

<b>Name of Post:</b>	Junior Manager (Electrical/Mechanical/IT/Instrumentation) in Assam Power Generation Corporation Limited (APGCL)
<b>Advt. No.</b>	12/2023 dated 25.04.2023
<b>Date of Exam.</b>	03.12.2023

**JM/APGCL/EE/23**

**ASKED TO DO SO**

**Series**



01245

**TEST BOOKLET**  
**Paper—I**  
**( ELECTRICAL ENGINEERING )**

**Time Allowed : 2 Hours**

**Full Marks : 100**

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

1. 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.
2. **Answer-Sheet without marking Series as mentioned above in the space provided for in the Answer-Sheet shall not be evaluated.**
3. 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

- (A) Chennai
- (B) London
- (C) Dhaka
- (D) Dhubri

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



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 :



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

4. Use of eraser, blade, chemical whitener fluid to rectify any response is prohibited.
5. 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.
6. No candidate shall be admitted to the Examination Hall/Room 20 minutes after the commencement of the examination.
7. **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.
8. 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.
9. 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.
10. 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.
11. This Test Booklet can be carried with you after answering the questions in the prescribed Answer-Sheet.
12. Noncompliance with any of the above instructions will render a candidate liable to penalty as may be deemed fit.
13. 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.**

**/6-A**

**[ No. of Questions : 100 ]**

**SEAL**

1. The condition of validity of Ohm's law is that the

- (A) temperature should remain constant
- (B) current should be proportional to voltage
- (C) resistance must be wire-wound type
- (D) All of the above

2. Kirchoff's law helps in determining

- (A) current flowing in a circuit
- (B) EMF and voltage drops in a circuit
- (C) power in a circuit
- (D) All of the above

3. If the internal resistance of a voltage source is infinity, then the internal resistance of the equivalent current source is

- (A) zero
- (B) infinity
- (C) Either (A) or (B)
- (D) Neither (A) nor (B)

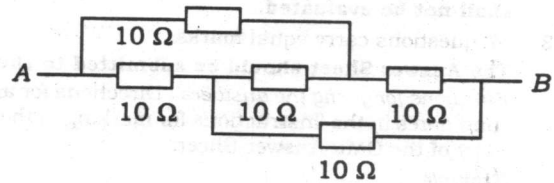
4. A mathematical expression for 50 Hz sinusoidal voltage of peak value 80 V will be

- (A)  $V = 50 \sin 314t$
- (B)  $V = 50 \sin 80t$
- (C)  $V = 80 \sin 314t$
- (D)  $V = 80 \sin 50t$

5. The apparent power drawn by an AC circuit is 10 kVA and active power is 8 kW. The reactive power in the circuit is

- (A) 4 kVA
- (B) 6 kVA
- (C) 8 kVA
- (D) 16 kVA

6. The equivalent resistance between terminals A and B of the network shown in the figure given below is



- (A) 20 Ω
- (B) 5 Ω
- (C) 10 Ω
- (D) 2.5 Ω

7. A 3-phase, 4-wire system is commonly used for

- (A) primary distribution
- (B) secondary distribution
- (C) primary transmission
- (D) secondary transmission

8. The rating of fuse wire is always expressed in

- (A) volt
- (B) ampere
- (C) ampere-volt
- (D) ampere-hour

9. For a sinusoidal waveform, the ratio of average to r.m.s. value is

(A)  $\frac{\sqrt{2}}{2} \pi$

(B)  $\frac{\pi}{2\sqrt{2}}$

(C)  $2 \frac{\sqrt{2}}{\pi}$

(D)  $\frac{2}{\pi\sqrt{2}}$

10. The resistors  $R_1$  and  $R_2$  give combined resistance of  $4.5 \Omega$  when in series and  $1 \Omega$  when in parallel. The resistances are

