MIZORAM PUBLIC SERVICE COMMISSION

COMMON COMPETITIVE EXAMINATION FOR GROUP 'B' NON-GAZETTED (TECHNICAL)

JUNIOR ENGINEER (CONTRACT BASIS) (ELECTRICAL) UNDER POWER & ELECTRICITY DEPARTMENT, GOVERNMENT OF MIZORAM, NOVEMBER-2024

PAPER-III (ELECTRICAL ENGINEERING)

Time Allowed : 2 hours FM : 200

All questions carry equal mark of 2 each.
Attempt all questions.

1. Which gas is used in gas insulated substation?
(a) Nitrogen + SF_6 (b) Hydrogen + SF_6
(c) SF_6 (d) None of these

2. If the surrounding atmosphere is contaminated with impurities like fumes, dust and metal corroding then the indoor substations are usually preferred for a voltage level up to -
(a) 33 kV (b) 66 kV
(c) 132 kV (d) 220 kV

3. Isolators must be open only -
(a) after opening of circuit breaker (b) after closing of circuit breaker
(c) under closed position of circuit breaker (d) while on load

4. Which of the following is used to maintain clearance between ground and live conductor in substations?
(a) Isolators (b) Insulators
(c) Circuit breakers (d) All of these

5. The components that connects incoming and outgoing electrical lines are called -
(a) Bus bars (b) Isolator
(c) Insulators (d) Circuit breakers

6. At the secondary transmission substation in Mizoram, electrical power is transmitted at voltage level of-
(a) 132 kV (b) 66 kV
(c) 220 kV (d) 33 kV

7. At receiving end of secondary distribution substation voltage is -
(a) stepped up to 220 kV (b) stepped down to 66 kV
(c) stepped down to 11 kV (d) stepped down to 440 V

8. Consumer with more than 500 kVA and upto 2000 kVA demand is supplied with -
(a) 66 kV (b) 33 kV
(c) 11 kV (d) 400 V

9. Primary distribution substation voltage is -
(a) 11 kV (b) 33 kV
(c) 66 kV (d) 220 kV

10. Residential load is connected between -

(a) any two phase
(b) any one phase and neutral
(c) any two phase and neutral
(d) three phase

11. Usually distribution substation are -

(a) underground type
(b) indoor type
(c) outdoor type
(d) dry type

12. Which is the most common voltage level of electrical lines that is running along the road sides on poles?

(a) 66 kV
(b) 33 kV
(c) 11 kV
(d) 400 V

13. Capacitor bank installed in a substation -

(a) improves the power factor of the system
(b) improves the voltage profile of the system
(c) reduces the losses in the transmission system
(d) all of these

14. A converting substation changes quantity from -

(a) DC to AC
(b) AC to DC
(c) AC to AC
(d) DC to DC

15. A substation which performs the switching operations of power transmission lines is called -

(a) Transformer substation
(b) Switching substation
(c) Industrial substation
(d) Intermediate substation

16. Future expansion in substation is possible for -

(a) underground substation
(b) indoor substation
(c) outdoor substation
(d) pole mounted substation

17. Fault location in indoor type substation is -

(a) easy
(b) difficult
(c) dependent on type of fault
(d) independent on type of fault

18. Which substations are generally located in the power houses?

(a) Step-up
(b) Primary
(c) Secondary
(d) Distribution

19. A tariff system with fixed rate per unit of energy consumed.

(a) Simple Tariff
(b) Flat-rate Tariff
(c) Block-rate Tariff
(d) Two-part Tariff

20. Steam energy is converted into mechanical energy by means of -

(a) boiler
(b) condenser
(c) steam turbine
(d) reactor

21. What is the ideal site of thermal power plant?

(a) In hilly regions
(b) On islands
(c) Near water resources
(d) In centre lands

22. In thermal power plant, the turbine is placed -

(a) before boiler
(b) in between boiler and generator
(c) after generator
(d) attach to boiler

