Power System MCQ PDF

1. The frequency of carrier in the carrier current pilot scheme is in the range of

(a) 1 kHz to 10 kHz.

(b) 10 kHz to 25 kHz.

(c) 25 kHz to 50 kHz.

(d) 50 kHz to 500 kHz.

Answer: (d) 50 kHz to 500 kHz.

2. The frequency of carrier transmitted by microwave pilot is in the range of

(a) 1,000 kHz to 1,50G kHz

(b) 1000 kHz to 5,000 kHz

(c) 900 MHz to 6,000 MHz

(d) 10,000 MHz to 15,000 MHz

Answer: (c) 900 MHz to 6,000 MHz

3. In carrier current protection the purpose of the wave-trap is for

(a) trapping power frequency waves.

(b) trapping high frequency waves entering into generators/ transformer unit.

(c) both (a) and (b).

(d) none of the above.

Answer: (b) trapping high frequency waves entering into generators/ transformer unit.

4. A line trap in carrier current relaying tuned to carrier frequency presents

(a) high impedance to carrier frequency but low impedance to power frequency.

(b) low impedance to both carrier and power frequency.

(c) high impedance to both carrier and power frequency.

(d) low impedance to carrier frequency but high impedance to power frequency.

Answer: (a) high impedance to carrier frequency but low impedance to power frequency.

5. A line trap in a long transmission line is used to

(a) improve the power factor.

(b) dampen the overvoltage oscillations.

(c) confine the carrier signals in the line.

(d) protect the line against direct lightning stroke.

Answer: (c) confine the carrier signals in the line.

6. Line trap and coupling capacitors are used for carrier current protection in which

(a) line trap has high impedance to 50 Hz signal but low impedance to carrier current signal whereas a coupling capacitor has low impedance to 50 Hz signal but high impedance to carrier signal.

(b) line trap has low impedance to 50 Hz signal but high impedance to carrier current signal, where as a coupling capacitor has high impedance to 50 Hz signal but low impedance to carrier signal.

(c) both the line trap and coupling capacitor have low impedance to 50 Hz signal but high impedance to carrier current signal.

(d) both the line trap and coupling capacitor have high impedance to 50 Hz signal but low impedance to carrier current signal.

Answer: (b) line trap has low impedance to 50 Hz signal but high impedance to carrier current signal, where as a coupling capacitor has high impedance to 50 Hz signal but low impedance to carrier signal.

7. In a 3-step distance protection, the reach of the three zones of the relay at the beginning of the first line typically extends into

(a) 100% of the first line, 50% of the second line and 20% of the third line.

(b) 80% of the first line, 50% of the second line and 20% of the third line.

(c) 80% of the first line, 50% of the second line and 10% of the third line.

(d) 50% of the first line, 50% of second line and 20% of the third line.

Answer: (b) 80% of the first line, 50% of the second line and 20% of the third line.

8. Distance protection scheme is preferred over graded time-lag over-current protection in HV and EHV lines because

(a) it is faster in operation.

(b) it is simple.

(c) it is cheaper in cost.

(d) all of the above.

Answer: (a) it is faster in operation.

9. Three step time-distance characteristic of distance relay can be had by

(a) changing taps on voltage transformer.

(b) separate measuring elements for zones 2 and 3.

(c) switching resistance in relay restraint circuit at pre-set time intervals by means of timer element.

(d) any of the above.

Answer: (d) any of the above.

10. Lightning is a huge spark caused by electrical discharge taking place between

(a) clouds.

(b) within the same cloud.

(c) cloud and earth.

(d) any of the above.

Answer: (d) any of the above.

11. Switching over-voltages are more hazardous than lightning surges in case of

(a) low voltage system.

(b) 33 kV system.

(c) EHV and UHV systems.

(d) all of these.

Answer: (c) EHV and UHV systems.

12. The overvoltage surges in power systems may be caused by

(a) lightning.

(b) resonance.

(c) switching.

(d) all of these.

Answer: (d) all of these.