(A)  $1 \Omega$  and  $3.5 \Omega$

(B)  $4 \Omega$  and  $0.5 \Omega$

(C)  $2 \Omega$  and  $2.5 \Omega$

(D)  $1.5 \Omega$  and  $3 \Omega$

11. A two-port network is **not** reciprocal if

(A)  $BC - AD = -1$

(B)  $g_{12} + g_{21} = 0$

(C)  $Z_{12} = Z_{21}$

(D)  $h_{12} + h_{21} = 1$

12. Form factor  $\times$  Peak factor = ?

(A)  $\frac{\text{Maximum value}}{\text{RMS value}}$

(B)  $\frac{\text{RMS value}}{\text{Average value}}$

(C)  $\frac{\text{Average value}}{\text{Maximum value}}$

(D)  $\frac{\text{Maximum value}}{\text{Average value}}$

13. Which of the following is the dimension of resistance?

(A)  $\frac{ML_2}{Q_2T}$

(B)  $\frac{Q_2T_2}{ML_2}$

(C)  $\frac{ML_2}{QT_2}$

(D)  $\frac{ML}{QT_2}$

14. Which one of the following statements is correct?

Spiral springs are used in instruments to

(A) provide controlling torque

(B) provide damping torque

(C) lead the current to moving coil as well as to provide the controlling torque

(D) provide linear deflection

15. Two lamps of wattage 40 W, 60 W are connected in series with voltage of 230 V. Which out of the two lamps will glow brighter?

(A) 40 W

(B) 60 W

(C) Both brightly

(D) Both dimly

16. A 12 V automobile light is rated at 30 W. The total charge that flows through the filament in one minute is
- 30 C
  - 12 C
  - 150 C
  - 180 C
17. A transformer steps up the voltage by a factor 100. The ratio of current in the primary to that in the secondary is
- 1
  - 100
  - 0.01
  - 0.1
18. An isolator is meant for
- breaking abnormal current
  - making under fault condition
  - breaking the current under no-load condition
  - None of the above
19. Feeder is designed mainly from the point of view of
- its current carrying capacity
  - voltage drop in it
  - operating voltage
  - operating frequency
20. A choke can be represented by an
- R-L-C series circuit
  - R-C series circuit
  - R-L series circuit
  - R circuit
21. The Biot-Savart law is a general modification of
- Faraday's law
  - Kirchhoff's law
  - Lenz's law
  - Ampere's law
22. The magnetic materials that are used to prepare permanent magnets should have
- steeply rising magnetization curve
  - small hysteresis loop
  - high receptivity
  - low coercive force
23. As per recommendation of ISI, the maximum number of points of lights, fans and socket outlets that can be connected in one sub-circuit is
- 8
  - 10
  - 15
  - 20

24. The meter that is suitable for only direct current measurement is
- moving-iron type
  - permanent magnet type
  - electro-dynamic type
  - hot-wire type
25. To increase the range of a voltmeter
- a low resistance is connected in series
  - a low resistance is connected in parallel
  - a high resistance is connected in parallel
  - a high resistance is connected in series
26. The trade name of the nickel-copper alloy, that is used as a heating element, is
- Eureka
  - Nichrome
  - Kanthal
  - Steel
27. If the length of a wire of resistance  $R$  is uniformly stretched to  $n$  times its original value, its new resistance is
- $nR$
  - $\frac{R}{n}$
  - $n^2R$
  - $\frac{R}{n^2}$
28. Dynamometer-type moving coil instruments are provided with
- eddy-current damping
  - pneumatic damping
  - fluid-friction damping
  - electrostatic damping
29. A superconductor material is
- copper
  - silver
  - mercury
  - gold
30. For a series  $R-L$  circuit,  $i(t) = \sqrt{2} \sin(\omega t - 45^\circ)$ . If  $\omega L = 1$  ohm, the value of  $R$  is
- 1 ohm
  - 3 ohm
  - $\sqrt{3}$  ohm
  - $3\sqrt{3}$  ohm
31. Which of the following is correct about ACSR conductors?
- All conductors are made up of aluminium
  - Outer conductors are made up of aluminium
  - Inner conductors are made up of aluminium
  - No conductors are made up of aluminium

32. Which of the following sequences is correct for operation of circuit breaker, isolator and earthing switch while opening a circuit?

