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-IV (ELECTRICAL ENGINEERING)

Time Allowed : 2 hours FM : 200

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

1. A Transformer will work on-
(a) a.c only (b) d.c only
(c) a.c as well as d.c (d) higg voltage d.c only

2. The primary and secondary of a transformer are-
(a) electrically coupled. (b) magnetically coupled.
(c) electrically and magnetically coupled. (d) directly coupled.

3. A transformer transfers electrical energy from primary to secondary usually with a change in-
(a) frequency (b) power
(c) voltage (d) time period

4. The winding of a transformer with greater number of turns will be-
(a) high-voltage winding. (b) low-voltage winding.
(c) either high or low voltage winding. (d) tertiary winding.

5. The iron core is used in transformer to-
(a) increase the weight. (b) provide tight magnetic coupling.
(c) reduce core losses. (d) increase the overall efficiency.

6. An ideal transformer is one which-
(a) has no losses and leakage reactance. (b) does not work.
(c) have same primary and secondary turns. (d) have good cooling system.

7. The no-load input power to a transformer is practically equal to-
(a) the iron loss in the transformer (b) the copper loss in the transformer
(c) the eddy current in the transformer (d) the hysteresis loss in the transformer

8. Two things which are same for primary and secondary of transformer are-
(a) ampere-turns and voltage per turn (b) resistance and leakage reactances
(c) currents (d) voltages

9. Cores of large transformers are built upto nearly circular cross-section in order to reduce-

(a) leakage reactance. (b) iron losses.

(c) eddy current loss. (d) copper losses.

10. The open-circuit test on a transformer is always made on-

(a) low-voltage winding only. (b) high-voltage winding only.

(c) tertiary winding. (d) low-voltage and high voltage winding.

11. Open-circuit test is done on a transformer to find-

(a) the copper losses. (b) the total equivalent resistance.

(c) the turns-ratio. (d) the total equivalent leakage reactance.

12. In the short-circuit test on a transformer, we generally short the-

(a) tertiary winding. (b) high-voltage winding only.

(c) low-voltage winding only. (d) low-voltage and high voltage winding.

13. A transformer will have zero efficiency at-

(a) full-load. (b) no-load.

(c) half full load. (d) 90 % load.

14. Short-circuit test of a transformer helps us its-

(a) iron loss. (b) full-load copper loss.

(c) copper loss at no-load. (d) copper loss at half-load.

15. In an auto transformer, power from the primary is transferred to the secondary

(a) inductively only (b) conductively only

(c) inductively and conductively (d) resistively

16. In nickel cadmium cells, the electrolyte is a mixture of -

(a) potassium chloride and deionised water. (b) potassium hydroxide and deionised water.

(c) sulphuric acid and water. (d) potassium peroxide and deionised water.

17. Battery cells are connected in series to -

(a) increase the current capacity (b) increase the output voltage

(c) decrease the internal resistance (d) decrease the ampere hour

18. If the capacity of a battery is 4000Ah, it can supply 4000 Ampere current for-

(a) 120 min (b) 240 min

(c) 60 min (d) 30 min

19. The specific gravity of a fully charged lead-cell is-

(a) 1.0 (b) 1.1

(c) 1.22 (d) 2.12

20. During the charging of a lead acid cell.

(a) Its voltage increase

(b) It gives out energy

(c) Its cathode becomes dark chocolate brown in colour

(d) Specific gravity of acid decreases

21. A three-phase slip ring induction motor is fed from the rotor side with the stator winding short-circuited. The frequency of the current flowing in the short-circuited stator is -

(a) slip frequency (b) supply frequency

(c) the frequency corresponding to rotor speed (d) zero

22. A 50 Hz, 4poles, a single phase induction motor is rotating in the clockwise direction at a speed of 1425 rpm. The slip of motor in the direction of rotation & opposite direction of the motor will be respectively.

