Power System MCQ with Answers PDF

1. A 3 -phase, 4-wire system is commonly used for

(a) primary distribution.

(b) secondary distribution.

(c) primary transmission.

(d) secondary transmission.

Answer: (b) secondary distribution.

2. The rated voltage of a 3-phase power system is given as

(a) RMS phase voltage.

(b) peak phase voltage.

(c) RMS line to line voltage.

(d) peak line to line voltage.

Answer: (c) RMS line to line voltage.

3. Which of the following is usually not the generating voltage ?

(a) 6.6 kV.

(b) 9.9 kV.

(c) 11 kV.

(d) 13.2 kV.

Answer: (b) 9.9 kV.

4. In a transmission system the feeder supplies power to

(a) transformer substations (step-up).

(b) service mains.

(c) distributors.

(d) all of the above.

Answer: (c) distributors.

5. Feeder is designed mainly from the point of view of

(a) its current carrying capacity.

(b) voltage drop in it.

(c) operating voltage.

(d) operating frequency.

Answer: (a) its current carrying capacity.

6. Distributors are designed from the point of view of

(a) its current carrying capacity.

(b) operating voltage.

(c) voltage drop in it.

(d) operating frequency.

Answer: (c) voltage drop in it.

7. Transmission and distribution of electric power by underground system is superior to overhead system in respect of

(a) appearance and public safety.

(b) maintenance cost.

(c) frequency of faults, power failure and accidents.

(d) all of the above.

Answer: (d) all of the above.

8. The main drawback(s) of underground system over overhead system is/are

(a) exposure to lightning.

(b) heavy initial cost.

(c) exposure to atmospheric hazards such as smoke, ice, wind etc.

(d) inductive interference between power and communication circuits.

Answer: (b) heavy initial cost.

9. The main drawback(s) of overhead system over underground system is/are

(a) underground system is more flexible than overhead system.

(b) higher charging current.

(c) surge problem.

(d) high initial cost.

Answer: (c) surge problem.

10. By increasing the transmission voltage double of its original value, the same power can be dispatched keeping the line loss

(a) equal to its original value.

(b) half of original value.

(c) double the original value.

(d) one-fourth of original value.

Answer: (d) one-fourth of original value.

11. If a fixed amount of power is to be transmitted over certain length with fixed power loss, it can be said that volume of conductor is

(a) inversely proportional to magnitude of the voltage and that of power factor of the load.

(b) inversely proportional to square of the voltage and square of power factor of the load.

(c) proportional to square of voltage and that of power factor of the load.

(d) proportional to magnitude of the voltage only.

Answer: (b) inversely proportional to square of the voltage and square of power factor of the load.

12. For the same voltage drop, increasing the voltage of a distributor n-times

(a) reduces the x-section of the conductor by n times.

(b) increases the x-section of the conductor by n times.

(c) reduces the x-section of the conductor by n^2 times.

(d) increases the x-section of the conductor by n^2 times.

Answer: (a) reduces the x-section of the conductor by n times.

13. The volume of copper required for an AC transmission line is inversely proportional to

(a) current.

(b) voltage.

(c) pf.

(d) both (b) and (c).

Answer: (d) both (b) and (c).

14. Improving pf

(a) reduces current for a given output.

(b) increases losses in line.

(c) increases the cost of station equipment.

Answer: (a) reduces current for a given output.

15. For a given amount of power to be transmitted over a certain distance with fixed power loss, the volume of copper required is

(a) directly proportional to voltage.

(b) inversely proportional to voltage.

(c) inversely proportional to the square of voltage and pf of the load.

(d) directly proportional to the square of the voltage and pf of the load.

Answer: (c) inversely proportional to the square of voltage and pf of the load.

16. For the same conductor length, same amount of power, same losses and same maximum voltage to earth, which system requires minimum conductor area?

(a) single phase AC

(b) 3 phase AC

(c) 2 wire AC

(d) 3 wire DC

Answer: (d) 3 wire DC

17. Which of the following distribution systems is preferred for good efficiency and high economy?

(a) Single-phase, 2-wire system.

(b) 2-phase, 3-wire system.

(c) 3-phase, 3-wire system.

(d) 3-phase, 4-wire system.

Answer: (d) 3-phase, 4-wire system.

18. The approximate cost ratio of a 220 kV, underground cable transmission and 220 kV overhead transmission is

(a) 50

(b) 25

(c) 13

(d) 5

Answer: (c) 13

19. With the same maximum voltage to earth, which of the following AC systems with 0.8 pf will need more copper in comparison to DC 2-wire system?

(a) Single-phase, 2-wire (midpoint earthed).

(b) Single-phase, 3-wire (neutral half of outer).

(c) Three-phase, 3-wire.

(d) Three-phase, 4-wire (neutral = outer).

Answer: (d) Three-phase, 4-wire (neutral = outer).

20. The main reason for using high voltage for long distance power transmission is

(a) reduction in transmission losses.

(b) reduction in time of transmission.

(c) increase in system reliability.

(d) none of the above.

Answer: (a) reduction in transmission losses.

21. 66 kV is suitable for transmission of power over

(a) 30 km

(b) 60 km

(c) 120 km

(d) 200 km

Answer: (b) 60 km

22. If 3 MW power is to be transmitted over a distance of 30 km, the desirable transmission voltage will be

(a) 11 kV

(b) 33 kV

(c) 66 kV

(d) 3.3 kV

Answer: (c) 66 kV

23. The highest transmission voltage used in India is

(a) 400 kV

(b) 220 kV

(c) 132 kV

(d) 765 kV

Answer: (d) 765 kV

24. If variable part of annual cost on account of interest and depreciation on the capital out lay is equal to the annual cost of electrical energy wasted in the conductors, the total annual cost will be minimum and the corresponding size of conductor will be the most economical. This statement is known as

(a) Lenz' s law.