- (A) Open circuit breaker → Open isolator → Close earthing switch
- (B) Open isolator → Open circuit breaker → Close earthing switch
- (C) Open earthing switch → Open isolator → Open circuit breaker
- (D) Open circuit breaker → Close earthing switch → Open isolator

33. MCB is a device that provides definite protection to the wiring installation and sophisticated equipments against

- (A) overcurrent
- (B) short circuit
- (C) theft
- (D) Both (A) and (B)

34. A Wheatstone bridge has got three resistances taken in clockwise direction as 150 ohm, 200 ohm and 200 ohm. The value of fourth resistance in null balance would be

- (A) 200 ohm
- (B) 150 ohm
- (C) 400 ohm
- (D) 700 ohm

35. The least number of single-phase transformer(s) required to measure total power consumed by an unbalanced load fed from 3-phase, 4-wire system is

- (A) 4
- (B) 1
- (C) 2
- (D) 3

36. Dielectric strength of a material depends on

- (A) temperature
- (B) thickness
- (C) moisture content
- (D) All of the above

37. Speed of meggar is kept at

- (A) 140 r.p.m.
- (B) 160 r.p.m.
- (C) 120 r.p.m.
- (D) 100 r.p.m.

38. A steam power station needs space

- (A) less than that required by a diesel power station of same output
- (B) less than that required by an atomic power station of same output
- (C) less than that required by a hydropower station of same output
- (D) less than that required by a gas turbine power station of same output

39. The function of a surge tank is to
- (A) supply water at constant pressure
  - (B) relieve water hammer pressure in the penstock pipe
  - (C) produce surge in the pipeline
  - (D) None of the above

40. The function of economizer is to
- (A) heat up the incoming water with the exhaust steam
  - (B) heat up the pulverized fuel by exhaust gases
  - (C) heat up the incoming air by exhaust gases
  - (D) heat up the incoming water by exhaust gases

41. A Buchholz relay is used for
- (A) protection of a transformer against all internal faults
  - (B) protection of a transformer against external faults
  - (C) protection of a transformer against both internal and external faults
  - (D) protection of AC generator

42. In an HVDC system
- (A) both generation and distribution are DC
  - (B) generation is AC and distribution is DC
  - (C) generation is DC and distribution is AC
  - (D) both generation and distribution are AC

43. The protective relays are the devices that detect the abnormal conditions in electrical circuit by measuring
- (A) voltage
  - (B) current
  - (C) constantly the electrical quantities which differ during normal and abnormal conditions
  - (D) None of the above

44. Air pollution due to smoke around a thermal power station can be reduced by installing
- (A) induced draft fan
  - (B) superheater
  - (C) economizer
  - (D) electrostatic precipitator

45. Distribution transformers have core losses
- > copper losses
  - < copper losses
  - = copper losses
  - $= \frac{1}{2}$  (copper losses)
46. Loop in system of wiring is generally employed in
- domestic wiring
  - industrial wiring
  - temporary wiring
  - All of the above
47. The e.m.f. induced in a coil depends on
- number of turns
  - the change of flux linked with it
  - the time taken to change the flux
  - All of the above
48. The main consideration in designing distributors is
- transmission voltage
  - resistance
  - voltage drop
  - current carrying capacity
49. A null type of instrument as compared to a deflection-type of instrument has
- a higher accuracy
  - a lower sensitivity
  - a faster response
  - All of the above
50. Power transformed from primary to secondary depends on
- number of primary turns
  - number of secondary turns
  - current transformation ratio
  - magnetic coupling between primary and secondary winding
51. For a three-layer stranded wire, the number of strands in first, second and third layer respectively are
- 1, 4, 8
  - 1, 6, 12
  - 1, 5, 10
  - 1, 7, 14
52. A 3-phase power transformer is provided with star-delta connections. In order to protect against fault, the connections for current transformer should be
- star-star
  - delta-star
  - delta-delta
  - star-delta



