Power System MCQ PDF

1. In ac distribution system the voltage can be controlled by using

(a) tap changing transformer.

(b) booster transformer

(c) induction regulator.

(d) any of the above.

Answer: (d) any of the above.

2. Tap changing transformers are employed for

(a) stepping down the voltage.

(b) stepping up the voltage.

(c) supplying low voltage current to instruments.

(d) both stepping up and stepping down the voltage.

Answer: (d) both stepping up and stepping down the voltage.

3. The best location for use of a booster transformer in a transmission line is

(a) at the sending end.

(b) at the receiving end.

(c) at the intermediate point.

(d) any where in the line.

Answer: (c) at the intermediate point.

4. For voltage control in ac distribution system the induction regulators have the advantage(s) of

(a) reliability of operation.

(b) operation independent of load and power factor variations.

(c) stepless voltage variations without acing or short-circuiting of turns as in the case of transformers.

(d) all of the above.

Answer: (d) all of the above.

5. A line voltage regulator is to be used in a single phase 200 V, 5 kVA system to keep the voltage constant for voltage variations within ± 10%. The rating (in kVA) of the voltage regulator is

(a) 0.05

(b) 0.5

(c) 5

(d) 50

Answer: (b) 0.5

4. Series capacitor is used in a transmission line to

(a) compensate the voltage drop.

(b) reduce line losses.

(c) limit short-circuit current.

(d) improve load power factor.

Answer: (a) compensate the voltage drop.

5. Shunt compensation in an EHV line is used to improve

(a) stability and fault level.

(b) fault level and voltage profile.

(c) voltage profile and stability.

(d) stability, fault level and voltage profile.

Answer: (b) fault level and voltage profile.

6. ……are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.

(a) Condensers.

(b) Resistors.

(c) Reactors.

(d) Condensers, resistors or reactors.

Answer: (a) Condensers.

7. The combined effect of series and shunt compensation on transmission lines in terms of degree of series compensation (K_{se}), degree of shunt compensation (K_{sh}), and surge impedance of uncompensated line (Z_o) is given by which one of the following equations ?

(a) $Z'_o = Z_o \sqrt{(1 - K_{se}).\sqrt{(1 - K_{sh})}}$

(b) $Z'_o = [\sqrt{(1 - K_{se}).\sqrt{(1 - K_{sh})}}] \div Z_o$

(c) $Z'_o = Z_o[(1 - K_{se}) \div (1 - K_{sh})]^{1/2}$

(d) $Z'_o = Z_o[(1 - K_{sh}) \div (1 - K_{se})]^{1/2}$

Answer: (c) $Z'_o = Z_o[(1 - K_{se}) \div (1 - K_{sh})]^{1/2}$

8. Consider the following statements : Addition of lumped capacitances in parallel to a loss-free transmission line increases

1. characteristic impedance.

2. propagation constant.

3. system stability.

4. charging current.

Which of these statements are correct ?

(a) 1 and 3

(b) 2 and 4

(c) 2, 3 and 4

(d) 1, 2 and 4

Answer: (b) 2 and 4

9. What will happen if a short-circuit fault occurs in a switched capacitor controlled reactor?

(a) Oscillation.

(b) Capacitor discharge.

(c) Over voltage.

(d) Noise.

Answer: (a) Oscillation.

10. An AC capacitor is to be switched in parallel with AC line using back to back connected thyristor. What is the firing angle of thyristor for first switching?

(a) 0°

(b) 180°

(c) 90°

(d) 45°

Answer: (c) 90°

11. Which of the following is provided with arcing horns?

(a) Isolator.

(b) Air-break switch.

(c) Oil switch.

(d) None of the above.

Answer: (b) Air-break switch.

12. Pole mounted substations are used in

(a) primary transmission system.

(b) secondary transmission system.

(c) primary distribution system.

(d) secondary distribution system.

Answer: (d) secondary distribution system.

13. With large reactance interconnector between two power stations

(a) the power stations may fall out of step due to large angular displacement between the power stations.

(b) power will be transferred with minimum power losses.

(c) power will be transferred with voltage fluctuations and noise.

(d) none of the above.

Answer: (a) the power stations may fall out of step due to large angular displacement between the power stations.

14. AC network analyzer is employed for solving the problems of

(a) load flow.

(b) load flow and stability.

(c) load flow and short circuit.

(d) load flow, stability and short circuit.

Answer: (d) load flow, stability and short circuit.

15. Consider the following statements : Stability studies constitute

1. the major analytical approach to the study of power system electromechanical dynamic behavior.

2. the involvement of one or just a few machines undergoing slow or gradual changes in operating conditions.

3. the determination of the locus of essentially steady-state operating points of the system.

4. the determination of whether or not the rotors of the machines being perturbed, return to the constant speed operation. Which of the statements given above are correct ?

(a) 1, 2 and 3.

(b) 2, 3 and 4.

(c) 1 and 4.

(d) 1, 2, 3 and 4.

Answer: (c) 1 and 4.

16. Power system stability is defined as

(a) that attribute of the system or part of the system which enables it to develop restoring forces between the elements there of equal or greater than disturbing forces so as to restore a state of equilibrium between the elements.