(b) Faraday's law.

(c) Kelvin's law.

(d) Ohm's law.

Answer: (c) Kelvin's law.

25. The supports used for transmission lines should have the characteristic(s) of

(a) high mechanical strength and longer life.

(b) good looking, light in weight and easily accessible for painting and erection of line conductors.

(c) cheap in initial as well in maintenance cost.

(d) all of the above.

Answer: (d) all of the above.

27. The wooden poles well impregnated with kerosene oil or any preservative compound have life of

(a) 25 - 30 years.

(b) 20 - 25 years.

(c) 10 - 15 years.

(d) 5 - 10 years.

Answer: (a) 25 - 30 years.

28. Steel poles for transmission lines need protection against

(a) borer.

(b) termites.

(c) corrosion.

(d) all of these.

Answer: (c) corrosion.

29. RCC poles usually have the spans of

(a) 250 - 400 m.

(b) 80 - 150 m.

(c) 50 - 80 m.

(d) 25 - 50 m.

Answer: (b) 80 - 150 m.

30. In India for distribution of electric power we usually use

(a) wooden poles.

(b) steel poles.

(c) RCC poles.

(d) both (b) and (c).

Answer: (d) both (b) and (c).

31. Conductors used in HT transmission lines are stranded because of

(a) increased tensile strength.

(b) ease in handling.

(c) cheaper in cost.

(d) reduced resistivity.

Answer: (b) ease in handling.

32. Consider the following materials for line conductors :

1. Hard drawn copper.

2. Cadmium copper.

3. Aluminum.

4. Galvanized steel.

The correct sequence of the descending order of their electrical conductivities is

(a) 1, 2, 4, 3

(b) 2, 1, 4, 3

(c) 2, 1, 3, 4

(d) 1, 2, 3, 4

Answer: (d) 1, 2, 3, 4

33. Which of the following properties has got higher value for aluminum in comparison to that of copper ?

(a) Electrical resistivity.

(b) Melting point.

(c) Thermal conductivity.

(d) Specific gravity.

Answer: (a) Electrical resistivity.

34. In a 7/30 ACSR conductor why is grease put between steel and aluminum conductors?

(a) To reduce corrosion by electrolytic action between zinc (galvanizing agent on steel) and aluminum.

(b) To reduce friction between the strands.

(c) To reduce leakage of current from aluminum strands to steel strands.

(d) To eliminate air pockets.

Answer: (a) To reduce corrosion by electrolytic action between zinc (galvanizing agent on steel) and aluminum.

35. ACSR is used in place of copper in overhead lines because of

(a) higher current carrying capacity.

(b) being lighter in weight.

(c) economy.

(d) higher tensile strength.

Answer: (c) economy.

36. ACSR conductors have

(a) all conductors made of aluminum.

(b) outer conductors made of aluminum.

(c) inner conductors made of aluminum.

(d) no conductors made of aluminum.

Answer: (b) outer conductors made of aluminum.

37. "Expanded ACSR" are conductors composed of

(a) larger diameter individual strands for a given cross section of the aluminum strands.

(b) larger diameter of the central steel strands for a given overall diameter of the conductor.

(c) larger diameter of the aluminum strands only for a given overall diameter of conductor.

(d) A filter between the inner steel and the outer aluminum strands to increase the overall diameter of the conductor.

Answer: (b) larger diameter of the central steel strands for a given overall diameter of the conductor.

38. The function of steel wire in an ACSR conductor is to

(a) compensate for skin effect.

(b) take care of surges.

(c) provide additional mechanical strength.

(d) reduce inductance.

Answer: (c) provide additional mechanical strength.

39. The material used for the manufacture of ground wire is

(a) aluminum.

(b) galvanized steel.

(c) cast iron.

(d) stainless steel.

Answer: (b) galvanized steel.

40. Guy wire is employed for

(a) providing protection against surges.

(b) providing emergency earth route.

(c) supporting the pole.

(d) all of the above.

Answer: (c) supporting the pole.

41. The sag of a transmission line is least affected owing to

(a) weight of the conductor.

(b) current through the conductor.

(c) atmospheric temperature.

(d) ice deposition on the conductor.

Answer: (b) current through the conductor.

42. Effect of temperature rise in overhead lines is to

(a) increase the sag and decrease the tension.

(b) decrease the sag and increase the tension.

(c) increase both.

(d) decrease both.

Answer: (a) increase the sag and decrease the tension.

43. The sag of a transmission line conductor in summer is

(a) less than that in winter.

(b) more than that in winter.

(c) same as in winter.

Answer: (b) more than that in winter.

44. In a transmission line, sag depends upon

(a) span length.

(b) tension in conductors.

(c) weight of the conductor per unit length.

(d) all of the above.

Answer: (d) all of the above.

45. Which of the following statements is correct?

(a) Ice on conductors increases skin effect.

(b) Wind pressure reduces corona effect.

(c) Wind pressure is taken to act at perpendicular to that for ice.

(d) Ice on conductors reduces sag.

Answer: (c) Wind pressure is taken to act at perpendicular to that for ice.

46. Wind loading in coastal regions is in the range of

(a) 40 - 50 kg/m^2

(b) 150 kg/m^2

(c) 96 kg/m^2

Answer: (b) 150 kg/m^2

47. The maximum tension in a section of overhead line conductor between two supports of unequal height occurs at

(a) the higher support.

(b) the lower point.

(c) the midpoint of the conductor.

(d) None of the above.