13. Requirements of protection power station buildings against direct strokes are

(a) interception.

(b) conduction.

(c) dissipation.

(d) reflection and convection.

(e) (a), (b) and (c).

Answer: (e) (a), (b) and (c).

14. The protection against direct lightning strokes and high voltage steep waves is provided by

(a) ground wires.

(b) lightning arresters.

(c) lightning arresters and ground wires.

(d) earthing of neutral.

Answer: (c) lightning arresters and ground wires.

15. Which of the following factors should be considered in the design of a transmission line against lightning with ground wire?

(a) Mechanical strength of ground wire.

(b) Clearance between line conductor and ground wire.

(c) Clearance between line conductor and earth.

(d) All of the above.

Answer: (d) All of the above.

16. For protection of rotating machines against lightning surges……..is used

(a) lightning arrester.

(b) capacitor.

(c) combination of lightning arrester and capacitor.

(d) lightning conductor and arrester.

Answer: (c) combination of lightning arrester and capacitor.

17. Consider the following statements. To provide reliable protection for a distribution transformer against over-voltages using lightning arresters, it is essential that the

1. lead resistance is high.

2. distance between the transformer and the arrester is small.

3. transformer and the arrester have a common interconnecting ground.

4. spark-over voltage of the arrester is greater than the residual voltage.

Of these statements.

(a) 1, 3 and 4 are correct.

(b) 2 and 3 are correct.

(c) 2, 3 and 4 are correct.

(d) 1 and 4 are correct.

Answer: (b) 2 and 3 are correct.

18. Impulse ratios of insulators and lightning arresters should be

(a) both low.

(b) high and low respectively.

(c) low and high respectively.

(d) both high.

Answer: (b) high and low respectively.

19. Lighting arresters are used in power systems to protect electrical equipments against

(a) direct strokes of lightning.

(b) over-voltages due to indirect lightning stroke.

(c) power frequency over-voltages.

(d) over-currents due to lightning.

Answer: (c) power frequency over-voltages.

20. Which of the following is the protective device against lightning over-voltages?

(a) Rod gaps.

(b) Surge absorbers.

(c) Horn gaps.

(d) All of the above.

Answer: (d) All of the above.

21. Overhead ground wires are used to protect a transmission line against

(a) line-to-ground faults.

(b) arcing earths.

(c) voltage surges due to direct lightning stroke.

(d) high voltage oscillations due to switching.

Answer: (c) voltage surges due to direct lightning stroke.

22. An overhead transmission line is provided with earth wire for protection against

(a) switching surge.

(b) lightning surge.

(c) power frequency over-voltage.

(d) none of these.

Answer: (b) lightning surge.

23. In a thyrite lightning arrester the resistance

(a) varies linearly with the applied voltage.

(b) increases with the applied voltage.

(c) decreases linearly with the applied voltage.

(d) is high at low current and low at high current.

Answer: (d) is high at low current and low at high current.

24. An ideal surge diverter should have the characteristics

(a) its power frequency breakdown or spark-over must be above normal or abnormal fundamental frequency.

(b) when the value of voltage transient peak exceeds the spark-over value of the surge diverter, a conducting path to earth must be provided.

(c) after occurrence of breakdown, it must carry the resulting discharge current without any damage to it.

(d) after breakdown the power frequency current must be interrupted as soon as the transient voltage has dropped below the breakdown value.

(e) all of the above.

Answer: (e) all of the above.

25. Consider the following statements:

1. Present-day surge diverters use nonlinear resistance elements.

2. A travelling wave is usually represented as a step wave in the analysis.

3. A travelling wave suffers reflection when it reaches a discontinuity.

4. The function **f(vx ± t)** represents a travelling wave.

Which of the above statements is/are correct? .

(a) 1 only.

(b) 1 and 2 only.

(c) 1, 2 and 3.

(d) 3 and 4 only.

Answer: (c) 1, 2 and 3.

26. A lightning arrester provides

(a) low impedance path.

(b) high impedance path.