(b) the maximum power flow possible through some particular point in the system when the entire or part of the system is disturbed.

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

(d) neither (a) nor (b).

Answer: (a) that attribute of the system or part of the system which enables it to develop restoring forces between the elements there of equal or greater than disturbing forces so as to restore a state of equilibrium between the elements.

17. Stability limit of a power system is defined as

(a) that attribute of the system or part of the system which enables it to develop restoring forces between the elements there of equal or greater than disturbing forces so as to restore a state of equilibrium between the elements.

(b) the maximum power flow possible through some particular point in the system when the entire or part of the system is disturbed.

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

(d) neither (a) nor (b).

Answer: (b) the maximum power flow possible through some particular point in the system when the entire or part of the system is disturbed.

18. Steady-state stability of a power system is the ability of the power system to

(a) maintain voltage at the rated voltage level.

(b) maintain frequency exactly at 50 Hz.

(c) maintain a spinning reserve margin at all times.

(d) maintain synchronism between machines and on external tie lines.

Answer: (d) maintain synchronism between machines and on external tie lines.

19. Transient disturbances are caused by

(a) sudden load changes.

(b) switching operations.

(c) inadvertent tripping of lines and generators.

(d) faults in the power system.

(e) all of the above.

Answer: (e) all of the above.

20. Transient stability of a 3-phase power systems having more than one synchronous generator is not affected by which one of the following specifications?

(a) Initial operating conditions of generators.

(b) Quantum of large power disturbance.

(c) Fast fault clearance and reclosure.

(d) Small changes in system frequency.

Answer: (d) Small changes in system frequency.

21. The power transmission capacity of a transmission line is

(a) proportional to transmission voltage.

(b) proportional to the square of transmission voltage.

(c) inversely proportional to transmission voltage.

(d) inversely proportional to the square of transmission voltage.

Answer: (b) proportional to the square of transmission voltage.

22. The load carrying capability of a long ac transmission line is

(a) always limited by the conductor size.

(b) limited by stability considerations.

(c) reduced at low ambient temperatures.

(d) decreased by the use of bundled conductors of single conductors.

Answer: (b) limited by stability considerations.

23. Maximum power will be transferred from the sending end to the receiving end by a transmission line when

(a) the line reactance is √3 times its resistance, i.e., X = √3R.

(b) the torque angle δ = 90°.

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

(d) neither (a) nor (b).

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

24. The steady state stability limits for round rotor and salient pole 3-phase synchronous generator are attained at the values of power angle δ

(a) = π/2, and = π/2, respectively.

(b) < π/2, and < π/2, respectively.

(c) < π/2, and = π/2, respectively.

(d) = π/2, and < π/2, respectively.

Answer: (d) = π/2, and < π/2, respectively.

25. Which one of the following statements is true?

(a) steady-state stability limit is greater than transient stability limit.

(b) steady-state stability limit is equal to transient stability limit.

(c) steady-state stability limit is less than the transient stability limit.

(d) no generalization can be made regarding the equality or otherwise of the steady, state stability limit and transient stability limit.

Answer: (a) steady-state stability limit is greater than transient stability limit.

26. Steady-state stability of a power system is improved by

(a) reducing fault clearing time.

(b) using double circuit line instead of single circuit line.

(c) single pole switching.

(d) decreasing generator inertia.

Answer: (b) using double circuit line instead of single circuit line.

27. The methods employed in improving the system stability are

(a) increasing the system voltage only.

(b) reducing the transfer reactance only.

(c) using high-speed auto-reclosing circuit breaker only.

(d) using all (a), (b), (c) together.

Answer: (d) using all (a), (b), (c) together.

28. Series capacitors are used to

(a) compensate for line inductive reactance and improve the stability of the power system.

(b) improve the voltage.

(c) reduce fault level.

(d) improve the power factor.

Answer: (a) compensate for line inductive reactance and improve the stability of the power system.

29. In a multimachine interconnected system, subsequent to a 3-phase fault, the transient stability is examined by

(a) equal-area criterion.

(b) solution of swing equation.

(c) either by equal-area criterion or by solution of swing equation

(d) combination of equal-area criterion and solution of swing equation.

Answer: (b) solution of swing equation.

30. The equal area criterion of stability is used for

(a) no load on the bus-bar.

(b) one machine and infinite bus-bar.

(c) more than one machine and infinite bus-bar.

(d) none of the above.

Answer: (b) one machine and infinite bus-bar.

31. The 'equal area criterion' for the determination of transient stability of a synchronous machine connected to an infinite bus

(a) ignores line as well as synchronous machine resistances and shunt capacitances.

(b) assumes accelerating power acting on the rotor as constant.

(c) ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine.

(d) takes into consideration the possibility of machine losing synchronism after it has survived during the first swing.

Answer: (b) assumes accelerating power acting on the rotor as constant.

32. The 'Equal area criterion' for the determination of transient stability of the synchronous machine connected to an infinite bus:

(a) Ignores line as well as synchronous machine resistances and shunt capacitances.

