

Name of Post:	Junior Manager (Electrical/IT) in Assam Power Distribution Company Limited (APDCL)
Advt. No.	08/2023 dated 30.03.2023
Date of Screening Test	24.09.2023

24/09/2023

JM/APDCL/I/23

ASKED TO DO SO

Series



01965

TEST BOOKLET
Paper—I
(ELECTRICAL ENGINEERING)

Time Allowed : 2 Hours

Full Marks : 150

Read the following instructions carefully before you begin to answer the questions :

- The name of the Subject, Roll Number as mentioned in the Admission Certificate, Test Booklet No. and Series are to be written legibly and correctly in the space provided on the Answer-Sheet with Black/Blue ballpoint pen.
- Answer-Sheet without marking Series as mentioned above in the space provided for in the Answer-Sheet shall not be evaluated.**
- All questions carry equal marks.

The Answer-Sheet should be submitted to the Invigilator.

Directions for giving the answers : Directions for answering questions have already been issued to the respective candidates in the 'Instructions for marking in the OMR Answer-Sheet' along with the Admit Card and Specimen Copy of the OMR Answer-Sheet.

Example :

Suppose the following question is asked :

The capital of Bangladesh is

- Chennai
- London
- Dhaka
- Dhubri

You will have four alternatives in the Answer-Sheet for your response corresponding to each question of the Test Booklet as below :

(A) (B) (C) (D)

In the above illustration, if your chosen response is alternative (C), i.e., Dhaka, then the same should be marked on the Answer-Sheet by blackening the relevant circle with a Black/Blue ballpoint pen only as below :

(A) (B) (●) (D)

The example shown above is the only correct method of answering.

- Use of eraser, blade, chemical whitener fluid to rectify any response is prohibited.
- Please ensure that the Test Booklet has the required number of pages (16) and 100 questions immediately after opening the Booklet. In case of any discrepancy, please report the same to the Invigilator.
- No candidate shall be admitted to the Examination Hall/Room 20 minutes after the commencement of the examination.
- No candidate shall leave the Examination Hall/Room** without prior permission of the Supervisor/Invigilator. No candidate shall be permitted to hand over his/her Answer-Sheet and leave the Examination Hall/Room before expiry of the full time allotted for each paper.
- No Mobile Phone, Electronic Communication Device, etc., are allowed to be carried inside the Examination Hall/Room by the candidates. Any Mobile Phone, Electronic Communication Device, etc., found in possession of the candidate inside the Examination Hall/Room, even if on off mode, shall be liable for confiscation.
- No candidate shall have in his/her possession inside the Examination Hall/Room any book, notebook or loose paper, except his/her Admission Certificate and other connected papers permitted by the Commission.
- Complete silence must be observed in the Examination Hall/Room. No candidate shall copy from the paper of any other candidate, or permit his/her own paper to be copied, or give, or attempt to give, or obtain, or attempt to obtain irregular assistance of any kind.
- This Test Booklet can be carried with you after answering the questions in the prescribed Answer-Sheet.
- Noncompliance with any of the above instructions will render a candidate liable to penalty as may be deemed fit.
- No rough work is to be done on the OMR Answer-Sheet. You can do the rough work on the space provided in the Test Booklet.

N.B. : There will be negative marking @ 0.25 per 1 (one) mark against each wrong answer.

/130-A

[No. of Questions : 100]

SEA

22-2/19/14

JM/APDCL/1/23/130-A

1. Resistivity of copper is

- (A) less than aluminium
- (B) more than aluminium
- (C) equal to aluminium
- (D) exactly twice the aluminium

2. Kirchhoff's voltage law is concerned with

- (A) IR drops
- (B) battery e.m.f.s
- (C) junction currents
- (D) Both (A) and (B)

3. Which one of the following laws is based on the principle of conservation of electric charge?

- (A) Kirchhoff's current law
- (B) Kirchhoff's voltage law
- (C) Ohm's law
- (D) Coulomb's law

4. According to Faraday's law of electromagnetic induction, an e.m.f. is induced in a conductor whenever it

- (A) lies in a magnetic field
- (B) lies perpendicular to the magnetic field
- (C) cuts the magnetic flux
- (D) moves parallel to the direction of magnetic field

5. In Fleming's left-hand rule, thumb always represents the direction of

- (A) current
- (B) induced e.m.f.
- (C) magnetic field
- (D) mechanical force

6. Sinusoidal wave repeats itself after an interval of

- (A) 180° electrical
- (B) 180° mechanical
- (C) 360° electrical
- (D) 360° mechanical

