

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 - II

Time Allowed : 2 hours

Full Marks : 150

Attempt all questions.

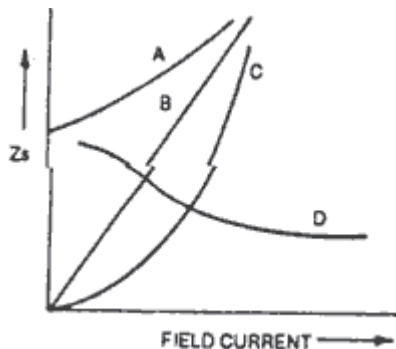
All questions carry equal marks of 2 each.

1. Which of the following 3-phase connections of a transformer causes interference with the neighboring communication lines?
 - (a) Delta-star
 - (b) Star-delta
 - (c) Star-star
 - (d) Delta-delta
2. Power transformers are provided with additional cooling arrangement in order to:
 - (a) Increase the power rating
 - (b) Increase insulation life
 - (c) Lower operating temperature
 - (d) All of these
3. A Distribution transformer is selected on the basis of:
 - (a) Voltage regulation
 - (b) Efficiency
 - (c) All day efficiency
 - (d) All of these
4. The most common method of cooling employed in power transformer is:
 - (a) Oil natural
 - (b) Natural cooling
 - (c) Air cooling
 - (d) Air-blast cooling
5. Which of the following transformer connections will give highest secondary voltage?
 - (a) Delta primary, delta secondary
 - (b) Delta primary, star secondary
 - (c) Star primary, delta secondary
 - (d) Star primary, star secondary
6. The chemical used in the breather is:
 - (a) Sodium chloride
 - (b) Silica sand
 - (c) Silica gel
 - (d) Copper silicate gel
7. Major insulation in a transformer is the insulation between the:
 - (a) LV winding and core
 - (b) LV winding and HV winding
 - (c) Turns of the windings
 - (d) Both (a) and (b)
8. Low voltage winding is placed next to the core in the case of concentric windings as ___ is reduced:
 - (a) Hysteresis loss
 - (b) Leakage fluxes
 - (c) Eddy current loss
 - (d) Insulation requirement
9. The transformer oil should have:
 - (a) High volatility
 - (b) High viscosity
 - (c) High dielectric strength
 - (d) All of these

10. The Transformer core laminations are insulated from each other by:
- (a) Paper
 - (b) Thin varnish coating
 - (c) Mica strip
 - (d) All the above can be used for insulation
11. For minimum weight of the transformer, the iron weight should be ___ the weight of the copper:
- (a) More than
 - (b) Equal to
 - (c) Less than
 - (d) None of these
12. In a Transformer, the primary flux is always _____ the secondary (flux).
- (a) Greater than
 - (b) Smaller than
 - (c) Equal to
 - (d) Equal in both step up and Step down Transformer
13. What would happen if we operate a 60 Hz Transformer on 50 Hz Source of Supply?(and how can we do that?)
- (a) Current will decrease (so increase the current)
 - (b) Current will increase (so decrease the current)
 - (c) Current will be same in both cases.
 - (d) No Effect (We can do that without changing anything)
14. The rating of transformer may be expressed in _____.
- (a) kW
 - (b) kVAR
 - (c) kVA
 - (d) Horse power
15. What would happen if a power transformer designed for operation on 50 Hz (frequency) were connected to a 500 Hz (frequency) source of the same voltage?
- (a) Current will be too high
 - (b) Transformer may start to smoke and burn
 - (c) Eddy Current and Hysteresis loss will be excessive
 - (d) No effect
16. A Step Up transformer _____.
- (a) Steps up the level of voltage
 - (b) Steps down the level of current
 - (c) Steps up level the power
 - (d) (a) and (b) only
17. An Auto-transformer (which has only one winding) may be used as a _____
- (a) Step-Up Transformer
 - (b) Step-Down Transformer
 - (c) Both Step-Up and Step-Down transformer
 - (d) None of these
18. The friction losses in Real Transformers are _____
- (a) 0%
 - (b) 5%
 - (c) 25%
 - (d) 50%
19. In Three Phase Transformer, the load Current is 139.1A, and Secondary Voltage is 415V. The Rating of the Transformer would be _____.
- (a) 50kVA
 - (b) 57.72kVA
 - (c) 100kVA
 - (d) 173kVA