Answer: (a) the higher support.

48. Stringing chart is useful

(a) for finding the sag in the conductor.

(b) in the design of tower.

(c) in the design of insulator string.

(d) finding the distance between towers.

Answer: (a) for finding the sag in the conductor.

49. Hot template curves are plots of

(a) temperature and humidity.

(b) conductor sag and span lengths.

(c) conductor weight and sag.

(d) none of the above.

Answer: (b) conductor sag and span lengths.

50. The effect of wind pressure is more predominant on

(a) insulators.

(b) transmission lines.

(c) supporting towers.

(d) none of the above.

Answer: (c) supporting towers.

51. Galloping in transmission line conductors arises due to

(a) asymmetrical layers of ice formation.

(b) vortex phenomenon in light winds.

(c) heavy weight of the line conductors.

(d) adoption of horizontal conductor configuration.

Answer: (a) asymmetrical layers of ice formation.

52. Which one of the following is reduced by using stock bridge dampers on power overhead transmission lines?

(a) Sag.

(b) Conductor vibration.

(c) Line losses.

(d) Mechanical tension.

Answer: (b) Conductor vibration.

53. The sag of the conductors of a transmission line is 2.5 m when the span is 250 m. Now if the height of supporting tower is increased by 25%, the sag will

(a) reduce by 25%

(b) increase by 25%

(c) reduce by 12.5%

(d) remain unchanged.

Answer: (d) remain unchanged.

54. For a 400 kV line, the spacing between phase conductors is around

(a) 8 m.

(b) 11 m.

(c) 14 m.

(d) 17 m.

Answer: (a) 8 m.

55. Stranded conductors usually have a central wire around which there are successive layers of 6,12,18,24 wires. For n-layers, the total number of individual wires is

(a) 3n(n + 1)

(b) 2n(n + 1)

(c) 3n(n + 1) + 1

(d) 2n(n + 1) + 1

Answer: (c) 3n(n + 1) + 1

56. The diameter of each strand is d then the diameter of n-layer stranded conductor will be

(a) (2n + 1)d

(b) 3(n + 1)d

(c) (2n - 1)d

(d) 3(n - 1)d

Answer: (a) (2n + 1)d

57. Strain type insulators are used

(a) at dead ends.

(b) at intermediate anchor towers.

(c) on straight runs.

(d) any of (a) or (b).

Answer: (d) any of (a) or (b).

58. Wavy structure of pin insulator increases its

(a) mechanical strength.

(b) puncture strength.

(c) flash-over voltage.

(d) thermal strength.

Answer: (c) flash-over voltage.

59. The voltage rating of a multiple shell (petticoat or rainshed) pin type insulator unit cannot be increased beyond a limiting value by increasing the number of shells, because

(a) the internal voltage distribution between shells becomes unequal.

(b) the leakage path resistance starts diminishing.

(c) the disruptive critical voltage for the material of the insulator is reached.

(d) the puncture voltage of the material of the insulator is reached.

Answer: (a) the internal voltage distribution between shells becomes unequal.

60. Which type of insulators are used on 132 kV transmission lines ?

(a) Pin type.

(b) Disc type.

(c) Shackle type.

(d) Pin and Shackle type.

Answer: (b) Disc type.

61. Whenever the conductors are dead-ended or there is a change in the direction of transmission line, the insulators used are of the

(a) Pin type.

(b) Suspension type

(c) Strain type.

(d) Shackle type.

Answer: (c) Strain type.

62. Post type insulators are generally used in lines operating

(a) above 100 kV.

(b) below 33 kV.

(c) at any voltage level, HV or EHV.

Answer: (c) at any voltage level, HV or EHV.

63. The number of discs in a string of insulators for 400 kV AC overhead transmission line lies in the range of

(a) 32 to 33

(b) 22 to 23

(c) 15 to 16

(d) 9 to 10

Answer: (b) 22 to 23

64. The non-uniform distribution of voltage across the units in a string of suspension type insulators is due to

(a) unequal self-capacitance of the units.

(b) non-uniform distance of separation of the units from the tower body.

(c) the existence of stray capacitance between the metallic junctions of the units and the tower body.

(d) non-uniform distance between the cross-arms and the units.

Answer: (c) the existence of stray capacitance between the metallic junctions of the units and the tower body.

65. The voltages across the various discs of a string of suspension insulators having identical discs is different due to

(a) surface leakage currents.

(b) series capacitance.

(c) shunt capacitance to ground.

(d) series and shunt capacitances.

Answer: (c) shunt capacitance to ground.

66. The string efficiency of a string of suspension insulators is dependent on

(a) size of the insulators.

(b) number of discs in the string.

(c) size of tower.

Answer: (b) number of discs in the string.

67. 100 per cent string efficiency means

(a) one of the insulator discs shorted.

(b) zero potential across each disc.

(c) equal potential across each insulator disc.

(d) none of the above.

Answer: (c) equal potential across each insulator disc.

68. In a suspension type insulator the potential drop is

(a) maximum across the lowest disc.

(b) maximum across the topmost disc.

(c) uniformly distributed over the discs.

Answer: (a) maximum across the lowest disc.

69. If the frequency of a transmission system is changed from 50 Hz to 100 Hz, the string efficiency

(a) will increase.

(b) will decrease.

(c) remain unchanged.

(d) may increase or decrease depending on the line parameters.

Answer: (c) remain unchanged.

70. The string efficiency of a high-voltage line is around

(a) 100%

(c) 40%

(b) 80%

(d) 10%

Answer: (b) 80%

71. In three-unit insulator string, voltage across the lowest unit is 17.5 kV and string efficiency is 84.28%. The total voltage across the string will be equal to

(a) 8.285 kV

(b) 44.25 kV

(c) 88.25 kV

(d) 442.5 kV [U.P.S.C. I.E.S.]