7. Constant voltage source is

- (A) active and bilateral
- (B) passive and bilateral
- (C) active and unilateral
- (D) passive and unilateral

8. An ideal current source has

- (A) zero internal conductance
- (B) zero internal resistance
- (C) zero voltage on no-load
- (D) zero ripple

9. In a parallel AC circuit, if the supply frequency is more than the resonance frequency, then the circuit is

- (A) resistive
- (B) inductive
- (C) capacitive
- (D) None of the above

10. The resistance of a 200 watt, 250 V lamp will be

- (A) 625 Ω
- (B) 1250 Ω
- (C) 312.5 Ω
- (D) 31.25 Ω

11. A voltmeter, an ammeter and a cell are connected in series. The ammeter will

- (A) burn
- (B) show almost zero
- (C) give large value
- (D) Can't say

12. A moving electric charge will produce

- (A) electric field only
- (B) both electric and magnetic fields
- (C) magnetic field only
- (D) no field

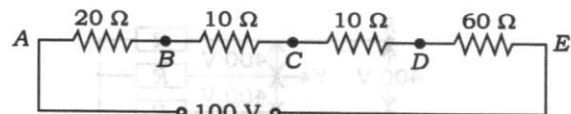
13. While thevenizing a circuit between two terminals, V_{Th} is equal to

- (A) short-circuit terminal voltage
- (B) open-circuit terminal voltage
- (C) net voltage available in the circuit
- (D) e.m.f. of the battery nearest to the terminals

14. For maximum transfer of power, internal resistance of the source should be

- (A) equal to load resistance
- (B) less than that of load resistance
- (C) more than that of load resistance
- (D) zero

15. In the circuit shown below, the point B is earthed. What is the potential at point D?



- (A) + 10 V
- (B) - 20 V
- (C) 0 V
- (D) - 25 V

16. The reluctance of a magnetic circuit is relative permeability of the material comprising the circuit.

- (A) directly proportional to
- (B) inversely proportional to
- (C) independent of
- (D) None of the above

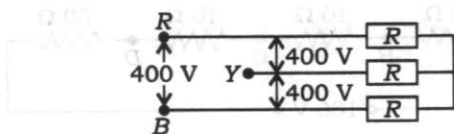
17. The unit of reluctance of magnetic circuit is

- (A) AT/m
- (B) weber/m
- (C) AT/weber
- (D) H/m

18. A star (Y) arrangement of resistance has each resistance of $3\ \Omega$. The equivalent delta (Δ) arrangement will have each resistance of

- (A) $9\ \Omega$ (B) $6\ \Omega$
- (C) $3\ \Omega$ (D) $1\ \Omega$

19. The power consumed in the star-connected load shown below is 690 W. The line current is



- (A) 2.5 A
- (B) 1 A
- (C) 1.725 A
- (D) None of the above

20. In a series resonant circuit, the voltage across the circuit is same as the voltage across the

- (A) resistance
- (B) inductance
- (C) capacitance
- (D) None of the above

21. The angle of series R-L-C circuit is leading, if

- (A) $X_L = 0$
- (B) $R = 0$
- (C) $X_C > X_L$
- (D) $X_C < X_L$

22. In an R-L-C parallel circuit, the line current at resonance is

- (A) minimum at unit power factor
- (B) minimum at lagging power factor
- (C) maximum at leading power factor
- (D) maximum at lagging power factor

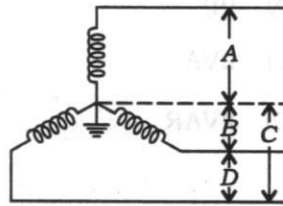
23. The power in a 3-phase system is given by $\sqrt{3} V_L I_L \cos \phi$, where ϕ is the phase angle between

- (A) line voltage and line current
- (B) phase voltage and phase current
- (C) line voltage and phase current
- (D) phase voltage and line current

24. On which supply, does the appliance based on heating effect of electric current work?

- (A) AC
- (B) DC
- (C) AC and DC both
- (D) None of the above

25. In a 3-phase, 4-wire load circuit shown below, the line voltage is indicated by



- (A) A
- (B) B
- (C) C
- (D) D

26. The power factor of an ordinary electric bulb is

- (A) zero
- (B) unity
- (C) slightly more than unity
- (D) slightly less than unity