(b) Assumes accelerating power acting on the rotor as constant.

(c) Ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine.

(d) Takes into consideration the possibility of machine loosing synchronism after it has survived during the first swing.

Answer: (a) Ignores line as well as synchronous machine resistances and shunt capacitances.

33. For what value of damping parameter, the transient stability is assured by equal area criterion?

(a) Independent of systems damping.

(b) If only damping is exactly zero.

(c) For all values of damping parameters.

(d) If only damping is positive and finite.

Answer: (b) If only damping is exactly zero.

34. Equal area criterion gives the information regarding

(a) stability region.

(b) absolute stability.

(c) relative stability.

(d) swing curves.

Answer: (b) absolute stability.

35. The critical clearing time of a fault in power system is related to

(a) reactive power limit.

(b) short-circuit limit.

(c) steady-state stability limit.

(d) transient stability limit.

Answer: (d) transient stability limit.

36. With fault clearing time, the transient stability limit of a power system

(a) increases.

(b) decreases.

(c) first increases and then decreases.

(d) first decreases and then increases.

Answer: (d) first decreases and then increases.

37. For which one of the following types of motors, is the equal-area criterion for stability applicable ?

(a) Three phase synchronous motor.

(b) Three-phase induction motor.

(c) DC series motor.

(d) DC compound motor.

Answer: (a) Three phase synchronous motor.

38. The inertia constants of two groups of machines which do not swing together are M_1 and M_2 such that $M_1 > M_2$. It is proposed to add some inertia to one of the two groups of machines for improving the transient stability of the system. It should be added to

(a) M_1

(b) M_2

(c) either to M_1 or to M_2.

(d) neither of the above.

Answer: (b) M_2

39. The transient stability limit of a power system can be appreciably increased by introducing

(a) series inductance.

(c) series capacitance.

(b) shunt inductance.

(d) shunt capacitance.

Answer: (c) series capacitance.

40. Consider the following statements: The transient stability of the power system under unbalanced fault condition can be effectively improved by

1. excitation control.

2. phase shifting transformer.

3. single-pole switching of circuit breakers.

4. increasing the turbine input.

Of these statements

(a) 1 and 2 are correct.

(b) 2 and 3 are correct.

(c) 3 and 4 are correct.

(d) 1 and 3 are correct.

Answer: (d) 1 and 3 are correct.

41. The use of high speed circuit breakers

(a) improves transient stability.

(b) decreases transient stability.

(c) has no effect on system stability.

Answer: (a) improves transient stability.

42. The use of fast acting relays and circuit breakers for clearing a sudden short-circuit on a transmission line between a generator and the receiving end bus improves the transient stability of the machine because the

(a) short-circuit current becomes zero.

(b) post-fault transfer impedance attains a value higher than that during the fault.

(c) ordinate of the post-fault power-angle characteristic is higher than that of during fault characteristic.

(d) voltage behind the transient reactance increases to a high.

Answer: (c) ordinate of the post-fault power-angle characteristic is higher than that of during fault characteristic.

43. Load flow study is carried out for

(a) load-frequency control.

(b) planning of power system.

(c) fault calculations.

(d) study of stability of the system.

Answer: (b) planning of power system.

44. Load flow studies must be made on a power system before

(a) making short-circuit studies but not for transient stability studies on the power system.

(b) making transient stability studies but not for short-circuit studies on the power system.

(c) making both short-circuit and transient stability studies on the power system.

(d) for neither making short-circuit studies nor transient stability studies on the power system.

Answer: (c) making both short-circuit and transient stability studies on the power system.

45. Load flow studies involve solving simultaneous

(a) linear algebraic equations.

(b) non-linear algebraic equations.

(c) linear differential equations.

(d) nonlinear differential equations.

Answer: (b) non-linear algebraic equations.

46. In a power system, each bus or node is associated with four quantities, namely

1. real power. 2. reactive power. 3. bus-voltage magnitude. 4. phase angle of the bus voltage.

For load-flow solution, among these four, the number of quantities to be specified is

(a) any one.

(b) any two.

(c) any three.

(d) all the four.

Answer: (b) any two.

47. Consider the following quantities :

1. Real power 2. Reactive power 3. Power factor 4. Input current 5. Bus voltage magnitude 6. Bus voltage phase-angle.

For the purpose of the load flow studies of a power system, each bus or node is associated with which one of the combinations of the above four quantities ?

(a) 1, 3, 4 and 5

(b) 1, 2, 3 and 4

(c) 2, 3, 5 and 6

(d) 1, 2, 5 and 6

Answer: (d) 1, 2, 5 and 6

48. In load flow studies of a power system, a voltage control bus is specified by :

(a) Real power and reactive power.

(b) Reactive power and voltage magnitude.

(c) Voltage and voltage phase angle.

(d) Real power and voltage magnitude.

Answer: (d) Real power and voltage magnitude.

49. For a load-flow solution the quantities normally specified at a voltage controlled bus are

(a) P and Q

(b) P and |V|

(c) Q and |V|

(d) P and δ.

Answer: (b) P and |V|

50. Load bus is specified by

(a) P and V.

