

MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO JUNIOR ENGINEER (J.E) (CONTRACT) UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT, APRIL, 2016

ELECTRICAL ENGINEERING PAPER - I

Time Allowed : 2 hours

Full Marks : 150

Attempt all questions.

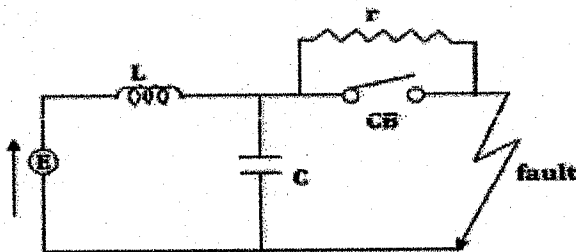
All questions carry equal marks of 2 each.

1. Heating value of coal is approximately
 - (a) 1000-2000 kcal/kg
 - (b) 2000-4000 kcal/kg
 - (c) 5000-6500 kcal/kg
 - (d) 9000-10,500 kcal/kg
2. Power plants using coal work closely on known which of the following cycle?
 - (a) Otto cycle
 - (b) Binary vapor cycle
 - (c) Brayton cycle
 - (d) Rankine cycle
3. The equipment installed in power plants to reduce air pollution due to smoke is
 - (a) Induced draft fans
 - (b) De-super heaters
 - (c) Electrostatic precipitators
 - (d) Re-heaters
4. Most of the generators in thermal power plants run at
 - (a) 3000 rpm
 - (b) 1500 rpm
 - (c) 1000 rpm
 - (d) 750 rpm
5. Which power plant is free from environmental pollution problems?
 - (a) Thermal power plant
 - (b) Nuclear power plant
 - (c) Hydro-power plant
 - (d) Geothermal energy power plant
6. For low head and high discharge, the hydraulic turbine used is
 - (a) Kaplan turbine
 - (b) Francis turbine
 - (c) Pelton wheel
 - (d) Jonual turbine
7. In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
 - (a) Dam
 - (b) Reservoir
 - (c) Penstock
 - (d) Surge tank
8. Efficiency is secondary consideration in case of
 - (a) peak load plants
 - (b) base load plants
 - (c) both peak load and base load plants
 - (d) none of these
9. During load shedding
 - (a) system voltage is reduced
 - (b) system frequency is reduced
 - (c) some loads are switched off
 - (d) system power factor is changed

10. Stones are provided in the substation to:
- (a) avoid fire accident by draining oil from transformer if leaks
 - (b) avoid growing of weeds and plants
 - (c) provide insulation
 - (d) All of these
11. In order to improve the power factor ___ device is employed in the substation
- (a) Synchronous condenser
 - (b) Synchronous reactor
 - (c) Series Capacitors
 - (d) None of these
12. In substation which of the following devices is a carrier communication device?
- (a) CVT
 - (b) Earth conductor
 - (c) Wave trap
 - (d) Lightning arrestor
13. Which of the following devices is employed in substation to limit the short circuit current in the power system?
- (a) Shunt condenser
 - (b) Reactor
 - (c) Series capacitor
 - (d) Shunt capacitor
14. Earthing conductivity is affected by:
- (a) Moisture content in the soil
 - (b) Chemical composition
 - (c) Concentration of salts in the soil
 - (d) All of these
15. Which component connects the substation to the area where power is to be distributed?
- (a) Distributors
 - (b) Service mains
 - (c) Feeders
 - (d) All of these
16. A load curve is a plot of
- (a) Load versus generation capacity
 - (b) Load versus current
 - (c) Load versus time
 - (d) Load versus cost of power
17. For economy in generation power
- (a) diversity factor should be high
 - (b) plant utilisation factor
 - (c) load factor should be high
 - (d) load factor and diversity factor should be low.
18. Demand factor is the
- (a) Maximum Demand / Average Demand
 - (b) Maximum Demand / Connected Load
 - (c) Average Demand / Maximum Demand
 - (d) Connected Load / Maximum Demand
19. In a system if the base load is the same as the maximum demand, the load factor will be
- (a) 1
 - (b) Zero
 - (c) Infinity
 - (d) 1 percent
20. A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW, will have a load factor of
- (a) 40%
 - (b) 50%
 - (c) 60%
 - (d) 80%
21. The protection against direct lightning strokes and high voltage steep waves is provided by
- (a) earthing of neutral
 - (b) lightning arresters
 - (c) ground wires
 - (d) lightning arresters and ground wires