Answer: (b) 44.25 kV

72. Two-insulator discs of identical capacitance value C makes up a string for a 22 kV, 50 Hz, single-phase overhead line insulation system. If the pin to earth capacitance is also C, then the string efficiency is

(a) 50%

(b) 75%

(c) 90%

(d) 86% [I.E.S. 2003]

Answer: (b) 75%

73. In a cable the sheath radius is R and conductor radius is r. As r changes from 0.5R to 0.25R the maximum voltage gradient in the dielectric

(a) decreases by about 6%.

(b) increases by about 6%.

(c) increases by about 15%.

(d) decreases by about 15%

Answer: (b) increases by about 6%.

74. Consider the following statements : In the case of suspension type insulators, the string efficiency can be improved by

1. using a longer cross arm.

2. using a guard ring.

3. grading the insulator discs.

4. reducing the cross-arm length.

Of these statements

(a) 1, 2, and 3 are correct.

(b) 2, 3 and 4 are correct.

(c) 2 and 4 are correct.

(d) 1 and 3 are correct.

Answer: (a) 1, 2, and 3 are correct.

75. The ratio of puncture voltage to the flash-over voltage of a line insulator is

(a) equal to 1

(b) lower than 1

(c) much greater than 1

Answer: (c) much greater than 1

76. The insulators may fail due to

(a) flash over.

(b) short-circuits.

(c) deposition of dust.

(d) any of the above.

Answer: (d) any of the above.

77. The purpose of guard ring in transmission lines is to

(a) reduce the earth capacitance of the lowest unit.

(b) increase the earth capacitance of the lowest unit.

(c) reduce the transmission line losses.

(d) none of the above.

Answer: (a) reduce the earth capacitance of the lowest unit.

78. The use of a guard ring

(a) equalizes the voltage division between insulator discs.

(b) is unnecessary complication.

(c) decreases string efficiency.

Answer: (a) equalizes the voltage division between insulator discs.

79. Corona is

(a) partial breakdown of air.

(b) complete breakdown of air.

(c) sparking between lines.

Answer: (b) complete breakdown of air.

80. Which of the following statements is true regarding corona ?

(a) Corona takes place at a voltage lower than breakdown voltage.

(b) Corona takes place at a voltage higher than breakdown voltage.

(c) Corona is a current phenomenon.

(d) Corona increases the transmission line efficiency.

Answer: (a) Corona takes place at a voltage lower than breakdown voltage.

81. Which of the following statements regarding corona are true ?

1. It causes radio interference.

2. It attenuates lightning surges.

3. It amplifies switching surges.

4. It causes power loss.

5. It is more prevalent in the middle conductor of a transmission line employing a flat conductor configuration.

Select the correct answer using the codes given below. Codes:

(a) 1, 3, 5

(b) 2, 3, 4

(c) 1, 2, 4, 5

(d) 2, 3, 4, 5

Answer: (c) 1, 2, 4, 5

82. Corona is accompanied by

(a) violet visible discharge in darkness

(b) hissing sound.

(c) vibration.

(d) power loss.

(e) radio-interference.

(f) ozone.

(g) all of the above.

Answer: (g) all of the above.

83. Ozone effect can be detected by

(a) presence of ozone detected by odor.

(b) hissing sound.

(c) faint luminous glow of bluish color.

(d) all of the above.

Answer: (d) all of the above.

84. Corona loss increases with

(a) decrease in conductor size and increase in supply frequency.

(b) increase in both conductor size and supply frequency.

(c) decrease in both conductor size and supply frequency.

(d) increase in conductor size and decrease in supply frequency.

Answer: (a) decrease in conductor size and increase in supply frequency.

85. The good effect of corona on overhead lines is to

(a) increase the line carrying capacity due to conducting ionized air envelope around the conductor.

(b) increase the power factor due to corona loss.

(c) reduce the radio interference from the conductor.

(d) reduce the steepness of surge fronts.

Answer: (d) reduce the steepness of surge fronts.

86. Compared with a solid conductor of the same radius, corona appears on a stranded conductor at a lower voltage, because stranding

(a) assists ionization.

(b) makes the current flow spirally about the axis of the conductor.

(c) produces oblique sections to a plane perpendicular to a axis of the conductor.

(d) produces surfaces of smaller radius.

Answer: (d) produces surfaces of smaller radius.

87. Corona loss can be reduced by the use of hollow conductors because

(a) the current density is reduced.

(b) the eddy current in the conductor is eliminated.

(c) for a given cross section, the radius of the conductor is increased.

(d) of better ventilation in the conductor.

Answer: (c) for a given cross section, the radius of the conductor is increased.

88. Bundled conductors reduce

(a) surface electric stress of conductor.

(b) increases the line reactance.

(c) decreases the line capacitance.

Answer: (a) surface electric stress of conductor.

89. Corona loss in a transmission line is dependent on

(a) diameter of the conductor.

(b) material of the conductor.

(c) height of the conductor.

Answer: (a) diameter of the conductor.

90. Corona occurs between two transmission conductors when they

(a) have high potential difference.

(b) are closely spaced.

(c) carry DC power.

(d) both (a) and (b).

Answer: (d) both (a) and (b).

91. In humid weather, the corona occurs at a voltage

(a) much less than that needed in fair weather.

(b) much higher than that needed in fair weather.

(c) equal to that needed in fair weather.

(d) none of the above.

Answer: (a) much less than that needed in fair weather.

92. The effect of corona is

(a) increased energy loss.