(c) low resistance path.

(d) high resistance path between line and earth during operation.

Answer: (a) low impedance path.

27. Surge absorbers are used for protection against

(a) high voltage low frequency oscillations.

(b) high voltage high frequency oscillations.

(c) low voltage high frequency oscillations.

(d) low voltage low frequency oscillations.

Answer: (c) low voltage high frequency oscillations.

28. Surge modifiers are employed for

(a) reducing the steepness of wavefront.

(b) reducing the current of wavefront.

(c) reducing the voltage of wavefront.

(d) modify the shape of the wavefront.

Answer: (a) reducing the steepness of wavefront.

29. Which of the following are the important limitations of rod gap surge arresters ?

1. They are not capable of sealing off power frequency follow up current.

2. After a discharge, the rods are destroyed completely.

3. Performance is affected by climatic conditions.

Use the following codes for selecting the correct answer.

(a) 1, 2 and 3

(b) 1 and 2

(c) 2 and 3

(d) 1 and 3

Answer: (d) 1 and 3

30. A thyrite type lightning arrester

(a) blocks the surge voltage appearing in a line.

(b) absorbs the surge voltage appearing in a line.

(c) offers a low resistance path to the surge appearing in a line.

(d) returns the surge back to the source.

Answer: (c) offers a low resistance path to the surge appearing in a line.

31. A lightning arrester connected between the line and earth in a power system

(a) protects the terminal equipment against travelling surges.

(b) protects the terminal equipment against direct lightning stroke.

(c) suppresses high frequency oscillations in the line.

(d) reflects back the travelling waves approaching it.

Answer: (a) protects the terminal equipment against travelling surges.

32. Which of the following is a non-linear diverter?

(a) Expulsion type arrester.

(b) Valve type arrester.

(c) Electrolytic type arrester.

(d) Rod gap arrester.

Answer: (b) Valve type arrester.

33. A valve type lightning arrestor in a substation should be placed

(a) close to the circuit breaker.

(b) close to the transformer.

(c) away from the transformer.

(d) none of these.

Answer: (b) close to the transformer.

34. Surge absorber

(a) absorbs

(b) reflects

(c) diverts the energy of travelling waves

(d) partly absorbs and partly diverts

Answer: (d) partly absorbs and partly diverts

35. Coupling factor of a ground wire can be increased by

(a) reducing the footing impedance.

(b) increasing the ground wire size.

(c) using cantilever rods on the crossing along with the areas of ground wire.

(d) all of the above.

Answer: (d) all of the above.

36. In the presence of corona, electrostatic coupling…….and electro-magnetic coupling……..

(a) decrease, increases.

(b) increases, decreases.

(c) increases, remains the same.

(d) remains the same, decreases.

Answer: (c) increases, remains the same.

37. When a transmission line is energized,……..propagate on it.

(a) voltage wave only

(b) current wave only

(c) both voltage and current waves

(d) none of the above.

Answer: (c) both voltage and current waves

38. When a wave propagates on a transmission line, it suffers reflection several times at

(a) load end.

(b) sending end.

(c) sending end and other end.

(d) tapping point.

Answer: (c) sending end and other end.

39. Travelling voltage wave and current wave have the same waveforms and travel together along the transmission line at a velocity

(a) of sound.

(b) of light.

(c) slightly lesser than that of light.

(d) slightly lesser than that of sound.

Answer: (c) slightly lesser than that of light.

40. The relation between travelling voltage wave and current wave is given as

(a) ei = √(L/C)

(b) e/i = √(L/C)

(c) ei = √(LC)

(d) e/i = √(LC)

Answer: (b) e/i = √(L/C)

41. For a transmission line the standing wave ratio is the ratio of

(a) peak voltage to rms voltage.

(b) maximum current to minimum current.

(c) maximum voltage to minimum voltage.

(d) maximum impedance to minimum impedance.

Answer: (c) maximum voltage to minimum voltage.

42. The steepness of the wavefront can be reduced by connecting

(a) an inductor in series with the line.