23. Modern steam power plant works on which of the following cycle -

(a) carnot cycle
(b) rankine cycle
(c) otto cycle
(d) bell-coleman cycle

24. Dam having very wide base as compared to its height is called _____.

(a) buttress dam (b) arch dam

(c) earth dam (d) solid gravity dam

25. Which element of hydroelectric power plant prevents the penstock from water hammer phenomenon?

(a) Valves and Gates (b) Draft tubes

(c) Spillway (d) Surge Tank

26. Trash racks are built for -

(a) discharging the water freely from the turbine exit to tailrace

(b) preventing the turbine from ingress of floating and other materials

(c) creating artificial head to store sufficient potential energy of water

(d) controlling the opening of valves

27. Penstock in a hydroelectric power plant is -

(a) a pipe connected to runner outlet

(b) nozzle that release high pressure water on turbine blades

(c) a conduit connecting forebay and turbine

(d) a pipe connecting surge tank to dam

28. Trash racks are located -

(a) near tailrace (b) at the entrance of turbine

(c) inside penstock (d) at the intake

29. The type of turbine used in hydro power plant between 10-70m is -

(a) Pelton (b) Kaplan

(c) Francis (d) Propeller

30. Impulse turbines are used in -

(a) very low head plants (b) high head plants

(c) medium head plants (d) low head plants

31. Copper conductors are generally not used for transmission lines because -

(a) it is costly (b) it is not strong enough to allow long spans

(c) it requires more support (d) it requires more insulation

32. Different types of insulators used for transmission lines are -

(a) pin type only (b) suspension type only

(c) strain type only (d) pin type, suspension type and shackle type

33. At what height a conductor may be string if the required ground clearance is 7.5m with a sag of 2.5m for a horizontal line?

(a) 5.1 m (b) 10 m

(c) 7.5 m (d) 7.591 m

34. Corona effect can be minimised by increasing -

(a) the length of the conductors

(b) spacing between conductors

(c) diameter of the conductors

(d) both spacing between conductors and diameter of the conductor

35. The minimum ground clearance of the lowest conductor 11kV voltage lines along the street -

(a) 4 m (b) 5 m

(c) 5.80 m (d) 7.591 m

36. Guard ring transmission line -

(a) improves power factor
(b) reduces earth capacitance of the lowest unit
(c) reduces transmission losses
(d) improves regulation

37. If the span of transmission increased, the sag -

(a) decreases
(b) increases
(c) remains the same
(d) decreases two times

38. The economic size of a conductor is determined by -

(a) Kirchhoff's law
(b) Ohm's law
(c) Kelvin's law
(d) Faraday's law

39. Sag is provided in overhead lines so that -

(a) safe tension is not exceeded
(b) repair can be made
(c) conductor material is saved
(d) extra conductor is kept for future maintenance

40. Power factor can be improved by installing a device in parallel with load which takes -

(a) lagging reactive power
(b) leading reactive power
(c) apparent power
(d) leading apparent power

41. In a transmission line, if the load is suddenly increased in the receiving end of the system, the phase shift will -

(a) decrease
(b) becomes zero
(c) increase
(d) not be affected

42. For the single phase 2-wire system, the maximum voltage between the outer wires and earth is -

(a) $V/\sqrt{3}$
(b) $\sqrt{2}V$
(c) V
(d) 2V

43. As matter of economy, voltage for power transmission will be -

(a) low
(b) high
(c) medium
(d) very low

44. An insulator is so designed that it should fail only when -

(a) a line breakdown
(b) a flash over occurs
(c) it is punctured
(d) sag is less

45. The primary function of a lightning arrester is to:

(a) divert lightning current safely to ground
(b) increase the voltage level in a power system
(c) acts as a fuse to interrupt excess current
(d) store electrical energy for later use

46. What environmental factor can significantly impact the performance of lightning arresters?

(a) Humidity
(b) Ambient temperature
(c) Wind speed
(d) Solar

47. 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 current

48. Ferranti effect on long overhead lines is experienced when -

(a) the line is lightly loaded
(b) the power factor is unity
(c) corona effect is dominant
(d) the power factor is leading