(b) P and δ.

(c) P and |V|.

(d) P and Q.

Answer: (d) P and Q.

51. At slacks bus, which one of the following combinations of variables is specified ?

(a) |V|, δ

(b) P, Q

(c) P, |V|

(d) Q, |V| (The symbols have their usual meaning)

Answer: (a) |V|, δ

52. In a power system, the maximum number of buses are

(a) generator buses.

(b) load buses.

(c) slack buses.

(d) P-V buses.

Answer: (b) load buses.

53. If a voltage controlled bus is treated as a load bus, then which one of the following limits would be violated ?

(a) Voltage.

(b) Active power.

(c) Reactive power.

(d) Phase angle.

Answer: (a) Voltage.

55. In load-flow analysis, the load connected at a bus is represented as

(a) constant current drawn from the bus.

(b) constant impedance connected at the bus.

(c) voltage and frequency dependent source at the bus.

(d) constant real and reactive power drawn from the bus.

Answer: (d) constant real and reactive power drawn from the bus.

56. The voltage of a particular bus can be controlled by controlling the

(a) active power of the bus.

(b) reactive power of the bus.

(c) phase angle. (d) both

(a) and (b).

(e) (b) and (c).

Answer: (b) reactive power of the bus.

57. The voltage of a particular bus can be controlled by controlling

(a) phase angle.

(b) reactive power of the bus.

(c) active power of the bus.

(d) phase angle and reactive power.

Answer: (b) reactive power of the bus.

58. A power system consists of two areas connected via a tie line. While entering the data for load flow the tie line parameters and its connectivity data were inadvertently left out. If the load flow program is run with this incomplete data, then the load flow calculations will converge only if

(a) One slack bus is specified in the first area.

(b) One slack bus is specified in the second area.

(c) One slack bus is specified in either of the two areas.

(d) Two slack buses, one in each area, are specified.

Answer: (d) Two slack buses, one in each area, are specified.

37. When the load on a transmission line is equal to the surge impedance loading

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

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

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

(d) none of these.

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

38. The receiving-end voltage of a transmission line will be greater than the sending-end voltage if the load is

(a) greater than SIL (surge impedance loading).

(b) less than SIL.

(c) equal to SIL.

Answer: (b) less than SIL.

39. The SIL of a single circuit 220 kV line is around

(a) 120 MW

(b) 90 MW

(c) 220 MW

(d) 400 MW

Answer: (a) 120 MW

40. What is the surge impedance loading of a lossless 400 kV, 3-phase, 50 Hz overhead line of average of surge impedance of 400 ohms?

(a) 400 MW

(b) 400√3 MW

(c) 400 ÷ √3 MW

(d) 400 kW

Answer: (a) 400 MW

41. Consider the following statements: Surge impedance loading of a transmission line can be increased by

1. increasing its voltage level.

2. addition of lumped inductance in parallel.

3. addition of lumped capacitance in series.

4. reducing the length of the line.

Of these statements

(a) 1 and 3 are correct.

(b) 1 and 4 are correct.

(c) 2 and 4 are correct.

(d) 3 and 4 are correct.

Answer: (a) 1 and 3 are correct.

42. A lossless radial transmission line with surge impedance loading

(a) takes negative VAR at sending end and zero VAR at receiving end.

(b) takes positive VAR at sending end and zero VAR at receiving end.

(c) has flat voltage profile and unity power factor at all points along it.

(d) has sending-end voltage higher than receiving-end voltage and unity power factor at sending end.

Answer: (c) has flat voltage profile and unity power factor at all points along it.

43. What does the standing wave ratio (SWR) of unity imply ?

(a) Transmission line is open-circuited.

(b) Transmission line is short-circuited.

(c) Transmission line's characteristic impedance is equal to load impedance.

(d) Transmission line's characteristic impedance is not equal to load impedance. I.E.S. 2007]

Answer: (c) Transmission line's characteristic impedance is equal to load impedance.

44. Consider the following statements:

1. Equivalent-T circuit of a long line is preferred to equivalent-π circuit.

2. The nature of reactive power compensation is different for peak load and off-peak load conditions.

3. Ferranti effect is significant only on medium and long lines.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

Answer: (c) 2 and 3 only

45. For a good voltage profile under no-load condition, a long line needs

(a) shunt capacitors at receiving end.

(b) shunt reactors at the receiving end.

(c) shunt resistance at receiving end.

Answer: (b) shunt reactors at the receiving end.

46. No-load compensation of a high voltage line involves

(a) shunt capacitors.

(b) shunt reactors.

(c) series capacitors.

Answer: (b) shunt reactors.

47. Full-load compensation in a line requires

(a) shunt capacitors.

(b) series capacitors.

(c) transformers.

(d) shunt reactors.

Answer: (a) shunt capacitors.

48. Use of additional shunt capacitor can be made for increasing the capability of line as it

(a) reduces surge impedance Z_o.

(b) increases phase shift β.

(c) increase in α.

(d) all of the above.

Answer: (a) reduces surge impedance Z_o.

49. To increase the transmission capability of a high voltage long line

(a) the resistance can be increased.