53. Fibre-optic cables are used in power system applications mainly for

- (A) SCADA
- (B) communication between power station and sub-station
- (C) communication between power station and load control centre
- (D) All of the above

54. The resistance of an electric arc can be increased by

- (A) increasing the concentration of ionized particles
- (B) reducing the arc length
- (C) splitting the arc
- (D) increasing the arc cross-section

55. Induction heating process is based on

- (A) thermal ion release principle
- (B) nuclear heating principle
- (C) resistance heating principle
- (D) electromagnetic induction principle

56. Which of the following equipments is generally used for arc welding?

- (A) Single-phase alternator
- (B) Two-phase alternator
- (C) Three-phase alternator
- (D) Transformer

57. The earth fault relays are

- (A) directional relays
- (B) non-directional relays
- (C) short operating relays
- (D) long operating relays

58. A meggar is an instrument used for measuring

- (A) very high voltage
- (B) very low voltage
- (C) very high resistance
- (D) very low resistance

59. Earth potential is taken as

- (A) infinity
- (B) zero
- (C) that of supply
- (D) None of the above

60. Differential relays are used to protect the equipment against

- (A) internal fault
- (B) reverse current
- (C) overvoltage
- (D) overcurrent

61. The torque produced in shaded-pole structure induction-type relay is
- proportional to the square of the current
  - proportional to the current
  - inversely proportional to the current
  - inversely proportional to the square of the current
62. Which of the following distribution systems is **not** normally used?
- 3-phase, 3-wire
  - 3-phase, 4-wire
  - 1-phase, 3-wire
  - 1-phase, 2-wire
63. During load shedding
- system load is reduced
  - system frequency is reduced
  - system loads are switched off
  - system power factor is changed
64. Series capacitors can be used in distribution line
- to provide reactive power compensation
  - to reduce the receiving end voltage under light load condition
  - to reduce voltage drop
  - to reduce line losses
65. Which protective device will **not** operate due to overcurrent?
- Fuse
  - MCB
  - MCCB
  - ELCB
66. Norton's equivalent circuit consists of
- voltage source in series with resistance
  - current source in series with resistance
  - current source in parallel with resistance
  - voltage source in parallel with resistance
67. The phase sequence of a series  $R-L-C$  circuit is lagging if
- $X_L = 0$
  - $X_L > X_C$
  - $X_L < X_C$
  - $R = 0$
68. Which of the following AC bridges is preferred for measurement of inductance having high  $Q$ -factor?
- Hay's Bridge
  - Maxwell Bridge
  - De Sauty Bridge
  - Wien's Bridge

69. The measurement of frequency can be carried out with
- Owen's Bridge
  - Wien's Bridge
  - Maxwell inductance-capacitance Bridge
  - Schering Bridge
70. The charging reactance of 100 km length of line is 2000 ohm. What is the charging reactance for 200 km of the line?
- 2000 ohm
  - 3000 ohm
  - 1000 ohm
  - 1500 ohm
71. A  $p-n$  junction acts as a
- controlled switch
  - bidirectional switch
  - unidirectional switch
  - None of the above
72. For  $n$ -type semiconductor, the doping material is
- tetravalent
  - pentavalent
  - trivalent
  - bivalent
73. Which semiconductor device behaves like two SCRs?
- TRIAC
  - MOSFET
  - JFET
  - UJT
74. A device having characteristics very close to that of an ideal voltage source is
- vacuum diode
  - Zener diode
  - transistor
  - FET
75. A transistor has a current gain of 0.99 in common base mode. Its current gain in common emitter mode is
- 0.99
  - 10.1
  - 99
  - 100
76. The common emitter transistor circuit has
- high gain
  - low gain
  - negligible gain
  - no gain

77. The output of a NOR gate is
- (A) high if all of its inputs are high
  - (B) low if all of its inputs are low
  - (C) high if all of its inputs are low
  - (D) high if only one of its inputs is low