(b) increased reactance.

(c) increased inductance.

(d) all of the above.

Answer: (a) increased energy loss.

93. The charging current in a transmission line increases due to corona effect because corona increases

(a) line current.

(b) effective line voltage.

(c) power ions in lines.

(d) the effective conductor diameter.

Answer: (d) the effective conductor diameter.

94. The chances of occurrence of corona are maximum during

(a) humid weather.

(b) dry weather.

(c) winter.

(d) hot summer.

Answer: (a) humid weather.

95. Corona is likely to occur maximum in case of

(a) distribution lines.

(b) transmission lines.

(c) domestic wiring.

(d) service mains.

Answer: (b) transmission lines.

96. Corona is affected by

(a) size of conductor.

(b) shape and surface condition of the conductor.

(c) operating voltage.

(d) all of the above.

Answer: (d) all of the above.

97. The only advantage of corona is that it

(a) produces a pleasing luminous glow.

(b) makes line current sinusoidal.

(c) works as a safety valve for surges.

(d) ozone gas is produced.

Answer: (c) works as a safety valve for surges.

98. Presence of ozone owing to corona

(a) improves the pf.

(b) reduces the pf.

(c) corrodes the material.

(d) improves regulation.

Answer: (c) corrodes the material.

99. What is the approximate breakdown strength of atmospheric air at N.T.P.?

(a) 0.3 kV/cm.

(b) 1.0 kV/cm.

(c) 3 kV/cm.

(d) 30 kV/cm.

Answer: (d) 30 kV/cm.

100. The dielectric strength of air under normal condition is about

(a) 100 kV_p/cm

(b) 21.1 kV_p/cm

(c) 30 kV_p/cm

(d) 200 kV_p/cm

Answer: (c) 30 kV_p/cm

101. Disruptive corona begins in smooth cylindrical conductors in air at NTP if the electric field intensity at the conductor surface goes up to

(a) 21.1 $kV_{(rms)}$/cm.

(b) 21.1 $kV_{(peak)/}$cm.

(c) 21.1 $kV_{(average)}$/cm

(d) 21.1 $kV_{(rms)}$/m.

Answer: (a) 21.1 $kV_{(rms)}$/cm.

102. The dielectric strength of air is

(a) proportional to barometric pressure.

(b) proportional to absolute temperature.

(c) inversely proportional to barometric pressure.

(d) none of the above.

Answer: (a) proportional to barometric pressure.

103. Visual critical voltage is

(a) lower than disruptive critical voltage.

(b) higher than disruptive critical voltage.

(c) equal to critical voltage.

(d) none of the above.

Answer: (b) higher than disruptive critical voltage.

104. Critical voltage limit of a transmission line is increased by

(a) increasing the radius of the conductors.

(b) increasing the spacing between conductors.

(c) reducing the spacing between conductors.

(d) reducing the radius of the conductors.

Answer: (a) increasing the radius of the conductors.

105. The maximum permissible value of fair weather corona loss for an HV line is

(a) 0.6 kW/3-phase km.

(b) 1.2 kW/3-phase km.

(c) 0.3 kW/3-phase km.

(d) 2.4 kW/3-phase km.

Answer: (d) 2.4 kW/3-phase km.

106. Corona losses are minimized when

(a) conductor size is reduced.

(b) smooth conductor is used.

(c) sharp points are provided in the line hardware.

(d) current density in conductors is reduced.

Answer: (b) smooth conductor is used.

107. The corona loss on a particular system at 50 Hz is 1 kW/km per phase. What is the corona loss at 60 Hz in kW/km per phase?

(a) 0.83

(b) 1.0

(c) 1.13

(d) 1.2

Answer: (c) 1.13

108. Corona loss can be reduced by using

(a) solid conductor of diameter 'd'.

(b) hollow conductor of diameter 'd +δd' .

(c) bundle conductor.

(d) both (a) and (b).

(e) both (b) and (c).

Answer: (e) both (b) and (c).

109. In a transmission line the distributed constants are

(a) resistance and shunt conductance only.

(b) resistance and inductance only.

(c) resistance, inductance and capacitance only.

(d) resistance, inductance, capacitance and shunt conductance.

Answer: (d) resistance, inductance, capacitance and shunt conductance.

110. Skin effect depends upon

(a) x-section of conductor.

(b) supply frequency.

(c) permeability of conductor material.

(d) all of the above.

Answer: (d) all of the above.

111. Skin effect in transmission line is due to

(a) supply frequency.

(b) self inductance of conductor.

(c) high sensitivity of material in the centre.

(d) both (a) and (b).

Answer: (d) both (a) and (b).

112. The effective resistance of a conductor will be the same as ohmic resistance when

(a) voltage is low.

(b) current is true sinusoidal.

(c) current is uniformly distributed in the x-section of the conductor.

Answer: (c) current is uniformly distributed in the x-section of the conductor.

113. When an alternating current flows through a conductor

(a) entire current passes through the core of the conductor.

(b) portion of conductor near the surface carries more current in comparison to the core.

(c) current remains uniformly distributed over the whole x-section of the conductor.

(d) portion of conductor near the surface carries less current in comparison to the core.

Answer: (b) portion of conductor near the surface carries more current in comparison to the core.

114. The conductor carries more current on the surface in comparison to its core. This phenomenon is called the

(a) skin effect.

(c) Ferranti effect.

(b) corona.

(d) Lenz's effect.

Answer: (a) skin effect.

115. Increasing the frequency of transmission line will

(a) increase shunt reactance.

(b) decrease line resistance.

(c) increase line resistance.

(d) decrease series reactance.

Answer: (c) increase line resistance.