27. In an MI instrument, the deflecting torque is proportional to

- (A) I^2
- (B) $\frac{1}{I}$
- (C) I
- (D) None of the above

28. The resolution of an instrument is the

- (A) minimum quantity it can measure
- (B) maximum quantity it can measure
- (C) maximum non-linearity
- (D) None of the above

29. The real working part of a DC machine is

- (A) commutator
- (B) field winding
- (C) armature winding
- (D) None of the above

30. When a charge is given to a conductor

- (A) it distributes uniformly all over the surface
- (B) it distributes uniformly all over the volume
- (C) it distributes on the surface, inversely proportional to the radius of curvature
- (D) it stays where it was placed

31. Hysteresis loss is affected minimum by
- (A) frequency
 - (B) ambient temperature
 - (C) volume of material
 - (D) Steinmetz hysteresis coefficient
32. A DC motor is running at rated speed without any additional resistance in series. If an additional resistance is added in series, the speed of the motor
- (A) increases
 - (B) decreases
 - (C) remains same
 - (D) None of the above
33. The operation of an induction motor is based on
- (A) Lenz's law
 - (B) Ampere's law
 - (C) mutual induction
 - (D) self-induction
34. The measuring range of a voltmeter can be extended by using
- (A) high shunt resistance
 - (B) high series resistance
 - (C) low shunt resistance
 - (D) low series resistance
35. The condition of an induction motor at no-load resembles those of a transformer whose secondary is
- (A) short-circuited
 - (B) open-circuited
 - (C) supplying a variable resistive load
 - (D) None of the above
36. The rating of an alternator is expressed in
- (A) kV
 - (B) hp
 - (C) kVA
 - (D) kVAR
37. When load on synchronous motor is increased, the armature current is increased provided it is
- (A) normally excited
 - (B) over-excited
 - (C) under-excited
 - (D) All of the above
38. Which of the following motors has the largest starting torque?
- (A) Shaded-pole motor
 - (B) Split-phase motor
 - (C) Capacitor-run motor
 - (D) Repulsion motor

39. The synchroscope is an instrument for
- (A) checking the voltages of the two circuits
 - (B) checking the phase sequence of the two circuits
 - (C) indicating the differences of phases and frequencies of two circuit voltages
 - (D) checking power factor of two circuits
40. Kelvin double bridge is best suited for the measurement of
- (A) inductance
 - (B) capacitance
 - (C) low resistance
 - (D) high resistance
41. Two things which are same for primary and secondary of transformer are
- (A) armature turn and voltage per turn
 - (B) resistances and leakage reactances
 - (C) current and induced voltage
 - (D) None of the above
42. The 'all-day efficiency' of a distributed transformer is _____ the commercial efficiency.
- (A) the same as
 - (B) more than
 - (C) less than
 - (D) None of the above
43. A transformer has full-load copper loss of 400 W. The copper loss at half-load will be
- (A) 100 W
 - (B) 200 W
 - (C) 400 W
 - (D) 250 W
44. The power drawn by a potentiometer from the source, whose voltage is under measurement and under null condition, is
- (A) ideally zero
 - (B) small
 - (C) high
 - (D) very high
45. Anderson bridge is used for the measurement of
- (A) time period
 - (B) phase difference
 - (C) inductance
 - (D) capacitance
46. Zero adjustment is provided in a multimeter for
- (A) correcting zero point
 - (B) changing the sensitivity
 - (C) tightening the moving components to the casing
 - (D) All of the above

47. A 4-pole dynamo with wave wound armature has 51 slots containing 20 conductors in each slot. The induced e.m.f. is 357 V and the speed is 8500 r.p.m. The flux per pole will be
- 3.5 mWb
 - 1.2 mWb
 - 14 mWb
 - 21 mWb
48. The e.m.f. induced in a transformer depends on
- frequency
 - number of turns
 - maximum value of flux
 - All of the above
49. The efficiency of a power transformer is around
- 50%
 - 60%
 - 80%
 - 95%
50. The flux is maximum in which of the following parts of a DC motor?
- Pole core
 - Under the interpole
 - Under the leading pole tip
 - Under the trailing pole tip
51. The DC machine torque is proportional to
- flux
 - armature current
 - both flux and armature currents
 - None of the above
52. The full-load slip of a 60 Hz, 12-pole squirrel cage induction motor is 5%. Its full-load speed is
- 600 r.p.m.
 - 570 r.p.m.
 - 500 r.p.m.
 - 475 r.p.m.
53. A 3-phase synchronous motor provided with damper winding is started as a 3-phase
- synchronous motor
 - synchronous alternator
 - induction motor
 - induction generator
54. How will you change the rotation of DC shunt motor?
- Change the field terminal
 - Change the supply terminal
 - Change the armature terminal
 - Any of (A) and (C)