(b) a capacitor between line and earth.

(c) either (a) or (b).

(d) an inductor between line and earth or a capacitor in series with the line.

Answer: (c) either (a) or (b).

43. If a travelling wave travelling along a loss-free overhead line does not result in any reflection after it has reached the far end, then the far end of the line is

(a) open circuited.

(b) short circuited.

(c) terminated into a resistance equal to surge impedance of the line.

(d) terminated into a capacitor.

Answer: (c) terminated into a resistance equal to surge impedance of the line.

44. A rectangular voltage wave is impressed on a loss-free overhead line, with the far end of the line being short-circuited. on reaching the end of this line

(a) the current wave is reflected back with positive sign, but the voltage wave with negative sign.

(b) the current wave is reflected back with negative sign, but the voltage wave with positive sign.

(c) both the current and the voltage waves are reflected with positive sign.

(d) both the current and the voltage waves are reflected with negative sign.

Answer: (a) the current wave is reflected back with positive sign, but the voltage wave with negative sign.

45. Consider the following statements for transmission lines :

1. When a transmission line is terminated by its characteristic impedance the line will not have any reflected wave.

2. For a finite line terminated by its characteristic impedance the velocity and current at all points on the line are exactly same.

3. For a lossless half wave transmission line the input impedance is not equal to load impedance.

Which of the statements given above are correct ?

(a) 1 and 2 only.

(b) 2 and 3 only.

(c) 1 and 3 only.

(d) 1, 2 and 3.

Answer: (a) 1 and 2 only.

46. The reflection coefficient for the voltage wave in overhead lines is given as

(a) $R_o \div (R_o - R_L)$

(b) $R_L \div (R_o - R_L)$

(c) $(R_L - R_o) \div (R_L + R_o)$

(d) $(R_L + R_o) \div (R_o - R_L)$

Answer: (c) $(R_L - R_o) \div (R_L + R_o)$

47. The insulation coordination for UHV lines (above 500 kV) is done based on

(a) lightning surges.

(b) lightning surges and switching surges.

(c) switching surges.

(d) none of the above.

Answer: (c) switching surges.

48. In comparison to line insulation, the insulation level of the station equipment is

(a) less.

(b) more.

(c) equal.

(d) not related directly with each other.

Answer: (d) not related directly with each other.

49. When a wave reaches an open circuit the……..at the termination is/are double the incident value(s)

(a) voltage

(b) current

(c) both the voltage and current

Answer: (a) voltage

51. When a wave reaches a short-circuit the……..at the termination is/are zero

(a) voltage

(b) current

(c) both the voltage and current

Answer: (a) voltage

52. A backward wave means a

(a) negative voltage wave.

(b) negative current wave.

(c) a wave travelling in the negative direction.

Answer: (c) a wave travelling in the negative direction.

53. The size of the earth wire is determined on the basis of

(a) voltage of the service line.

(b) current carrying capacity of the service line.

(c) atmospheric conditions.

(d) none of the above.

Answer: (b) current carrying capacity of the service line.

54. Neutral earthing is provided for

(a) the safety of personnel from electric shock.

(b) the safety of equipment and personnel against lightning and voltage surges.

(c) reducing the voltage stress on lines and equipment with respect to earth under various operating and fault conditions.

(d) controlling the earth fault currents for protective relaying.

(e) both (c) and (d).

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

55. Isolated neutral system has the disadvantage(s) of

(a) voltage oscillations.

(b) difficult earth fault relaying.

(c) persistent arcing ground.

(d) all of the above.

Answer: (d) all of the above.

56. Isolated neutral transmission system is not recommended as the

(a) system insulation is overstressed due to over-voltages.

(b) insulation overstress may lead to its failure resulting in phase-to-phase faults.

(c) system is not adequately protected against earth fault.

(d) all of the above.

Answer: (d) all of the above.

57. Neutral earthing has the advantage(s) of

(a) elimination of arcing grounds.