(b) the resistance can be decreased.

(c) the series reactance can he reduced.

(d) the shunt admittance can be reduced.

Answer: (c) the series reactance can he reduced.

50. Power dispatch through a line can be increased by

(a) installing series capacitors.

(b) installing shunt capacitors.

(c) installing series reactor.

(d) installing shunt reactor.

Answer: (a) installing series capacitors.

51. The power transmitted will be maximum when

(a) line reactance is high.

(b) corona losses are minimum.

(c) sending-end voltage is more.

(d) receiving-end voltage is more.

Answer: (d) receiving-end voltage is more.

52. For constant voltage transmission, the voltage drop along the line is maintained constant by installing

(a) capacitors.

(b) inductors.

(c) resistors.

(d) synchronous phase modifiers at the receiving end.

Answer: (d) synchronous phase modifiers at the receiving end.

53. Constant voltage transmission have the drawback(s) of

(a) increase of short-circuit current of the system.

(b) lower reserve of lines in case of line trouble.

(c) increased risk of interruption of supply due to falling of synchronous motors out of synchronism.

(d) all of the above.

Answer: (d) all of the above.

54. Constant voltage transmission has the advantage(s) of

(a) availability of steady voltage at all loads at the receiving end.

(b) possibility of better protection for the line due to possible use of higher terminal reactances.

(c) possibility of carrying increased power for a given conductor size in case of long distance heavy power transmission.

(d) all of the above.

Answer: (d) all of the above.

55. Constant voltage transmission has the advantage(s) of

(a) increase of short-circuit current of the system.

(b) large reserve of lines in case of line trouble.

(c) improvement of power factor at the times of moderate and heavy loads.

(d) all of the above.

Answer: (c) improvement of power factor at the times of moderate and heavy loads.

56. A synchronous compensator absorbs inductive reactive power. It is

(a) overexcited.

(b) normally excited.

(c) underexcited.

(d) none of these.

Answer: (c) underexcited.

57. A synchronous phase modifier supplies

(a) both active and reactive powers.

(b) both lagging and leading reactive power.

(c) inductive reactive power only.

Answer: (b) both lagging and leading reactive power.

58. A synchronous phase modifier as compared to synchronous motor of the same rating has

(a) larger shaft diameter and higher speed.

(b) smaller shaft diameter and higher speed.

(c) larger shaft diameter and smaller speed.

(d) smaller shaft diameter and smaller speed.

Answer: (b) smaller shaft diameter and higher speed.

59. Phase modifier is normally installed in case of

(a) short transmission lines.

(b) medium length lines.

(c) long lines.

(d) for any length of lines.

Answer: (c) long lines.

60. Which of the following statements is not true ?

(a) Synchronous phase modifiers are installed at sending end

(b) Synchronous phase modifiers are installed at load end.

(c) Synchronous phase modifiers are nothing but synchronous motors (specially designed).

(d) Synchronous phase modifiers do not carry load.

Answer: (a) Synchronous phase modifiers are installed at sending end

61. Capacitors are used in power system to

(a) improve supply power factor.

(b) improve voltage regulation.

(c) change the load characteristics.

(d) all of the above.

Answer: (b) improve voltage regulation.

62. Series capacitors on transmission lines are of little use when

(a) the load VAR requirement is small.

(b) the load VAR requirement is large.

(c) the load VAR requirement is fluctuating.

(d) series capacitors are never used in transmission lines.

Answer: (a) the load VAR requirement is small.

63. The reactive power transfer over a line mainly depends on

(a) power angle δ.

(b) $|V_s| - |V_R|$

(c) V_s.

(d) V_R.

Answer: (b) $|V_s| - |V_R|$

64. For a fixed value of complex power flow in a transmission line having a sending end voltage V, the real power loss will be proportional to

(a)V

(b)V^2

(c)$1/V^2$

(d)1/V

Answer: (c)$1/V^2$

64. For a fixed receiving-end and sending-end voltages in a transmission system, what is the locus of the constant power?

(a) A straight line.

(b) An ellipse.

(c) A parabola.

(d) A circle. [I.E.S. E.E.-II, 2004]

Answer: (d) A circle.

65. Conduit pipe is generally employed for protection of

(a) unsheathed cables.

(b) armoured cables.

(c) PVC sheathed cables.

(d) all of above.

Answer: (a) unsheathed cables.

66. Sheaths are used in cables to

(a) provide proper insulation.

(b) provide mechanical strength.

(c) prevent ingress of moisture.

(d) none of the above.

Answer: (c) prevent ingress of moisture.

67. The bedding on a cable consists of

(a) jute strands.

(d) hessian tape.

(c) paper tape compounded with a fibrous material.

(d) any of the above.

Answer: (d) any of the above.

68. The material(s) used for armouring of an underground cable is/are

(a) galvanized steel wire.

(b) steel tape.

(c) aluminum.

(d) either (a) or (b).

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

69. Metallic shielding is provided on underground cables to

(a) reduce thermal resistance.

(b) reduce corona effect.

(c) control the electrostatic voltage stress.

(d) all of the above.