55. Eddy current loss in ferromagnetic core is proportional to
- square of frequency
 - square root of frequency
 - frequency
 - reciprocal of frequency
56. The losses that occur in an induction motor are
- stator copper loss and iron loss
 - rotor copper losses
 - windage and friction losses
 - All of the above
57. In thermal power station, superheater heats
- steam
 - air
 - feedwater
 - None of the above
58. The earth conductor carried in high-voltage transmission line is
- above the line conductor
 - below the line conductor
 - between the line conductor
 - None of the above
59. It is desirable to transmit electrical power for a distance of 200 km. What would be the most economical transmission voltage?
- 132 kV (B) 33 kV
 - 3.3 kV (D) 11 kV
60. 66 kV is suitable for transmission of power over
- 30 km
 - 60 km
 - 120 km
 - 200 km
61. The insulators used on 220 kV transmission line are of
- suspension type
 - pin type
 - shackle type
 - None of the above
62. In a balanced 3-phase, 4-wire AC system, the phase sequence is RYB. If the voltage of R-phase = $230\angle 0^\circ$ volts, then for B-phase it will be
- $230\angle 0^\circ$ volts
 - $230\angle -120^\circ$ volts
 - $230\angle 120^\circ$ volts
 - $230\angle 240^\circ$ volts
63. In case of single-phase supply, the size of the neutral wire as compared to that of line wire should be
- equal
 - one and half
 - half
 - double

64. Which of the following distribution systems is used for domestic load?

- (A) 3-phase 3-wire
- (B) 1-phase 2-wire
- (C) 3-phase 4-wire
- (D) None of the above

65. Which is the correct relation in the following?

- (A) $kVAR = kW \sin \phi$
- (B) $kVAR = kW \tan \phi$
- (C) $kVAR = kW \cos \phi$
- (D) None of the above

66. The smaller the lagging reactive power drawn by the circuit

- (A) the higher is the p.f.
- (B) the smaller is the p.f.
- (C) the higher is the active power
- (D) None of the above

67. To reduce corona effect, usually

- (A) the distance between the conductors is reduced
- (B) the conductor diameter is reduced
- (C) bundled conductors are used
- (D) stranded conductors are used

68. Resistivity of electrical conductors is most affected by

- (A) pressure
- (B) temperature
- (C) composition
- (D) ageing

69. A multimeter is used for measurement of which of the following?

1. Both AC and DC voltages
2. Both AC and DC currents
3. Resistance
4. Frequency
5. Power

Select the correct answer using the code given below.

- (A) 1, 2 and 4
- (B) 1, 2 and 5
- (C) 1, 3 and 5
- (D) 1, 2 and 3

70. A moving-coil galvanometer is made into DC ammeter by connecting

- (A) a low resistance across the meter
- (B) a high resistance in series with the meter
- (C) a pure inductance across the meter
- (D) a capacitor in series with the meter

- 71.** The circuit breaker is able to open under
- (A) no-load condition
 - (B) load condition
 - (C) fault condition
 - (D) All of the above
- 72.** Which of the following are desirable quantities of power system?
- (A) High load factor and diversity factor
 - (B) Low load factor and low diversity factor
 - (C) High load factor and low diversity factor
 - (D) Low load factor and high diversity factor
- 73.** Directional overcurrent relay is used for protection of
- (A) long transmission line
 - (B) large power transformer
 - (C) ring main distribution line
 - (D) radial distribution line
- 74.** The advantage of neutral earthing is
- (A) safety of personnel
 - (B) reduction of earth fault current
 - (C) elimination of arcing ground
 - (D) None of the above
- 75.** For protection against direct lightning stroke, we use
- (A) ground wire
 - (B) lightning arrester
 - (C) Both (A) and (B)
 - (D) None of the above
- 76.** Three-phase energy meter is a/an
- (A) ampere-hour meter
 - (B) watt-hour meter
 - (C) watt meter
 - (D) None of the above
- 77.** Third pin in a three-pin plug is provided so as to
- (A) provide an earth connection
 - (B) provide a three-phase supply when needed
 - (C) provide spare phase when required
 - (D) prevent the plug being reversed in socket
- 78.** Which of the following details is included in tender notice?
- (A) Earnest money deposit
 - (B) Security deposit
 - (C) Time limit of work
 - (D) All of the above