22. In outdoor substation, the lightning arrester is placed nearer to
- (a) the isolator
 - (b) the current transformer
 - (c) the power transformer
 - (d) the current breaker
23. In order to increase the limit of distance of transmission line
- (a) series resistances are used
 - (b) synchronous condensers are used
 - (c) shunt capacitors and series reactors are used
 - (d) series capacitors and shunt reactors are used.
24. A 30 km transmission line carrying power at 33 kV is known as
- (a) short transmission line
 - (b) long transmission line
 - (c) high power line
 - (d) ultra high voltage line
25. Surge impedance of transmission line is given by
- (a) $(L/C)^{1/2}$
 - (b) $(C/L)^{1/2}$
 - (c) $(CL)^{1/2}$
 - (d) $1/(CL)^{1/2}$
26. In case of transmission line conductors with the increase in atmospheric temperature
- (a) length increase but stress decreases
 - (b) length increases and stress also increases
 - (c) length decreases but stress increases
 - (d) both length as well as stress decreases
27. If the height of transmission towers is increased, which of the following parameters is likely to change?
- (a) Resistance
 - (b) Inductance
 - (c) Capacitance
 - (d) None of these
28. A string efficiency of 100% implies that
- (a) shunt capacitance is 1 MF
 - (b) potential across each disc is same
 - (c) potential across each disc is zero
 - (d) one of the insulator discs is shorted
29. Steel poles for transmission lines need protection against
- (a) termites
 - (b) borer
 - (c) corrosion
 - (d) all of these
30. Guy wire is used to
- (a) Support the pole
 - (b) Provide protection against surges
 - (c) Provide emergency earth route
 - (d) Protect conductors against short circuiting
31. If the voltage across the units in a two unit suspension insulator is 60% and 40% respectively of the line voltage, the ratio of capacitance of the insulator to that of its capacitance to earth will be
- (a) 0.5
 - (b) 0.50
 - (c) 0.65
 - (d) 0.75
32. 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
33. Which of the following is not the distribution system normally used?
- (a) 3 phase-4 wire
 - (b) 3 phase-3 wire
 - (c) Single phase - 3 wire
 - (d) Single phase -4 wire

34. Transmission efficiency increases as
- (a) voltage and power factor both increase
 - (b) voltage and power factor both decrease
 - (c) voltage increases but power factor decreases
 - (d) voltage decreases but power factor increases
35. The fact that a conductor carries more current on the surface as compared to core, is known as
- (a) skin effect
 - (b) corona
 - (c) permeability
 - (d) unsymmetrical fault
36. The insulating material for a cable should have
- (a) low cost
 - (b) high dielectric strength
 - (c) high mechanical strength
 - (d) all of these
37. Thickness of the layer of insulation on the conductor, in cables, depends upon
- (a) Reactive power
 - (b) Power factor
 - (c) Voltage
 - (d) Current carrying capacity
38. A certain cable has an insulation of relative permittivity 4. If the insulation is replaced by one of relative permittivity 2, the capacitance of the cable will become
- (a) one half
 - (b) double
 - (c) four times
 - (d) none of these
39. What is the actuating quantity for the relays?
- (a) Magnitude
 - (b) Frequency
 - (c) Phase angle
 - (d) All of these
40. Protective relays can be designed to respond to _____
- (a) Light intensity, impedance
 - (b) Temperature, resistance, reactance
 - (c) Voltage and current
 - (d) All of these
41. On what factor does the operating speed of the relay depend upon?
- (a) Rate of flux built up
 - (b) Armature core air gap
 - (c) Spring tension
 - (d) All of these
42. In the below figure, the relay circuit is divided into three parts. What does the first part consist of?



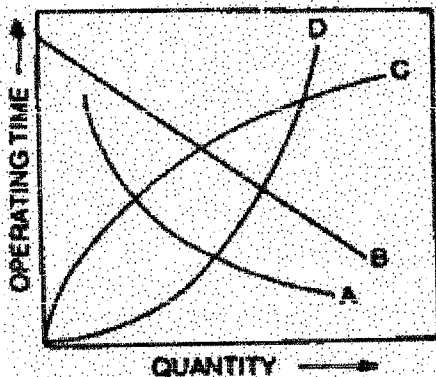
- (a) Primary winding of a current CT which is connected in series with the line to be protected
- (b) Secondary of the CT and the operating coil
- (c) Tripping circuit
- (d) All of these