Answer: (d) all of the above.

70. Metallic shielding provided on cables is usually of thickness.

(a) 0.1 - 0.8 mm.

(b) 3 - 5 mm.

(c) 10 - 15 mm.

(c) 15 - 25 mm.

Answer: (b) 3 - 5 mm.

71. The effect of bonding the cable is

(a) to increase the effective resistance and inductance.

(b) to increase the effective resistance but reduce inductance.

(c) to reduce the effective resistance and inductance.

(d) to reduce the effective resistance but increase the inductance

Answer: (b) to increase the effective resistance but reduce inductance.

72. The thickness of insulation layer provided on the conductor, in cables, depends upon

(a) operating voltage.

(b) current to be carried.

(c) power factor.

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

Answer: (a) operating voltage.

73. The insulating material used for cables should have all of the following except

(a) high dielectric strength, high mechanical strength, high tensile strength and plasticity, high resistivity and high viscosity at impregnation temperature.

(b) low thermal coefficient, low permittivity, acid proof, non-inflammable and non-hygroscopic.

(c) high water absorption.

(d) capability of withstanding high rupturing voltages.

Answer: (c) high water absorption.

74. Empire tape is

(a) varnished cambric.

(b) impregnated paper.

(c) vulcanized rubber.

(d) enamel insulation.

Answer: (a) varnished cambric.

75. Paper as an insulating material has the main drawback that it

(a) is hygroscopic.

(b) has poor dielectric strength.

(c) has low insulation resistivity.

(d) has high capacitance.

Answer: (a) is hygroscopic.

76. In paper insulated cables, the conductor x-section is usually limited to

(a) 50 mm^2

(b) 250 mm^2

(c) 600 mm^2

(d) 1200 mm^2

Answer: (c) 600 mm^2

77. The dielectric strength of impregnated paper is about

(a) 30 kV/mm

(b) 20kV/mm

(c) 15 kV/mm

(d) 5 kV/mm

Answer: (a) 30 kV/mm

78. Paper used as an insulating material is usually treated with oily compound because it

(a) is hygroscopic.

(b) gets electrostatically charged at high voltage.

(c) is porous.

(d) all of the above.

Answer: (b) gets electrostatically charged at high voltage.

79. Single-core cables are usually not provided with armouring in order to

(a) avoid excessive loss in the armour.

(b) make the cable more flexible.

(c) make the cable non-hygroscopic.

(d) none of the above.

Answer: (a) avoid excessive loss in the armour.

80. Single-core cable should have armour made of

(a) magnetic material.

(b) non-magnetic and non-conducting material.

(c) non-magnetic but conducting material. [A.M.I.E. Sec B. Summer 1993]

Answer: (c) non-magnetic but conducting material. [A.M.I.E. Sec B. Summer 1993]

81. Multi-core cables generally use

(a) oval shaped conductors.

(b) sector shaped conductors.

(c) square conductors.

(d) either (a) or (b).

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

82. In a 3-phase, 4-wire cable, the x-sectional area of neutral conductor is

(a) half of the area of phase conductor.

(b) equal to the area of phase conductor.

(c) double the area of phase conductor.

(d) 1.5 times the area of phase conductor.

Answer: (b) equal to the area of phase conductor.

83. The belted type construction is not suitable for cables used for voltages exceeding 22 kV because of

(a) development of both radial and tangential stresses.

(b) formation of vacuous spaces and voids on loading and unloading owing to non-homogenity of dielectric in belted construction.

(c) local heating caused by power loss at the centre filling owing to leakage current produced by tangential stresses along the impregnated paper insulation resulting in breakdown at any time.

(d) all of the above.

Answer: (d) all of the above.

84. SL type cables, over H-type cables, have the advantage(s) of

(a) possibility of bending of cables owing to no overall lead sheath.

(b) less tendency for oil drainage on hilly routes owing to elimination of filler spaces containing compound.

(c) easy manufacturing.

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

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

85. Screened type cables, over belted cables, have the advantage(s) of

(a) reduced possibility of core to core faults.

(b) uniform radial electric stresses in all sections of the dielectric.

(c) no possibility of formation of voids within the dielectric.

(d) increased current carrying capacity.

(e) all of the above.

Answer: (e) all of the above.

86. In a 3-core extra high voltage cable, a metallic screen around each core insulation is provided to

(a) facilitate heat dissipation.

(b) give mechanical strength.

(c) obtain radial electric stress.

(d) obtain longitudinal electric stress.

Answer: (c) obtain radial electric stress.

87. As the operating voltage and consequently the electric stress on the dielectric of solid type cable is increased from 4 low value, the dielectric power factor cos φ remains almost unchanged up to a certain value of the stress beyond which cos φ increases very rapidly. This is due to increase in

(a) resistivity of dielectric material.

(b) ionization in the voids present in the dielectric.

(c) core-to-core capacitance of the cable.

(d) core-to-earth capacitance of the cable.

Answer: (b) ionization in the voids present in the dielectric.

88. Oil-filled cables have the advantage(s) of

(a) no ionization, oxidation and formation of voids.

(b) possibility of increased temperature range in service.