(a) 0.05, 0.95 (b) 0.04, 1.96

(c) 0.05, 1.95 (d) 0.05, 0.02

23. The frame of an induction motor is made of -

(a) Aluminium (b) Silicon steel

(c) Cast iron (d) Stainless steel

24. An induction motor can be said analogous to -

(a) transformer (b) synchronous motor

(c) universal motor (d) stepper motor

25. The speed of a squirrel cage induction motor is changed by-

(a) pole changing (b) rheostatic control

(c) caocade control (d) none of the above

26. In a 3-phase induction motor, iron loss mainly occurs in-

(a) stator core and staror teeth (b) stator and rotor

(c) rotor core and rotor teeth (d) stator winding

27. The great advantage of the double squirrel-cage induction motor over single cage rotor is that its -

(a) efficiency is higher. (b) power factor is higher.

(c) slip is larger. (d) starting current is lower.

28. Majority of the induction motor have-

(a) totally enclosed frame (b) drip proof type frame

(c) totally enclosed fan cooled frame (d) good sound proof frame

29. A 4-pole, 3-phase, 60 Hz induction motor is operating at a speed of 1500 rpm. The frequency of the rotor current of the motor in Hz is _____.

(a) 5 (b) 10

(c) 2 (d) 7

30. Which of the following are used in preventing the hunting phenomenon in synchronous generators?

(a) Damper bars (b) Short pitch chords

(c) Distributed winding (d) Damper bars and short pitch chords

31. For a practical synchronous motor, the pull-out torque will occur when the torque angle is nearly equal to -

(a) 0° (b) 30°

(c) 45° (d) 75°

32. Single phase induction motor usually operate at -

(a) 0.6 pf (b) 0.8 pf lagging

(c) 0.1 pf lagging (d) unity pf

33. The capacitor used in single phase induction motor have no -
(a) voltage rating (b) dielectric medium
(c) polarity marking (d) definite value

34. In an induction motor, the motor fails to start when number of rotor slots is equal to number of stator slots, this is known as -
(a) crawling (b) cogging
(c) synchronous cusps (d) skewing

35. The single phase motor fails to start but gives huming noise, it is because of -
(a) high voltage (b) low voltage
(c) wrong connection (d) winding may be short circuited

36. A thyristor (SCR) is a -
(a) P-N-P device (b) N-P-N device
(c) P-N-P-N device (d) P-N device

37. Thyristors have controlled turn-on by a -
(a) Gate signal (b) Voltage Controller
(c) Rectified signal (d) Surge Current

38. With the anode positive with respect to the cathode & the gate circuit open, the SCR is said to be in the -
(a) reverse blocking mode. (b) reverse conduction mode.
(c) forward blocking mode. (d) forward conduction mode.

39. A Silicon Controlled Rectifier (SCR) is a -
(a) unijunction device (b) device with three junction
(c) device with four junction (d) device with two junction

40. The process of turning off a thyristor is called -
(a) Mounting (b) Commutation
(c) Free-Wheeling (d) Modulation

41. A high speed on/off semiconductor switch is -
(a) Cycloconverter (b) Thyristor
(c) Chopper (d) Inverter

42. In a multistage sequence control of voltage controller, the presence of harmonics in the output voltage depends on the -
(a) supply voltage (b) number of thyristors
(c) firing angle (d) magnitude of voltage variation

43. Which of the following motor can be referred as universal motor?
(a) Permanent magnet motor (b) DC shunt motor
(c) DC series motor (d) DC compound motor

44. What is the unit of the apparent or complex power?
(a) VA (b) ohm
(c) Volt (d) VAR

45. The AC voltage controller are used in _____ application.
(a) Power generation (b) Electric heating
(c) Conveyor belt motion (d) Power transmission

46. For which of the following is the frequency is constant from input to output?

(a) AC voltage controller (b) Chopper

(c) Inverter (d) Cyclo converter

47. In a single phase to single phase cyclo converter, the magnitude of harmonic components are quite large. How can they be reduced?