79. In a substation, current transformers are used for
- measuring purpose
 - protecting purpose connecting to relays
 - Both (A) and (B)
 - None of the above

80. Bus coupler is very essential in
- single busbar arrangement
 - ring busbar arrangement
 - double bus-double breaker arrangement
 - main and transfer bus

81. Which of the following is used to build an electric drive?
- Source
 - Motor
 - Control unit
 - All of the above

82. For arc heating, the electrodes are made up of
- copper
 - aluminium
 - graphite
 - ACSR conductor

83. During resistance welding, heat produced at the joint is proportional to
- current
 - voltage
 - I^2R
 - volt-ampere

84. Fig. 1 shows Norton's equivalent circuit of a network whereas Fig. 2 shows the Thevenin's equivalent circuit. The value of E_{Th} is

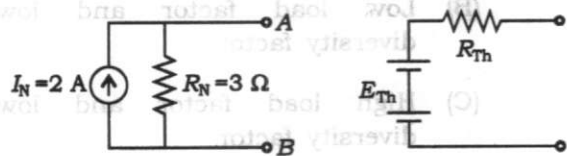


Fig. 1

Fig. 2

- 1.5 V
- 0.866 V
- 3 V
- 6 V

85. A series $R-L-C$ circuit will have unity p.f., if operating at a frequency (in Hz) of

- $\frac{1}{2\pi\sqrt{LC}}$
- LC
- $\frac{1}{LC}$
- $\frac{1}{\sqrt{LC}}$

86. The most reliable distribution system is

- (A) interconnected system
- (B) radial system
- (C) ring main system
- (D) None of the above

87. When electric power transferred to the load is maximum, the efficiency of power transfer is

- (A) 0.25
- (B) 0.75
- (C) 0.5
- (D) 1



88. A choke can be represented by an

- (A) R-L series circuit
- (B) R-L-C series circuit
- (C) R circuit
- (D) R-C circuit

89. The structure of pole-mounted substation is of _____ type.

- (A) H
- (B) I
- (C) A
- (D) T

90. In a transistor, the base current and collector current are $60\mu\text{A}$ and 1.75mA . The value of α is nearly

- (A) 0.91
- (B) 0.97
- (C) 1.3
- (D) 1.7

91. The simplification of Boolean expression $(\overline{A}BC) + (A\overline{B}C)$ is

- (A) 0
- (B) 1
- (C) A
- (D) BC

92. The Darlington pair is mainly used for

- (A) impedance matching
- (B) wide-band voltage application
- (C) power amplification
- (D) reducing distortion

93. The NAND gate output will be low, if two inputs are

- (A) 00
- (B) 01
- (C) 10
- (D) 11

94. Thyristor is nothing but a/an
- (A) controlled switch
 - (B) controlled transistor
 - (C) amplifier with large current rating
 - (D) amplifier with higher gain

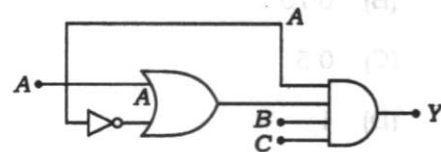
95. Speed of conversion is maximum in
- (A) successive approximation A/D converter
 - (B) parallel comparative A/D converter
 - (C) counter ramp A/D converter
 - (D) dual-slope A/D converter

96. Which one of the following is a unipolar device?
- (A) BJT
 - (B) IGBT
 - (C) GTO
 - (D) MOSFET

97. The logical expression of $y = A + \bar{A}B$ is equivalent to
- (A) $y = AB$
 - (B) $y = \bar{A}B$
 - (C) $y = A\bar{B}$
 - (D) $y = A + B$

98. Which terminal does not belong to the SCR?
- (A) Anode
 - (B) Gate
 - (C) Base
 - (D) Cathode

99. The Boolean expression for the output Y in the logic circuit is



- (A) $\bar{A}BC$
- (B) ABC
- (C) $\bar{A}BC$
- (D) $\bar{A}\bar{B}\bar{C}$

100. Low-level computer language uses
- (A) mathematical symbols
 - (B) English words
 - (C) mnemonic codes
 - (D) None of the above

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