(c) more maximum permissible stresses .

(d) all of the above.

Answer: (d) all of the above.

89. Oil-filled cables have the advantage(s) of

(a) smaller overall size.

(b) most perfect impregnation.

(c) easy detection of fault.

(d) all of the above.

Answer: (d) all of the above.

90. Oil-filled cables have the drawback(s) of

(a) no possibility of impregnation after sheathing.

(b) greater cost and complicated laying of cables and maintenance.

(c) high thermal resistance.

(d) all of the above.

Answer: (b) greater cost and complicated laying of cables and maintenance.

91. Cables used for 220 kV lines are invariably

(a) compressed oil or compressed gas insulated.

(b) paper insulated.

(c) mica insulated.

(d) none of the above.

Answer: (a) compressed oil or compressed gas insulated.

92. The insulation used in a cable designed for use on 1,000 kV is usually

(a) impregnated paper.

(b) compressed SF_6 gas.

(c) PVC.

(d) any of the above.

Answer: (b) compressed SF_6 gas.

93. Sulphur hexafluoride cable is insulated by

(a) impregnated paper.

(b) polyvinyl chloride.

(c) high pressure oil.

(d) compressed gas.

Answer: (d) compressed gas.

94. In compressed gas insulated cable SF_6 has the gas pressure in the range of

(a) 10 - 20 mm Hg

(b) 80 - 100 mm Hg

(c) 3 - 5 kg/cm^2

(d) 40 - 50 kg/cm_2

Answer: (c) 3 - 5 kg/cm^2

95. At bridge crossings and near the railway track ternary lead cables are used because they

(a) are of high tensile strength.

(b) are of low coefficient of thermal expansion.

(c) are of low specific gravity.

(d) can withstand shocks and vibrations.

Answer: (c) are of low specific gravity.

96. Internal pressure cables have the advantage(s) of

(a) elimination of external accessories.

(b) suitability for vertical run without any fear of drainage with suitable designs.

(c) marked improvement in the pf of the cable dielectric with the increased pressure.

(d) all of the above.

Answer: (d) all of the above.

97. With the rise in temperature, the insulation resistivity

(a) remains unchanged.

(b) decreases linearly.

(c) increases linearly.

(d) reduces exponentially.

Answer: (d) reduces exponentially.

98. The insulation resistance of a single-core cable is 200 MΩ/km. The insulation resistance for 5 km length is

(a) 40 MΩ

(b) 1000 MΩ

(c) 200 MΩ

(d) 8 MΩ

Answer: (a) 40 MΩ

99. The power factor of an open-ended cable can be improved by

(a) increasing the capacitance.

(b) decreasing the capacitance.

(c) increasing the conductor resistance.

(d) increasing the insulation resistance.

Answer: (d) increasing the insulation resistance.

100. The capacitance of a cable increases

(a) linearly with the increase in cable length.

(b) linearly with the decrease in cable length.

(c) exponentially with the increase in cable length.

(d) none of the above.

Answer: (a) linearly with the increase in cable length.

101. The capacitance of a cable depends upon the

(a) length of the cable.

(b) relative permittivity of dielectric used in cable.

(c) ratio of sheath diameter and core diameter.

(d) all of the above.

Answer: (d) all of the above.

102. The charging current drawn by the cable

(a) lags behind the voltage by 90°.

(b) leads the voltage by 90°.

(c) leads the voltage by 180°.

(d) none of the above.

Answer: (b) leads the voltage by 90°.

103. In underground cables, the electrostatic stress is

(a) maximum at conductor surface and minimum at the sheath.

(b) minimum at conductor surface and maximum at the sheath.

(c) same at the conductor and sheath.

(d) zero at the conductor as well as on the sheath.

Answer: (a) maximum at conductor surface and minimum at the sheath.

104. In a cable of conductor diameter 'd' and overall diameter with dielectric material 'D', the maximum dielectric stress.

(a) occurs at the conductor surface and is proportional to d.

(b) occurs at the conductor surface and is proportional to 1/d.

(c) occurs at the middle of the dielectric and is proportional to 1/D.

(d) occurs at the outer surface of the dielectric and is proportional to D.

Answer: (b) occurs at the conductor surface and is proportional to 1/d.

105. To obtain the minimum value of stress in cables, the ratio (R/r) should be

(a) 2.13

(b) 2.718

(c) 1.96

(d) 1.5

Answer: (b) 2.718

106. The surge impedance of a 50 miles long underground cable is 50 Ω. For a 25 miles length it will be

(a) 25 Ω

(b) 50 Ω

(c) 100 Ω

(d) none of these.

Answer: (b) 50 Ω

107. The breakdown of insulation of a cable can be avoided economically by using

(a) insulation layers of different dielectrics.

(b) inter-sheath.

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

(d) none of the above.

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

108. Capacitance grading of cable means

(a) use of dielectrics in different concentrations.

(b) introduction of capacitances at various lengths of cable to counter the effect of inductance.

(c) use of dielectrics of different permittivities.

(d) grading according to capacitance per km length of the cable.

Answer: (c) use of dielectrics of different permittivities.