(a) By using a chopper circuit (b) By using an RC oscillator

(c) By using a three phase input supply (d) By adding alternator to the input

48. A step down cyclo converter is a device which converts -

(a) DC to AC

(b) AC to AC only by changing higher input frequency into lower output frequency

(c) AC to AC only by changing lower input frequency into higher output frequency

(d) AC to DC

49. Input ripple of SMPS is -

(a) high (b) nil

(c) very low (d) low

50. Which commutation technique is also called line commutation?

(a) Class F (b) Class D

(c) Class E (d) Class A

51. Which type of rotor is used in ceiling fan?

(a) Two phase induction motor (b) Single phase induction motor

(c) Series motors (d) Parallel motors

52. To store electrostatic energy in an electric field and to supply energy in an electric circuit, the material used is -

(a) Capacitor (b) Inductor

(c) Resistor (d) Rotor

53. What is the purpose of local exhaust system?

(a) Control radiation of heat (b) Provides local cooling

(c) Removes contaminants from work (d) Provides air supply

54. The motor used in exhaust fan in household appliances is -

(a) Induction motor (b) Split phase motor

(c) Squirrel case motor (d) Permanent magnet DC motor

55. The hospital requires _____ fresh air and that is why air condition system is require.

(a) 50% (b) 70%

(c) 90% (d) 100%

56. What is the name of the device which controls temperature in window AC?

(a) OLP (b) Relay

(c) Thermostat (d) Selector switch

57. Split type AC becomes very popular because-

(a) it can be fix on window (b) it takes less current

(c) it is silent operator (d) it is very cheap

58. When a fluorescent lamp shows a dense blocking at each end, it could possibly mean that the -

(a) gas filled in lamp was wrong
(b) lamp was started infrequently
(c) starter is working improperly
(d) lamp is new

59. The gas used in sodium vapour lamp acts as a starter is -

(a) Neon
(b) Lithium
(c) Argon
(d) Hydrogen

60. If the starter of a glowing tube light is withdrawn then the tube light -

(a) will become OFF
(b) will continue to glow
(c) Filaments will be damaged
(d) will glow intermittently

61. Solar energy can be utilised directly by how many technologies?

(a) 1
(b) 2
(c) 3
(d) 4

62. In winter, Solar heating system in India should face towards which direction and kept at an inclination equal to latitude?

(a) South
(b) North
(c) East
(d) West

63. A solar cell is basically -

(a) a voltage source, controlled by flux of radiation.
(b) a current source, controlled by flux of radiation.
(c) an uncontrolled current source.
(d) an uncontrolled voltage source.

64. If no load is connected to solar PV system -

(a) it will stop absorbing light.
(b) it will dissipate energy in the panel and increase its temperature.
(c) its voltage will go on increasing till its breakdown.
(d) it will start reflecting the light.

65. A grid interactive solar system -

(a) always supplies power to the grid.
(b) supplies power to as well as receives power from the grid as required.
(c) always receives power from the grid.
(d) works only when the grid fails.

66. A solar thermal collector-

(a) collects the solar energy and reflects it back.
(b) absorbs the solar radiation and dissipate it to the ambient.
(c) collects and coverts the solar energy into electrical energy.
(d) collects and coverts the solar energy into thermal energy and delivers it to heat transfer liquid.

67. The percentage of the incoming radiation reflected back to space by the earth is -

(a) 10%
(b) 20%
(c) 30%
(d) 40%

68. For 1 degree change in longitude, the change in solar time is -

(a) 4 min
(b) 4 sec
(c) 1 min
(d) 1 hour

69. If the speed of wind stream remain unchanged while passing through the rotor:
(a) a large power will be generated
(b) zero power will be generated
(c) the flow is known as stalled flow
(d) the speed of rotor will be very high

70. If the velocity of wind is doubled, the power output will be -
(a) reduced to half
(b) doubled
(c) increase by 8 times
(d) increase by 6 times

71. The range of wind speed suitable for wind power generation is -
(a) 0 to 5 m/s
(b) 5 to 25 m/s
(c) 25 to 50 m/s
(d) 50 to 75 m/s

72. Stalled flow occurs when the value of incident angle is -
(a) 0 degree
(b) 180 degree
(c) around 15 degree (approximately)
(d) beyond 16 degree

73. A wind turbine extracts maximum power from wind, when the downstream wind speed reduces to -
(a) one third that of upstream
(b) half that of upstream wind
(c) two third that of upstream
(d) zero

74. A two blade turbine produces maximum power when the tip speed ratio is equal to -
(a) π
(b) 2π
(c) 3π
(d) 0.593

75. Windmill works on the principle of -
(a) rotation
(b) momentum
(c) gravitation
(d) collision

76. According to beaufort scale of wind, the speed of wind between 11-17 m/s is -
(a) hurricane
(b) gale
(c) strong
(d) moderate