20. In an Auto Transformer, the Primary and Secondary are _____ Coupled.
- (a) Only Magnetically (b) Only Electrically
(c) Magnetically as well as Electrically (d) None of these
21. The speed at which the rotating magnetic field produced by stator currents rotates in an induction motor is:
- (a) Synchronous speed (b) Rotor speed
(c) Greater than synchronous speed
22. A 3-phase 50 Hz induction motor runs at speed of 940 RPM; the speed of the rotating magnetic field will be:
- (a) 940 RPM (b) 1000RPM
(c) 1050 RPM (d) 1100 RPM
23. Full-load copper losses in a 3-phase 50 Hz 4-pole induction motor running at 1455 rpm are 300 W. The rotor input is
- (a) 5 kW (b) 10 kW
(c) 20 kW (d) 50 kW
24. The power factor of a 3-phase induction motor at no load is approximately
- (a) 0.2 (b) 0.7
(c) 0.85 (d) 1
25. The maximum torque in a 3-phase induction motor occurs at a slip
- (a) R_2/X_2 (b) X_2/R_2
(c) R_{22}/X_2 (d) R_{22}/X_{22}
26. For high starting torque, the most 3-phase induction motor is
- (a) Squirrel-cage type (b) Slip-ring type
(c) Deep bar squirrel-cage type (d) Double-cage induction motor
27. The starting torque in a single-phase induction motor is
- (a) High (b) Low
(c) Zero (d) Very low
28. The starting torque of a 3-phase induction motor can be increased by increasing
- (a) the rotor reactance (b) the rotor resistance
(c) the stator resistance (d) none of these
29. The crawling in the induction motor is caused by
- (a) improper design of the machine (b) low supply voltage
(c) high loads (d) harmonics developed in the motor
30. Synchronous motor can operate at
- (a) Lagging power factor only
(b) Leading power factor only
(c) Unity power factor only
(d) Lagging, leading and unity power factor only
31. With the increase in the excitation current of synchronous motor the power factor of the motor will
- (a) improve (b) decrease
(c) remain constant (d) depend on other factors

32. The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as
- (a) breaking torque (b) synchronizing torque
(c) pull out torque (d) slip torque
33. The hunting in a synchronous motor takes place when
- (a) friction in bearings is more (b) air gap is less
(c) load is variable (d) load is constant
34. In the figure shown which curve represents the variation of synchronous reactance for a synchronous motor with field current?



- (a) curve A (b) curve B
(c) curve C (d) curve D
35. Which of the following conditions is necessary for triggering system for thyristors?
- (a) It should be synchronized with the main supply
(b) It must use separate power supply
(c) It should provide a train of pulses
(d) None of these
36. The normal way to close a SCR is by approximate
- (a) Gate current (b) Cathode current
(c) Anode current (d) Forward current
37. When the SCR conducts, the forward voltage drop
- (a) is 0.7 V (b) is 1 to 1.5 V
(c) increases slightly with load current (d) remains constant with load current
38. A thyristor can be termed as
- (a) DC switch (b) AC switch
(c) Both (a) and (b) are correct (d) Square-wave switch
39. To obtain the highest possible string efficiency, the SCRs connected in string must have
- (a) Different characteristics (b) Same characteristics
(c) Same voltage ratings only (d) Same current ratings only
40. Power MOSFET is a
- (a) Voltage controlled device (b) Current controlled device
(c) Frequency controlled device (d) None of these
41. In a 3-phase controlled bridge rectifier, with an increase of an overlap angle, the output dc voltage
- (a) Decreases (b) Increases
(c) Does not change (d) Depends upon load inductance