109. Grading of cables

(a) reduces insulation cost and increases current rating.

(b) reduces insulation cost but decreases current rating.

(c) increases both.

(d) none of the above.

Answer: (a) reduces insulation cost and increases current rating.

110: The inter-sheaths in cables are used to

(a) provide proper stress distribution.

(b) minimize the stress.

(c) use inferior insulation.

(d) provide protection against moisture and voltage surges.

(e) provide protection against current and voltage surges.

Answer: (a) provide proper stress distribution.

111. The desired overall diameter of the conductor without increasing its x-sectional area can be had by

(a) using aluminum core instead of copper.

(b) stranding the copper conductors around a hemp centre.

(c) stranding the copper conductors over a lead tube.

(d) any of the above.

Answer: (d) any of the above.

112. In a 3-core cable, the capacitance between two conductors (with sheath earthed) is 3 μF. The capacitance per phase will be

(a) 1.5 μF

(b) 3 μF

(c) 6 μF

(d) 12 μF

Answer: (c) 6 µF

113. Underground cables are laid at sufficient depth so as to

(a) minimize temperature stresses.

(b) minimize effects of shocks and vibrations owing to passing vehicles etc.

(c) avoid being unearthed easily owing to removal of soil.

(d) both (a) and (c).

Answer: (a) minimize temperature stresses.

114. In case the communication cables are to be laid parallel to power cables the distance between the two should be at least……..so that there is no interference.

(a) 0.5 m

(b) 2.0 m

(c) 4.0 m

(d) 0.05 m

Answer: (a) 0.5 m

115. While crossing the road the cable should be

(a) buried in trenches.

(b) surrounded by sawdust to absorb vibrations.

(c) laid in conduits or pipes.

(d) none of the above.

Answer: (c) laid in conduits or pipes.

116. Consider the following statements :

1. The insulation resistance of cable will increase if the length of cable is increased.

2. For the same overall diameter of cable, the grading of cable will increase the safe working voltage.

3. The normal operating temperature of PVC cable is 70°C.

4. The thermal resistance of soil increases as the moisture content of soil increases.

Of these statements

(a) 1 and 2 are correct.

(c) 3 and 4 are correct.

(b) 2 and 3 are correct.

(d) 1 and 4 are correct.

Answer: (b) 2 and 3 are correct.

117. The source(s) of heat generation in cables is/are

(a) copper loss in conductor.

(b) dielectric losses in cable insulation.

(c) losses in metallic sheathings and armoring.

(d) all of the above.

Answer: (d) all of the above.

118. A cable carrying ac has

(a) leakage losses only.

(b) hysteresis losses only.

(c) hysteresis and leakage losses only.

(d) hysteresis, leakage and friction losses.

Answer: (c) hysteresis and leakage losses only.

119. Dielectric hysteresis loss in a cable varies as

(a) impressed voltage.

(b) $(\text{impressed voltage})^2$.

(c) $(\text{impressed voltage})^{1/2}$.

(d) $(\text{impressed voltage})^{3/2}$.

Answer: (b) $(\text{impressed voltage})^2$.

120. The current carrying capacity of cables in dc is more than that in ac. It is mainly due to

(a) smaller hysteresis losses.

(b) absence of harmonics.

(c) absence of ripples.

(d) none of the above.

Answer: (a) smaller hysteresis losses.

121. The fault(s) which are likely to occur in cables is/are

(a) breakdown of cable insulation.

(b) cross- or short-circuit fault.

(c) open-circuit fault.

(d) all of the above.

Answer: (d) all of the above.

122. The lead sheath of the cable may get damaged due to

(a) mechanical injury.

(b) crystallization of lead through vibrations.

(c) chemical action with impurities present in the soil when buried in earth.

(d) any of the above.

Answer: (d) any of the above.

123. The cables should not be operated too hot otherwise

(a) expansion of oil may cause sheath to burst.

(b) the oil may lose its viscosity and it may start drawing off from higher levels.

(c) unequal expansion may create voids in the insulation leading to ionization.

(d) rapid increase in dielectric losses with temperature may cause thermal instability.

(e) all of the above.

Answer: (e) all of the above.

124. The breakdown voltage of a cable depends upon

(a) presence of moisture.

(b) operating temperature.

(c) time of application of the voltage.

(d) all of the above.

Answer: (d) all of the above.

125. Breakdown of cable insulation may occur due to

(a) thermal instability.

(b) puncture.

(c) tracking.

(d) any of the above.

Answer: (d) any of the above.

126. Fiber-optic cables are used in power system applications mainly for

(a) SCADA.

(b) communication between power station and substation.

(c) communication between power station and load control center.

(c) all of the above.

Answer: (c) all of the above.

127. Solid type cables are not considered suitable for operating voltages exceeding 66 kV because

(a) skin effect dominates on the conductor.

(b) there is a danger of breakdown of insulation because of formation of voids in the layers of dielectric.

(c) there is a corona loss between conductor and sheath material.

(d) insulation may melt due to heating.

Answer: (b) there is a danger of breakdown of insulation because of formation of voids in the layers of dielectric.