43. Any winding of a power transformer develops short circuit owing to:
- (a) Loose connections
 - (b) Insulation failure
 - (c) Impulse voltage
 - (d) Mechanical vibration
44. The relay best suited for phase fault relaying for medium transmission lines is:
- (a) Mho relay
 - (b) Reactance relay
 - (c) Impedance relay
 - (d) None of these
45. 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 lightning strokes
 - (c) Suppresses the high frequency oscillations in the line
 - (d) Reflects back the travelling waves approaching it
46. Thermal relays are used for the protection of motors against over-current owing to:
- (a) Short circuit
 - (b) Heavy loads
 - (c) Earth fault
 - (d) All of these
47. Buchholz relay is:
- (a) Located in the conservator tank
 - (b) Located in the transformer tank itself
 - (c) Connected in the pipe connecting main tank of transformer and conservator
 - (d) Installed in the circuit breaker
48. Isolators are used for disconnecting a circuit when
- (a) Line is energised
 - (b) Line is on full load
 - (c) Line carries no current
 - (d) Can be operated under any condition
49. Earth fault relays are:
- (a) Directional relay
 - (b) Non-directional relay
 - (c) Short operate time relay
 - (d) Under voltage relay
50. Differential relays are used for the protection of equipments against:
- (a) Internal faults
 - (b) Over-current
 - (c) Reverse current
 - (d) Reverse power
51. The torque developed in Induction type relay is:
- (a) Directly proportional to the current
 - (b) Directly proportional to the square of the current
 - (c) Directly proportional to square root of the current
 - (d) Inversely proportional to the current
52. The operation speed of a relay depends on:
- (a) Rate of flux buildup
 - (b) Armature core air gap
 - (c) Spring tension
 - (d) All of these
53. The emf generated due to nth harmonic component of flux in an alternator will be
- (a) n times the fundamental emf
 - (b) same as fundamental emf
 - (c) less than the value of fundamental emf
54. In large generators protection provided against external faults is
- (a) biased differential protection
 - (b) sensitive earth fault protection
 - (c) inter-turn fault protection
 - (d) all of these

55. Best protection is provided by HRC fuses in case of

- (a) Open circuits
- (b) Short circuits
- (c) Overloads
- (d) None of these

56. Which curve in the figure represents inverse time characteristics?



- (a) Curve A
- (b) Curve B
- (c) Curve C
- (d) Curve D

57. A circuit breaker is

- (a) power factor correcting device
- (b) a device to neutralize the effect of transients
- (c) a waveform correcting device
- (d) a current interrupting device

58. The function of protective relay in a circuit breaker is

- (a) to detect any stray voltages
- (b) to close the contacts when the actuating quantity reaches a certain predetermined value
- (c) to limit arcing current during the operation of circuit breaker
- (d) to provide additional safety in the operation of circuit breaker

59. The fault clearing time of a circuit breaker is usually

- (a) few minutes
- (b) few seconds
- (c) one second
- (d) few cycles of supply voltage

60. Interrupting medium in a contactor may be

- (a) air
- (b) oil
- (c) SF₆ gas
- (d) any of these

61. In air blast circuit breakers, the pressure of air is of the order of

- (a) 100 mm Hg
- (b) 1 kg/cm²
- (c) 20 to 30 kg/cm²
- (d) 200 to 300 kg/cm²

62. A thermo-couple instrument can be used for the measurement of:

- (a) Direct current only
- (b) Alternating current only
- (c) Both direct current and alternating current
- (d) dc/ac voltage only

63. Electrostatic type instruments are mainly used for measurement of:

- (a) Heavy currents
- (b) Low currents
- (c) Low voltages
- (d) High voltages

64. The instrument which is cheapest for dc measurement is:
(a) Moving iron (b) PMMC
(c) Hot-wire (d) Electro-dynamo
65. Measurement range of a voltmeter can be extended by using:
(a) High current resistance (b) High series resistance
(c) Low shunt resistance (d) Low series resistance
66. Which of the following instruments can be used for full scale deflection of 300°?
(a) PMMC (b) Induction type
(c) Hot wire (d) Electrostatic
67. A Ohmmeter is basically:
(a) A ammeter (b) A voltmeter
(c) A multimeter (d) None of these
68. A megger indicates infinity when test terminals are open-circuited. This is because:
(a) No current flows through the current coil
(b) No current flows through the pressure coil
(c) No current flows through the compensating winding
(d) Current does not flow through current coil and pressure coil
69. Potentiometer is a/an ___ instrument:
(a) Indicating (b) Comparison
(c) Calibrating (d) Recording
70. Direct current is preferred over alternating current for testing of ac transmission lines and cables because:
(a) Heavy charging currents will be drawn and so a large sized transformer is required if tested with ac
(b) Transmission lines and cables should not be tested with dc
(c) The transformers required for testing cannot be used for long distances
(d) All of these
71. For the measurement of high pressure with high accuracy the device used is
(a) Manganin wire pressure (b) Ionization gauge
(c) Dead weight gauge (d) Bourdon tubes
72. Advantage of passive instrument is
(a) It does not need power supply (b) Cheap
(c) Sensitive (d) Accurate
73. Surge diverters are
(a) non-linear resistors in series with spark gaps which act as fast switches
(b) arc quenching devices
(c) shunt reactors to limit the voltage rise due to Ferranti effect
(d) over-voltages of power frequency harmonics
74. The breakdown voltage in gases depends on
(a) distance between the electrodes (b) relative air density
(c) humidity (d) all of these
75. The phenomenon of corona is generally accompanied by
(a) a bang (b) a hissing sound
(c) magnetic hum (d) all of these