(b) low maintenance and operating costs over isolated neutral systems.

(c) simplified design of earth fault protection.

(d) discharging of over-voltages due to lightning to earth.

(e) all of the above.

Answer: (e) all of the above.

58. The advantage of neutral earthing is

(a) safety of personnel.

(b) reduction of earth fault current.

(c) elimination of arcing ground.

(d) none of the above.

Answer: (c) elimination of arcing ground.

59. Resistance earthing is employed for voltages between

(a) 3.3 and 11 kV.

(b) 11 and 33 kV.

(c) 33 and 66 kV.

(d) 66 kV and 132 kV.

Answer: (a) 3.3 and 11 kV.

60. Earthing of transformer neutral through reactance will improve its

(a) transient stability.

(b) steady state stability.

(c) both of the above.

(d) none of these.

Answer: (a) transient stability.

61. The reflection coefficient at the load end of a short-circuited line is

(a) zero.

(b) 1 ∠0°

(c) 1 ∠90°

(d) 1 ∠180°

Answer: (d) 1 ∠180°

62. A short length of cable between the dead end tower and the power transformer

(a) reduces the steepness of the wave under certain conditions only.

(b) always reduces the steepness of the incident wave.

(c) steepness of the incident wave remains unaffected.

Answer: (b) always reduces the steepness of the incident wave.

63. The insulation strength of an EHV transmission line is mainly governed by

(a) load power factor.

(b) switching overvoltages.

(c) harmonics.

(d) corona.

Answer: (b) switching overvoltages.

64. Which of the following neutral systems will require the lightning arrester of least voltage rating ?

(a) Insulated.

(b) Solidly earthed.

(c) Resistance earthed.

(d) Reactance earthed.

Answer: (b) Solidly earthed.

65. Petersan coil is used for

(a) grounding of system neutral.

(b) to reduce fault current.

(c) connecting two interconnected systems

(d) for shunt compensation of transmission lines.

Answer: (a) grounding of system neutral.

66. Which one of the following grounding methods is used to reduce the tower footing resistance where earth resistance is low?

(a) Single driven rod.

(b) Multiple rods.

(c) Counter poises.

(d) Plates.

Answer: (c) Counter poises.

68. Tower footing resistance of a transmission tower should be

(a) as high as possible.

(b) as low as possible.

(c) moderately high.

(d) moderately low.

Answer: (b) as low as possible.

69 The method of neutral grounding affects the

(a) positive-sequence network.

(b) negative-sequence network.

(c) zero-sequence network.

(d) both positive and zero-sequence networks.

Answer: (c) zero-sequence network.

70. The earth transformer is used to

(a) avoid the harmonics in the transformers.

(b) provide artificial neutral earthing where neutral point is not accessible.

(c) improve stability, pf the system.

(d) measure the voltage.

Answer: (b) provide artificial neutral earthing where neutral point is not accessible.

71. The positive, negative and zero-sequence impedances of a solidly grounded system under steady-state condition always follow the relations

(a) $Z_o < Z_1 < Z_2$

(b) $Z_1 > Z_2 > Z_o$

(c) $Z_1 < Z_2 < Z_3$

(d) $Z_o > Z_1 > Z_2$

Answer: (b) $Z_1 > Z_2 > Z_o$

72. In an isolated neutral system, when a single line to ground fault occurs

(a) persistent arcing grounds will be developed.

(b) voltage in the healthy phases rise to full line value causing insulation breakdown.

(c) the capacitive current in the faulty phase rises to 3 times its normal value.

(d) all of the above.

Answer: (d) all of the above.

73. The voltage of a transmission line can be controlled by

(a) excitation control.

(b) using induction regulator.

(c) reactive VAR injection methods.

(d) any of the above.

Answer: (c) reactive VAR injection methods.

74. The voltage of a particular bus is regulated by controlling the

(a) active power of the bus.

(b) reactive power of the bus.

(c) phase angle.

(d) phase angle and reactive power.

Answer: (b) reactive power of the bus.