49. In the ring main distribution system, the distribution network is fed usually -

(a) by one feeder
(b) by two feeders
(c) at different points
(d) by four feeders

50. The conductor vibration of an overhead line may cause -

(a) breaking of insulator discs
(b) excessive sag
(c) collapse of supporting structures
(d) sound pollution

51. The transmission line which feed different substation represent -

(a) primary transmission
(b) secondary transmission
(c) primary distribution
(d) secondary distribution

52. In our home, the electrical appliances are connected -

(a) in parallel with the source only if it is a high power appliance
(b) in series with the source
(c) some in series and some in parallel with the source
(d) in parallel with the source

53. In electrical work, the fuse should be placed -

(a) in earth wire
(b) in live or phase wire
(c) in lamp directly
(d) neutral wire

54. 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

55. Power stations and transmission substations in Mizoram are protected against direct lightning using -

(a) Rod gap arrester
(b) Overhead ground wires
(c) Earthing screen
(d) Horn gap arrester

56. The lightning arrester is connected -

(a) in series with the line
(b) between line and Earth
(c) to a pole near the line
(d) to circuit breaker

57. According to the IS code, the colour of earth wire is -

(a) Red
(b) Green
(c) Yellow
(d) Black

58. Minimum distance of underground cable from the foundation of building should be -

(a) 100 cm
(b) 50 cm
(c) 10 cm
(d) 5 cm

59. The height for light points and junction boxes from the floor level should be -

(a) 3.0m to 4.0 m
(b) 2.5m to 3.0m
(c) 2.0m to 3.5m
(d) 1.5m to 2.5m

60. What rule should be followed for completing wiring in a new installation?

(a) Indian Electricity Rule, 1950
(b) Electricity (Right of Consumers) Rules, 2020
(c) Indian Electricity Act, 1960
(d) Indian Electricity Rule, 1971

61. While a transformer is energized due to inrush current, the differentially connected relay may -

(a) mal operate
(b) not mal operate
(c) mal operate for lagging loads
(d) never mal operate

62. Distance relay is used for -

(a) Transmission line protection
(b) Transformer protection
(c) Bus bar protection
(d) Generator protection

63. Overcurrent relays operate on the principle of -

(a) change in voltage
(b) magnitude of current exceeding a preset threshold
(c) rate of magnitude of current
(d) impedance measurement

64. Distance relay measure -

(a) impedance of the protected line
(b) voltage at different points along a line
(c) current flowing through the line
(d) power factor of the line

65. Which of the following is the main component of relay?

(a) Contacts
(b) Coils
(c) Diode
(d) Capacitor

66. What type of relay is used in applications where high frequency switching is required?

(a) Electromechanical relay
(b) Reed relay
(c) Solid state relay
(d) Mercury relay

67. What type of relay is used to protect a motor from overloading?

(a) Electromechanical relay
(b) Solid state relay
(c) Overload relay
(d) Proximity relay

68. What type of electrical accident can occur if a relay is used to switch high voltage or high current loads?

(a) Short circuit
(b) Open circuit
(c) Ground fault
(d) Overheating

69. Which type of protection is provided on generator to protect against stator insulation in future?

(a) Differential protection
(b) Overcurrent relay
(c) Thermocouple actuated alarm
(d) Reverse power relay

70. Buchholz relay is used for the protection of -

(a) transformer only
(b) transformer and transmission line
(c) transformer and alternator
(d) alternator only

71. The relay used for feeder protection is -

(a) Undervoltage relay
(b) overcurrent earth fault relay
(c) Thermal relay
(d) Buchholz relay

72. MCCB stands for -

(a) Miniature Current Circuit Breaker
(b) Maximum Current Circuit Breaker
(c) Moulded Cabinet Circuit Breaker
(d) Moulded Case Circuit Breaker

73. A circuit breaker perform the function of -

(a) detection only
(b) circuit interruption only
(c) both deduction and circuit interruption
(d) circuit rectification

74. What type of circuit breaker is best for protecting high power appliances like air conditioners?
(a) Miniature Circuit Breaker (b) Ground Fault Circuit Interrupter
(c) Double pole Breaker (d) Single pole breaker