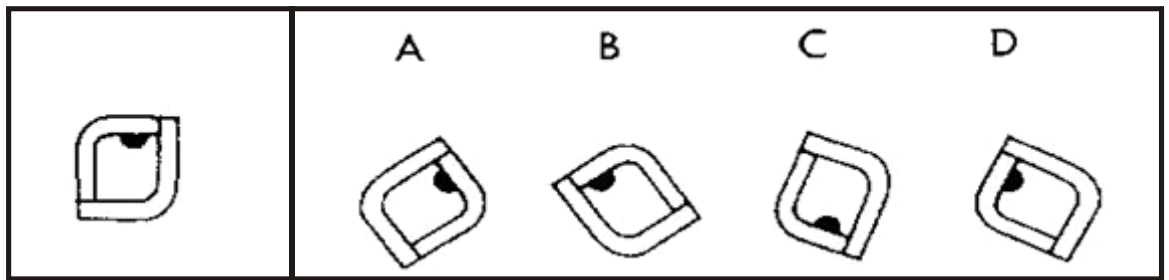
42. In dc choppers, the waveforms for input and output voltages are respectively
(a) Discontinuous, continuous (b) Continuous, discontinuous
(c) Both continuous (d) Both discontinuous
43. Chopper control for DC motors provides variation in
(a) Input voltage (b) Frequency
(c) Both (a) and (b) (d) None of these
44. A single phase voltage-source-square wave inverter feeds pure inductive load. The waveform of the load current will be
(a) Sinusoidal (b) Rectangular
(c) Trapezoidal (d) Triangular
45. In a dc motor, if the field coils get opened, the speed of the motor will
(a) Decrease (b) Come to a stop
(c) Increase (d) None of these
46. The advantage of the tachometer speed control method for d.c. motors is that it senses
(a) back emf (b) armature current
(c) armature voltage (d) speed
47. In an a.c. motor control, the ratio of voltage to frequency is maintained at constant value
(a) to make maximum use of magnetic circuit.
(b) to make minimum use of magnetic circuit.
(c) to maximize the current drawn from the supply to provide torque.
(d) to minimize the current drawn from the supply to provide torque.
48. Speed control of induction motor can be effected by varying
(a) Flux (b) Voltage input to stator
(c) Keeping rotor coil open (d) None of these
49. Thyristor switching circuits are used
(a) to reduce the stator voltage (b) to increase the stator voltage
(c) to keep the stator voltage control (d) none of these
50. The starting torque of a capacitor start motor is
(a) zero (b) low
(c) same as rated torque (d) more than rated torque
51. For ceiling fans generally the single phase motor used is
(a) split phase type (b) capacitor start type
(c) capacitor start and run type (d) permanent capacitor type
52. The purpose of providing a choke in a tube light is
(a) to eliminate corona effects (b) to avoid radio interference
(c) to improve power factor (d) to limit current to appropriate value
53. When a sodium vapor lamp is switched on, initially the color is
(a) Pink (b) Yellow
(c) Green (d) Blue
54. In a sodium vapor lamp the discharge is first started in the
(a) neon gas (b) nitrogen gas
(c) argon gas (d) krypton gas

55. Under the influence of fluorescent lamps sometimes the wheels of rotating machinery appear to be stationary. This is due to the
- (a) fluctuations
 - (b) luminescence effect
 - (c) stroboscopic effect
 - (d) low power factor
56. Pressure of refrigerant in the evaporator should be
- (a) Equal to the atmospheric pressure
 - (b) Less than the atmospheric pressure
 - (c) Greater than the atmospheric pressure
 - (d) None of these
57. Specific heats at constant pressure and at constant volume are equal
- (a) Vapor Refrigerant – 22
 - (b) Vapor Ammonia
 - (c) Water vapors
 - (d) None of these
58. The installed capacity of wind energy in India is about
- (a) 8000 MW
 - (b) 1500 MW
 - (c) 6000 MW
 - (d) 4000 MW
59. A module in a solar panel refers to
- (a) Series arrangement of solar cells
 - (b) Parallel arrangement of solar cells
 - (c) Series and parallel arrangement of solar cells
 - (d) None of these
60. The efficiency of the solar cell is about
- (a) 25%
 - (b) 15%
 - (c) 40%
 - (d) 60%
61. What is the maximum possible output of a solar array?
- (a) 300 W/m²
 - (b) 100 W/m²
 - (c) 250 W/m²
 - (d) 500 W/m²
62. The current density of a photo voltaic cell ranges from
- (a) 10 – 20 mA/cm²
 - (b) 40 – 50 mA/cm²
 - (c) 20 – 40 mA/cm²
 - (d) 60 – 100 mA/cm²
63. Maximum wind energy available is proportional to:
- (a) Air density
 - (b) Cube of wind velocity
 - (c) Square of the rotor diameter
 - (d) All of these
64. Theoretical maximum efficiency of wind power is about
- (a) 30%
 - (b) 48%
 - (c) 59%
 - (d) 65%
65. Which type of Generator is employed in wind power plant?
- (a) Synchronous generator
 - (b) Induction generator
 - (c) Permanent magnet motor
 - (d) Brushless motor
66. To bake two muffins it takes 3½ cups of sugar at about 11 paisa per cup. How much would it cost to purchase the sugar necessary to make 16 muffins?
- (a) 2.42
 - (b) 3.60
 - (c) 2.92
 - (d) 3.08
67. The next number in the following sequence would be 3, 5, 8, 13, 21, 34, _____.
- (a) 22
 - (b) 55
 - (c) 53
 - (d) 47

68. What does it mean to say “don’t judge a book by its cover”?
- (a) Don’t believe everything you hear
 - (b) In judging a person or an object, do not look at outward appearance alone
 - (c) Well-bound books often have cheap covers
 - (d) Someone else’s situation always seems better than our own
69. A substitute for “one who likes to spend time with others” in one word can be
- (a) Introvert
 - (b) Commoner
 - (c) Extrovert
 - (d) Extraordinary
70. Mark the one alternative that is nearest in meaning to the word - Nullify
- (a) Impress
 - (b) No effect
 - (c) Seclude
 - (d) Astound