77. Yawing system in a wind energy conversion system is used to -
(a) control wind speed
(b) stop the wind rotor
(c) control the electricity generation
(d) keep the rotor in wind direction

78. The most popular battery used in solar cell is -
(a) Lithium ion
(b) Nikel cadmium
(c) Lead acid
(d) Nickel metal hydride

79. The best solar battery performance is obtained in temperature range of -
(a) 0-20°C
(b) 20-40°C
(c) 40-50°C
(d) 50-60°C

80. The World Radiation Centre (WRC) has adopted a value of solar constant as -
(a) 1947 W/m^2
(b) 1467 W/m
(c) 1227 W/m^2
(d) 1367W/m^2

81. What should be the band gap of the semiconductors to be used as solar materials?
(a) 0.5eV
(b) 1.0eV
(c) 1.5eV
(d) 1.9eV

82. The light energy supplied to solar cell is in the form of -

(a) Electron (b) Photons

(c) Neutron (d) Isotope

83. How many layer does a solar cell has -

(a) 2 (b) 3

(c) 4 (d) 5

84. Photovoltaic cells are _____ materials.

(a) superconductor (b) conductor

(c) semiconductor (d) bad conductor

85. What is the purpose of using bypass diodes in the series connected solar panels?

(a) Increasing the current through shaded cells (b) To increase the resistance of shadow cells

(c) Protection of shaded cells (d) To redirect light for making solar cells

86. The metal used for making solar cells is -

(a) Gold (b) Iron

(c) Aluminium (d) Silicon

87. The element require for solar energy conversion is -

(a) Beryllium (b) Silicon

(c) Tantalum (d) Ultra pure carbon

88. Which of the following is the principal advantage of a solar cell?

(a) It shows oscillatory motion (b) It has metal in the outer area

(c) It has moving parts (d) It has no moving part

89. What is total amount of solar energy received by earth and atmosphere?

(a) 3.8 X 1024 J/year (b) 9.2 X 1024 J/year

(c) 5.4 X 1024 J/year (d) 2.1 X 1024 J/year

90. In what form solar energy is radiated from the sun?

(a) Ultraviolet Radiation (b) Infrared radiation

(c) Electromagnetic waves (d) Transverse waves

91. Solar radiation which reaches the Earth surface without scattering or absorbed is called -

(a) Beam Radiation (b) Infrared Radiation

(c) Ultraviolet Radiation (d) Diffuse Radiation

92. The scattered solar radiation is called _____.

(a) Direct Radiation (b) Beam Radiation

(c) Diffuse radiation (d) Infrared Radiation

93. Solar radiation received at any point of earth is called _____.

(a) Insolation (b) Beam Radiation

(c) Diffuse Radiation (d) Infrared rays

94. In solar panel, energy conversion is from _____ to _____.

(a) solar, electrical (b) heat, light

(c) electrical, light (d) electrical, magnetic

95. Which type of solar cell gives the highest efficiency?

(a) Mono crystalline (b) Polycrystalline germanium

(c) Thin film (d) Polycrystalline silicon

96. The principle of operation of solar cell is _____ effect.

(a) Thermoelectric
(b) Skin
(c) Photovoltaic
(d) Piezoelectric

97. The sun radiated solar energy on the surface of the earth on a normal sunny day is -

(a) $1320kW/m^2$
(b) $100W/m^2$
(c) $1000W/m^2$
(d) $1kW/m^2$

98. Typical solar efficiency is -

(a) less than 5%
(b) 12-25%
(c) 30-40%
(d) more than 50%

99. Which of the following is the advantages of flate plate collector of solar?

(a) High water temperature is achieved.
(b) Tracking of sun.
(c) It utilizes both the beam as diffuse radiation for heating.
(d) Small heat loss by conduction and radiation because of large area.

100. Battery charging and solar water pumping are the two main applications of -

(a) Stand Alone PV system.
(b) Hybrid PV system.
(c) Twin supplied PV system.
(d) Grid connected PV system.

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