small disturbance, it returns to essentially the same steady state condition of operation.

33. When is a power system said to be transiently stable?

If the machines of the system are found to remain essentially in synchronism within the first second following a system fault or other large disturbance, the system is considered to be transiently stable.

34. What is transient state of the power system?

The state of the system in the first second following a system fault or large disturbance is called the transient state of the power system.

35. Give the formula to calculate base current, I_b and base impedance of a three- phase system.

The equation for base current I_b is,

$$I_b = \frac{kVA_b}{\sqrt{3}\, kV_b}$$

The equation for base impedance is,

$$Z_b = \frac{kV_b \, x1000}{\sqrt{3}\, I_b}$$

Where,

I_b = Line value of base current.
kVA_b = 3-phase base KVA
kV_b = line to line base kV
Z_b = Base impedance per phase.

36. Give the equation for load impedance and load admittance per phase of a balanced star connected load.

Load impedance per phase, $Z = \frac{|V_L|^2}{P - jQ}$

Load admittance per phase, $Y = \frac{1}{Z} = \frac{P - }{|jQ|V_L}$

Where,

P = active power of star connected load in watts.
Three Q = Three phase reactive power of star connected load in VARs.
phase V_L = Line voltage of load.

37. Give the equation for load impedance and load admittance per phase of a balanced delta connected load.

Load impedance per phase, $Z = \frac{3|V_L|^2}{P - jQ}$

Load admittance per phase, $Y = \frac{1}{Z} \quad \frac{P - jQ}{3|V_L|^2}$

Where, =

P = Three phase active power of delta connected load in watts.
Q = Three phase reactive power of delta connected load in VARs.
V_L = Line voltage of load.

38. What is the advantage of per unit method over percent method?

The advantage of per unit method over percent method is that the product of two quantities expressed in per unit is expressed in per unit itself, but the product of two quantities expressed in percent must be divided by 100 to obtain the result in percent.

39. Define base impedance and base kilovoltamperes.

The base impedance is the impedance which will have a voltage drop across it equal to the base voltage when the current flowing in the impedance is equal to the base value of the current.

$$Z_b = \frac{(kV_b)^2}{kVA_b} x1000$$

The base kilovoltamperes in single-phase systems is the product of base voltage in kilovolts and base current in amperes.

$$kVA_b = kV_b \, x \, I_b$$

40. Define per unit value of any electrical quantity.

The per unit value of any electrical quantity is defined as the ratio of the actual value of the quantity to its base value expressed as a decimal.

$$Per\,unit\,value = \frac{Actual\,value}{Base\,value}$$

41. What are the quantities whose base values are required to represent the power system by reactance diagram?

The base value of voltage, current, power and impedance are required to represent the power system by reactance diagram. Selection of base values for any two of them determines the base values of the remaining two. Usually the base values of voltage and power are chosen in kilovolt and kVA or mVA respectively. The base values of current and impedance are calculated using the chosen bases.

42. What is the need for base values?

The components of various sections of power system may operate at different voltage and power levels. It will be convenient for analysis of power system if the voltage, power, current and impedance ratings of power system components are expressed with reference to a common value called base value. Then all the voltages, power, current and impedance ratings of the components are expressed as a percent or per unit of the base value.

43. Write the equation for converting the per unit impedance expressed in one base to another.

$$Z = x \left(\frac{kV_{b,old}}{} \right)^2 x \left(MVA_{b,new} \right)$$

$$Z_{p.u,new} \quad p.u, old \quad \left| kV_{b,new} \right| \quad \left| MVA_{b,old} \right|$$

44. List the advantages of per unit computations.

(1) The per unit impedance referred to either side of a single phase transformer is the same.

(2) The per unit impedance referred to either side of a three phase transformer is the same regardless of the three phase connections whether they are Y-Y, Δ-Δ or Δ-Y