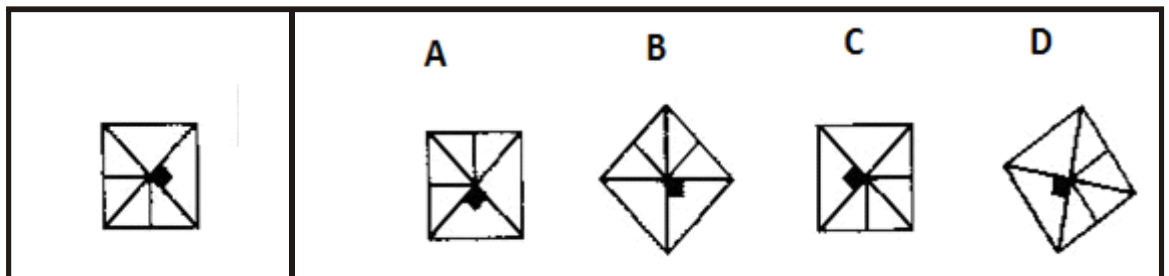
Directions (Questions 71 & 72): Each problem in this test consists of one figure on the left of a vertical line and four figures on the right. You are to decide which of the four figures on the right is the same as the figure on the left.

71.



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

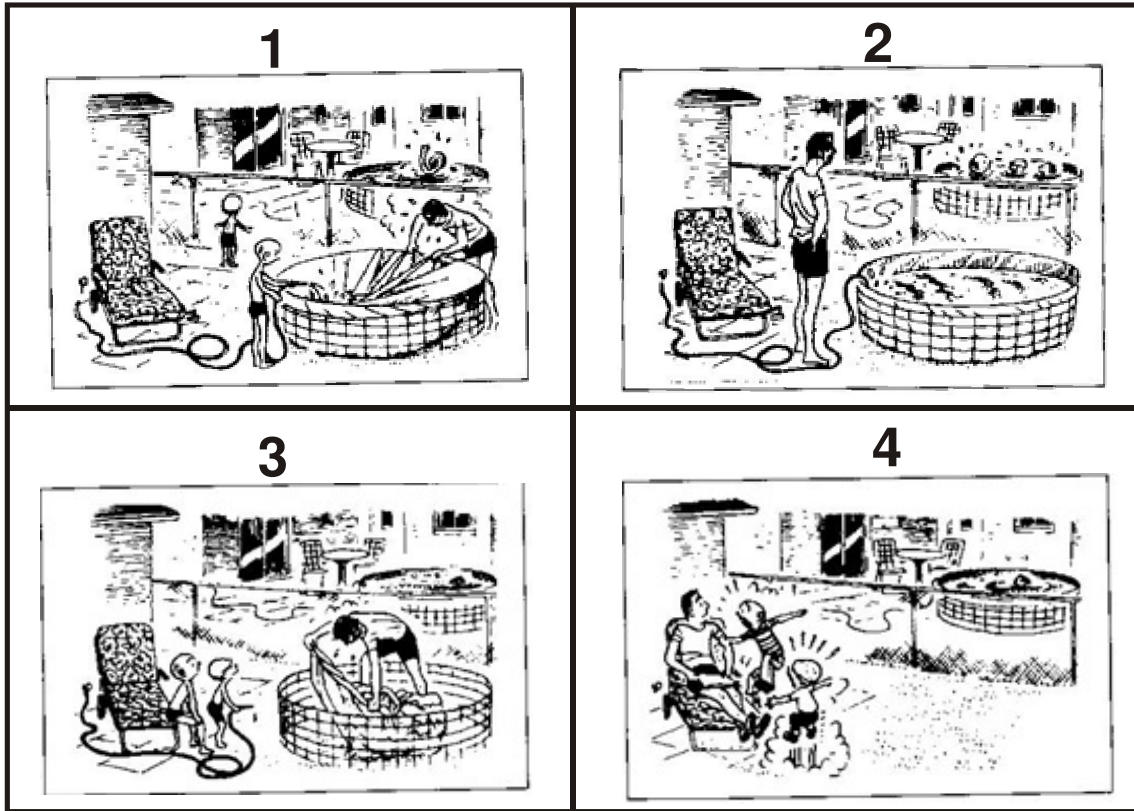
72.



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

Directions (Question 73): Here are some pictures for you to arrange. They are mixed up and you are to put them in the right order so that they make the most sensible story. Choose the correct one of the following possible.

73.



- (a) 1 4 3 2
- (c) 4 3 2 1

- (b) 4 1 2 3
- (d) 1 2 3 4