116. Skin effect exists in

(a) cable carrying dc current.

(b) dc transmission line only.

(c) ac transmission line only.

(d) dc as well as ac transmission lines.

Answer: (c) ac transmission line only.

117. Skin effect in a conductor becomes more pronounced

(a) at higher frequency.

(b) at lower frequency.

(c) at dc.

Answer: (a) at higher frequency.

118. The skin effect in conductor results in

(a) increases in its dc resistance.

(b) decrease in its ac resistance.

(c) increase in its ac resistance.

Answer: (c) increase in its ac resistance.

119. Skin effect

(a) increases the effective resistance and effective internal reactance.

(b) reduces the effective resistance and effective internal reactance.

(c) increases the effective resistance but reduces the effective internal reactance.

(d) reduces the effective resistance but increases the effective internal reactance.

Answer: (c) increases the effective resistance but reduces the effective internal reactance.

120. The skin effect of a conductor reduces with the increase in

(a) supply frequency.

(b) resistivity of the conductor material.

(c) x-section of conductor.

(d) permeability of conductor material.

Answer: (b) resistivity of the conductor material.

121. Skin effect in conductor is proportional to

(a) $(\text{diameter of conductor})^{1/2}$.

(b) diameter of conductor.

(c) $(\text{diameter of conductor})^{2}$.

(d) $(\text{diameter of conductor})^{4}$.

Answer: (c) $(\text{diameter of conductor})^{2}$.

122. In order to reduce the skin effect at UHF

(a) copper tubes with silver plating are used.

(b) copper rods with silver plating are used.

(c) anodized conductors are used.

(d) painted conductors are used.

Answer: (a) copper tubes with silver plating are used.

123. The component inductance due to the internal flux-linkage of anon-magnetic straight solid circular conductor per meter length, has a constant value, and is independent of the conductor diameter, because

(a) All the internal flux due to a current remains concentrated on the peripheral region of the conductor.

(b) The internal magnetic flux density along the radial distance from the centre of the conductor increases proportionately to the current enclosed.

(c) The entire current is assumed to flow along the conductor axis and the internal flux is distributed uniformly and concentrically.

(d) The current in the conductor is assumed to be uniformly distributed throughout the conductor cross section.

Answer: (d) The current in the conductor is assumed to be uniformly distributed throughout the conductor cross section.

124. Consider a long, two-wire line composed of solid round conductors. The radius of both conductors is 0.25 cm and the distance between their centers is 1 in. If this distance is doubled, then the inductance per unit length

(a) doubles.

(b) halves.

(c) increases but does not double.

(d) decreases but does not halve.

Answer: (c) increases but does not double.

125. The inductance of single-phase two-wire power transmission line per km gets doubled when the

(a) distance between the wires is doubled.

(b) distance between the wires is increased four fold.

(c) distance between the wires is increased as square of the original distance.

(d) radius of the wire is doubled.

Answer: (c) distance between the wires is increased as square of the original distance.

126. Inductance of an overhead line, in comparison to that of a cable of same capacity is

(a) larger.

(b) smaller.

(c) of the same order.

Answer: (a) larger.

127. The inductance of a power transmission line increases with

(a) decrease in line length.

(b) increase in diameter of conductor.

(c) increase in spacing between the phase conductors.

(d) increase in load current carried by the conductors.

Answer: (c) increase in spacing between the phase conductors.

128. The inductance of a transmission line is minimum when

(a) GMD is high.

(b) GMR is high.

(c) both GMD and GMR are high.

(d) GMD is low and GMR is high.

Answer: (d) GMD is low and GMR is high.

129. For a given conductor the value of GMR is

(a) larger for capacitance calculation.

(b) larger for inductance calculation.

(c) same for both capacitance and inductance calculation.

Answer: (a) larger for capacitance calculation.

130. The self GMD of a conductor with three strands each of radius r and touching each other is

(a) $r\ (0.7788 \times 2 \times 2)^{1/3}$

(b) r (0.7788 x 2 x 2 x 2)

(c) $r\ (0.7788 \times 2 \times 2 \times 2)^{3}$

(d) $r\ (0.7788 \times 2 \times 2)^{3}$

Answer: (a) $r\ (0.7788 \times 2 \times 2)^{1/3}$

131. Hollow conductors are used in transmission lines to

(a) reduce weight of copper.

(b) improve stability.

(c) reduce corona.

(d) increase power transmission capacity.

Answer: (c) reduce corona.

132. Bundled conductors arc employed to improve

(a) appearance of the transmission line.

(b) mechanical stability of the line.

(c) current carrying capacity of the line.

(d) corona performance of the line.

Answer: (d) corona performance of the line.

133. In by transmission, the spacing between sub-conductors of a bundle is approximately

(a) 20 cm

(b) 40 cm

(c) 80 cm

(d) 3.5 cm

Answer: (b) 40 cm

134. For a stranded conductor, the ratio of GMR to actual radius is

(a) equal to 1.

(b) more than 1.

(c) equal to 0.7788.

(d) less than 0.7788

Answer: (d) less than 0.7788

135. Bundled conductors in EHV transmission system provide

(a) reduced capacitance.

(b) increased capacitance.

(c) increased inductance.

(d) increased voltage gradient.

Answer: (b) increased capacitance.

136. Which one of the following statements is not correct for the use of bundled conductors in transmission lines?

(a) Control of voltage gradient.

(b) Reduction in corona loss.

(c) Reduction in radio interference.

(d) Increase in interference with communication lines.

Answer: (d) Increase in interference with communication lines.

137. Bundled conductors are mainly used in high voltage overhead transmission lines to

(a) reduce transmission line losses.

(b) increase mechanical strength of the line.