75. What environmental factors can affect the performance of circuit breakers?
(a) Humidity and dust buildup (b) Exposure to direct sunlight
(c) Extremely high or low temperature (d) Exposure to rain

76. Which of the following is used to measure the speed of a rotating shaft?
(a) Thermocouple (b) Pressure gauge
(c) Flow meter (d) Tachometer

77. A control system in which the control action is dependent on the output is known as -
(a) open loop system (b) semiclosed system
(c) closed loop system (d) no loop system

78. A Potential Transformer measures -
(a) voltage only (b) voltage and power factor
(c) current only (d) current and voltage

79. A Current Transformer measures -
(a) voltage only (b) voltage and current
(c) current only (d) current and reactive power

80. FM broadcast band lies in -
(a) VHF band (b) UHF band
(c) SHF band (d) HF band

81. Which of the following additional devices is required in order to measured pressure using LVDT?
(a) Strain gauge (b) Pilot Tube
(c) Rotameter (d) Bourdon Tube

82. Thermistor have -
(a) high and negative temperature coefficient (b) low and negative temperature coefficient
(c) high and positive temperature coefficient (d) low and positive temperature coefficient

83. LVDT is always used as -
(a) secondary transducer (b) primary transducer
(c) primary signal generator (d) secondary signal generator

84. The pH value of pure water is -
(a) zero (b) 1
(c) 7 (d) infinite

85. In a microphone, the acoustic energy is converted into -
(a) Vibration (b) Pressure energy
(c) Magnetic impulses (d) Thermal energy

86. The picture on an oscilloscope screen is produced by -
(a) an electron beam (b) a moving vane
(c) a T-V type camera (d) an intensity control

87. A piezometer may not be used for pressure measurement in pipes -
(a) when the pressure difference is high (b) when the velocity is high
(c) when the fluid in the pipe is gas (d) when the fluid in the pipe is highly viscous

88. Which of the following factors can affect the response time of a pressure sensor?

(a) The size of diaphragm
(b) The thickness of the diaphragm
(c) The type of fluid being used
(d) The operating temperature of the sensor

89. A transducer is classified into how many number -

(a) 2
(b) 3
(c) 4
(d) 5

90. Which of the following is the working principle of capacitive type transducer?

(a) Variable capacitance
(b) Constant capacitance
(c) Variable power
(d) Variable temperature

91. The Energy of lighning stroke can be as high as -

(a) 10 kA
(b) 100 kA
(c) 200 kA
(d) 10000 kA

92. In what shape of conductor, Corona loss is less?

(a) Circular
(b) Flat
(c) Oval
(d) Rectangle

93. Switching surge is -

(a) High voltage d.c
(b) High voltage a.c
(c) Short duration transient voltage
(d) Low impedance transformer

94. The essential condition for the Paschen's law to be valid is that -

(a) Voltage must be d.c
(b) Voltage must be a.c
(c) Temperature must be constant
(d) Humidity must be low

95. High Voltage Schering bridge is used to measure -

(a) large capacitance without additional element
(b) small capacitance without additional element
(c) medium value capacitance
(d) medium value inductance

96. Which insulating material is commonly used in high voltage cable?

(a) XLPE (Cross-linked polyethylene)
(b) PVC (Poly Vinyl Chloride)
(c) Wood
(d) Rubber

97. In plasma state, a gas -

(a) loses electrical conductivity
(b) conducts electricity
(c) becomes perfect insulator
(d) attracts moisture

98. Tower lines are used for transmission line of voltage -

(a) 400KV and above
(b) 220KV and above
(c) 132KV and above
(d) 33KV and above

99. High voltage for the long distance power transmission -

(a) reduces transmission losses
(b) reduces time of transmission
(c) increases system reliability
(d) increases transmission loss

100. How many disc insulators are used for each phase in 132KV transmission line?

(a) 5 Nos.
(b) 7 Nos.
(c) 9 Nos.
(d) 11 Nos.

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