78. A MOSFET is used as a switch, switches between
- (A) cut-off and linear regions
  - (B) cut-off and saturated regions
  - (C) linear and saturated regions
  - (D) different operating points in a linear region

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

80. In exclusive OR gate, when output is zero, the inputs are
- (A) 0, 1
  - (B) 1, 0
  - (C) 1, 1
  - (D) 1, X

81. In Boolean algebra,  $(A \cdot \bar{A}) + A = ?$
- (A)  $\bar{A}$
  - (B) 1
  - (C) A
  - (D) 0

82. The 2's complement of 1010101 is
- (A) 0101010
  - (B) 1110011
  - (C) 1101010
  - (D) 0101011

83. Consider the truth table shown below :

Input		Output
0	0	0
1	0	1
0	1	1
1	1	0

The logic gate represented by the truth table is

- (A) OR
  - (B) AND
  - (C) NAND
  - (D) XOR
84. In which of the following choppers, do the voltage and current remain negative?
- (A) Type A
  - (B) Type E
  - (C) Type C
  - (D) Type D

85. In a 3-phase, 50 Hz, full converter, the ripple frequency in output is
- 50 Hz
  - 100 Hz
  - 150 Hz
  - 300 Hz
86. For a prototype low-pass filter, the series and shunt elements are respectively
- inductive and capacitive
  - capacitive and inductive
  - resistive and capacitive
  - resistive and inductive
87. Which is the only function all C programs must contain?
- start( )
  - printf( )
  - getch( )
  - main( )
88. The current in reverse bias in  $p-n$  junction diode may be
- between 2 A and 5 A
  - few micro or nano amperes
  - few milliamperes
  - between 0.2 A and 2 A
89. A network has 10 nodes and 17 branches. The number of different node pair voltages would be
- 7
  - 9
  - 45
  - 10
90. The number of atoms per unit cell in BCC structure is
- 1
  - 2
  - 4
  - 8
91. What happens when moisture gets into the insulating materials?
- It increases the dielectric constant
  - It increases the insulating resistance
  - It increases the dielectric strength
  - It increases the dielectric loss
92. If the field of a DC shunt motor is opened
- it will continue to run at its rated speed
  - the motor will stop
  - the speed of the motor becomes very high
  - the speed of the motor will decrease

93. A 3-phase, 50 Hz induction motor has a full-load speed of 1440 r.p.m. The number of poles of the motor is
- (A) 4  
(B) 5  
(C) 6  
(D) 8
94. The value of earthing resistance in large power station is
- (A)  $1 \Omega$   
(B)  $0.5 \Omega$   
(C)  $2 \Omega$   
(D)  $5 \Omega$
95. If the voltage is increased by  $n$  times, the size of the conductor would be
- (A) increased by  $n$  times  
(B) reduced by  $\frac{1}{n}$  times  
(C) increased by  $n^2$  times  
(D) reduced by  $\frac{1}{n^2}$  times
96. A shunt generator running at 100 r.p.m. generates e.m.f. of 100 V. If the speed increases to 1200 r.p.m., the generated e.m.f. is
- (A) 140 V  
(B) 120 V  
(C) 240 V  
(D) 360 V
97. As the load factor of generating plant increases, the generation cost per kWh
- (A) decreases  
(B) increases  
(C) remains same  
(D) None of the above
98. The reactance offered by a capacitor to alternating current of 50 Hz is 5 ohm. If frequency is decreased to 25 Hz, the reactance becomes
- (A)  $20 \Omega$   
(B)  $5 \Omega$   
(C)  $10 \Omega$   
(D)  $40 \Omega$
99. The booster is inserted in the circuit to
- (A) reduce current  
(B) increase current  
(C) reduce voltage drop  
(D) compensate for voltage drop
100. A lamp has a total luminous flux of 1884 lumens. Its MSCP is
- (A) 250  
(B) 150  
(C) 375  
(D) 450

**SPACE FOR ROUGH WORK**

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**SEAL**

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