(c) reduce corona.

(d) reduce sag.

Answer: (c) reduce corona.

138. D_s, is the GMR of each sub-conductor of a four sub-conductor bundle conductor and d is the bundle spacing. What is the GMR of the equivalent single conductor?

(a) $1.09 \sqrt{(D_s \times d^3)}$

(b) $1.09 \sqrt{(D_s^3 \times d^3)}$

(c) $1.09 (D_s^3 \times d^3)^{1/4}$

(d) $1.09 (D_s \times d^3)^{1/4}$

Answer: (d) $1.09 (D_s \times d^3)^{1/4}$

139. Proximity effect

(a) is more pronounced for large conductors, high frequencies and close proximity.

(b) increases the resistance of the conductors and reduces the self reactance.

(c) is substantially eliminated with stranded conductors.

(d) all of the above.

Answer: (d) all of the above.

140. Following effects are associated with transmission lines

1. Skin effect. 2. Corona effect. 3. Proximity effect.

The effective resistance of a conductor is increased by

(a) 1 only.

(b) 2 and 3 only.

(c) 1 and 3 only.

(d) 1, 2 and 1.

Answer: (d) 1, 2 and 1.

141. Capacitance in equivalent circuit of a transmission line is due to

(a) current in the line.

(b) difference in potential of line.

(c) leakage of current.

(d) presence of magnetic flux.

Answer: (b) difference in potential of line.

142. If the separation between the three phases of a transmission line is increased then

(a) the inductance will increase and capacitance will remain unchanged.

(b) both the inductance and capacitance will increase.

(c) the inductance will increase and the capacitance will decrease.

(d) the inductance will decrease and the capacitance will increase.

Answer: (c) the inductance will increase and the capacitance will decrease.

143. The capacitance of an overhead transmission line increases with

1. increases in mutual geometrical mean distance.

2. increase in height of conductors above ground.

Select the correct answer from the following:

(a) Both 1 and 2 are true.

(b) Both 1 and 2 are false.

(c) Only 1 is true.

(d) Only 2 is true.

Answer: (b) Both 1 and 2 are false.

144. The charging reactance of 50 km length of the line is 1500 Ω. What is the charging reactance for 100 km length of the line?

(a) 1500 Ω

(b) 3000 Ω

(c) 750 Ω

(d) 600 Ω

Answer: (c) 750 Ω

145. Bundled conductors are used to

(a) reduce inductance of the line.

(b) reduce both inductance and capacitance.

(c) reduce corona loss.

(d) reduce corona loss and the line inductance.

Answer: (d) reduce corona loss and the line inductance.

146. A 3-phase overhead transmission line has its conductors horizontally spaced with spacing between adjacent conductors equal to 'd.' If now the conductors of the line are rearranged to form an equilateral triangle of sides equal to `d' then

(a) average capacitance and inductance will increase.

(b) average capacitance will decrease and inductance will increase.

(c) average capacitance will increase and inductance will decrease.

(d) surge impedance loading of the line increases. [GATE E.E. 1993]

Answer: (c) average capacitance will increase and inductance will decrease.

147. Proximity of a line to the earth surface

(a) does not affect its capacitance to neutral.

(b) increases the capacitance to neutral.

(c) decreases the capacitance to neutral.

Answer: (b) increases the capacitance to neutral.

148. If the effect of earth is taken into account, then the capacitance of line to ground

(a) decreases.

(b) increases.

(c) remains unaltered.

(d) becomes infinite.

Answer: (b) increases.

149. For equilateral spacing of conductors of an untransposed 3-phase line, we have

(a) balanced receiving-end voltage and communication interference.

(b) unbalanced receiving-end voltage and no communication interference.

(c) balanced receiving-end voltage and communication interference.

(d) unbalanced receiving-end voltage and communication interference.

Answer: (a) balanced receiving-end voltage and communication interference.

150. Transmission lines are transposed to

(a) reduce corona loss.

(b) reduce skin effect.

(c) prevent interference with neighboring telephone lines.

(d) prevent short-circuit between any two lines.

Answer: (c) prevent interference with neighboring telephone lines.

151. Transposition of transmission line is done to

(a) reduce line loss.

(b) reduce skin effect.

(c) balance line voltage drop.

(d) reduce corona.

Answer: (c) balance line voltage drop.

152. High voltage transmission lines are transposed because then

(a) corona losses can be minimized.

(b) computation of inductance becomes easier.

(c) voltage drop in the lines can be minimized.

(d) phase voltage imbalances can be minimized.

Answer: (d) phase voltage imbalances can be minimized.

153. The concept of an electrically short, medium and long line is primarily based on the

(a) nominal voltage of the line.

(b) physical length of the line.

(c) wavelength of the line.

(d) power transmitted over the line.

Answer: (b) physical length of the line.

154. Equivalent π model is quite suitable for analyzing the performance of transmission line of

(a) 50 km length.

(b) 150 km length.

(c) 250 km length.

(d) All of the above lengths.

Answer: (c) 250 km length.

155. Which of the following is neglected while analyzing a short transmission line ?

(a) Shunt admittances.

(b) Power losses.

(c) Series impedance.

(d) None of the above.

Answer: (a) Shunt admittances.

156. In modeling the equivalent circuit of a short length overhead transmission line, the line resistance and inductance are only considered because line capacitance to ground is

(a) equal to zero.

(b) finite but very small.

(c) finite but very large.

(d) infinite.

Answer: (b) finite but very small.

157. As compared to sending-end voltage, the receiving-end voltage of a short line under no-load condition is

(a) higher.

(b) lower

(c) remains the same.

Answer: (a) higher.

158. Which of the following voltage regulation is considered to be the best ?

(a) 2%

(b) 30%

(c) 70%

(d) 98%

Answer: (a) 2%

159. The regulation of a line at full load 0.8 pf lagging is 12%. The regulation at full-load 0.8 pf leading can be

(a) 24%

(b) 18%

(c) 12%

(d) 4%

Answer: (d) 4%

160. If in a short transmission line, resistance and inductive reactance are found to be equal and regulation appears to be zero, then the load will

(a) have unity power factor.

(b) have zero power factor.

(c) be 0.707 leading.

(d) be 0.707 lagging.

Answer: (c) be 0.707 leading.

161. If X is the inductive reactance/phase and R is the resistance/phase of a short transmission line, what is the power factor angle of the load for maximum voltage regulation?

(a) $\cos^{-1} X/R$

(b) $\tan^{-1} X/R$

(c) $\cos^{-1} R/X$

(d) $\tan^{-1} R/X$

Answer: (b) $\tan^{-1} X/R$

162. For a short line if the receiving-end voltage is equal to sending-end voltage under loaded conditions

(a) the sending-end power factor is unity.

(b) the receiving-end power factor is unity.

(c) the sending-end power factor is leading.

(d) the receiving-end power factor is leading.

Answer: (d) the receiving-end power factor is leading.

163. A single phase transmission line of impedance j0.8 ohm supplies a resistive load of 500 A at 300 V. The sending-end power factor is

(a) unity.

(b) 0.8 lagging.

(c) 0.8 leading

(d) 0.6 lagging.

Answer: (d) 0.6 lagging.

164. For an ac transmission line of length not exceeding 80 km, it is usual to lump the line capacitance at

(a) the sending end.

(b) the receiving end.

(c) the midpoint.

(d) any convenient point.

Answer: (b) the receiving end.

165. If L, C and Y are the inductance, capacitance and shunt admittance of a line per unit length, then for length *l*.

(a) the shunt admittance is Y.*l*.

(b) the inductance is L÷*l*.

(c) the capacitance is C÷*l*.

(d) the shunt admittance is Y÷*l*.

Answer: (a) the shunt admittance is Y.*l*.

166. Transmission efficiency of a transmission line increases with the

(a) decrease in power factor and voltage.

(b) increase in power factor and voltage.

(c) increase in power factor but decrease in voltage.

(d) increase in voltage but decrease in power factor.

Answer: (b) increase in power factor and voltage.

167. Under no-load conditions, the current in a transmission line is because of

(a) capacitance effect.

(b) corona effect.

(c) proximity effect.

(d) back flow from earth.

Answer: (a) capacitance effect.

168. Which of the following statements are correct ?

(a) Flow of unduly heavy current is Ferranti effect.

(b) Ferranti effect occurs under unloaded condition of line.

(c) The rise in receiving-end voltage is Ferranti effect.

(d) Both (b) and (c) combined is Ferranti effect.

Answer: (d) Both (b) and (c) combined is Ferranti effect.

169. In a long transmission line under no-load condition

(a) the receiving-end voltage is less than the sending and voltage.

(b) the sending-end voltage is less than the receiving-end voltage.

(c) the sending-end voltage is equal to the receiving-end voltage.

(d) none of these.

Answer: (b) the sending-end voltage is less than the receiving-end voltage.

170. When is the Ferranti effect on long overhead lines experienced?

(a) The line is lightly loaded.

(b) The line is heavily loaded.

(c) The line is fully loaded.

(d) The power factor is unity.

Answer: (a) The line is lightly loaded.

171. Ferranti effect happens in transmission line when the line is

(a) short and loaded.

(b) long and loaded.

(c) long and unloaded.

(d) none of these.

Answer: (c) long and unloaded.

172. The ABCD constants of a 3 phase transposed transmission line with linear and passive elements

(a) are always equal.

(b) never equal.

(c) A and D are equal.

(d) B and C are equal.

Answer: (c) A and D are equal.

173. The values of A, B, C and D constants for a short transmission line are respectively

(a) Z, 0, 1 and 1.

(b) 0, 1, 1 and Z.

(c) 1, Z, 0 and 1.

(d) 1, 1, Z and O.

Answer: (c) 1, Z, 0 and 1.

174. The angle of A, constant of the transmission line normally lies between

(a) 90° - 70°

(b) 70° - 40°

(c) 40° - 40°

(d) 10°- 0°

Answer: (d) 10°- 0°

175. For a transmission line with resistance R, reactance X and negligible capacitance, the generalized constant A is

(a) 0

(b) 1

(c) R + j X

(d) R + X

Answer: (b) 1

176. The value of the 'A' parameter of a transmission line

(a) increases with the increase in length of the line.

(b) decreases with the increase in line length.

(c) is independent of line length.

Answer: (a) increases with the increase in length of the line.

177. For a medium length transmission line, A is

(a) equal to B.

(b) equal to C.

(c) equal to D.

(d) not equal to any of the above.

Answer: (c) equal to D.

178. The generalized constant A for a medium line has magnitude

(a) close to but less than 1.

(b) close to but greater than 1.

(c) nearly equal to the series impedance of the line.

Answer: (a) close to but less than 1.

179. For transmission line which one of the following relations is true?

(a) AD - BC = 1

(b) -AD - BC = 1

(c) AD - BC = -1

(d) AD - BC = 0

Answer: (a) AD - BC = 1

180. Which one of the following equations is correct?

(a) -AB + CD = -1

(b) AD + CD = 1

(c) AB - CD = -1

(d) -AD + BC = -1 where A, B, C and D are generalized circuit constants.

Answer: (d) -AD + BC = -1