# 032/2020

**Question Booklet Alpha Code**

## A

**Total Number of Questions : 100**                                    **Time : 75 Minutes**

**Maximum Marks : 100**

## INSTRUCTIONS TO CANDIDATES

1.  The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C** & **D**.

2.  The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.

3.  The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.

4.  If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.

5.  The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.

6.  The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.

7.  Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.

8.  A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.

9.  **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**

10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.

11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**

12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.

13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

1. If in a conductor n is the number of free electrons available per $m^3$, v be the axial drift velocity of electrons in meters/second, A is area of cross-section of the conductor and e is the charge of free electrons then what will be the current density J ?

   A) nAev
   B) $\dfrac{nev}{A}$
   C) $\dfrac{ne}{vA}$
   D) nev

2. If there are three resistors of R Ohm, in which two resistors are connected in parallel and third resistor is connected in series with this parallel combination. What will be effective resistance of this series parallel circuit ?

   A) $\dfrac{2R}{3}$
   B) $\dfrac{R+2R}{3}$
   C) $\dfrac{R+2R}{2}$
   D) $\dfrac{R}{2}$

3. Resistance of a material is independent of

   A) Magnetic flux
   B) Length

   C) Nature of material
   D) Temperature

4. What will be the current drawn by a lamp of rating 230 V, 100 W when it is connected across 50 V dc supply ?

   A) 0.0945 A
   B) 0.0261 A
   C) 0.0831 A
   D) 0.0362 A

5. 1 kWh is equal to

   A) $3.6 \times 10^5$ J
   B) $36 \times 10^5$ J

   C) $0.36 \times 10^5$ J
   D) $0.036 \times 10^5$

6. What is the unit of power ?

   A) $J^2/s$
   B) J/s
   C) $J/s^2$
   D) J

7. According to Kirchhoff's voltage law in a closed loop

   A) $\Sigma IR - \Sigma emf = 0$
   B) $\Sigma IR^2 + \Sigma emf^2 = 0$

   C) $\Sigma IR + \Sigma emf = 0$
   D) $\Sigma IR + \Sigma emf = 1$

8. When two resistors $R_1$ and $R_2$ are connected in series and this series combination is connected across V volts. What will be the voltage across resistor $R_1$ ?

   A) $\dfrac{V}{R_1+R_2} \cdot \text{Bilateral} \times R_1$
   B) $\dfrac{V}{R_1 \times R_2} R_1$

   C) $\dfrac{V}{R_1-R_2} R_1$
   D) $\dfrac{V}{R_1 \times R_2} R_2$

**A**

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9. Two resistors 4 Ohm and R Ohm are connected in parallel across 20 V supply. What will be the value of unknown resistor R when 100 W power is dissipated in it ?

    A) $6\,\Omega$                                     B) $4\,\Omega$

    C) 4.1                                         D) $6.2\,\Omega$

10. The circuit whose properties or characteristics are the same in either direction is

    A) Liner                                    B) Non liner

    C) Both A) and B)                        D) None of these

11. What is the unit of absolute permittivity ?

    A) Farad/meter                         B) $Farad/m^2$

    C) $Farad^2/m$                          D) $Farad/m^3$

12. According to Coulomb's Law what will be the force between two charges $Q_1$ and $Q_2$ at a distance r meters in vacuum ?

    A) $9\times10^9\,\dfrac{Q_1Q_2}{d^2}$                   B) $9\times10^{-9}\,\dfrac{Q_1Q_2}{d^2}$

    C) $9\times10^9\,\dfrac{Q_1Q_2}{d^3}$                   D) $9\times10^9\,\dfrac{Q_1Q_2}{d}$

13. Unit of electric field is

    A) Newton                                 B) $Newton^2/Coulomb$

    C) Newton/Coulomb                 D) Coulomb

14. If in shifting one Coulomb of positive charge from infinity to a certain point in the electric field, the work done and potential of that point are

    A) One Joule and one volt          B) One Coulomb and one volt

    C) One Coulomb and one newton     D) None of the above

15. The capacitance of multiplate capacitor is

    A) $\dfrac{(n-1)\varepsilon_0\varepsilon_r A}{d}$             B) $\dfrac{(n+1)\varepsilon_0\varepsilon_r A}{d}$

    C) $\dfrac{(n-1)\varepsilon_0\varepsilon_r}{d}$             D) $\dfrac{(n+1)\varepsilon_0\varepsilon_r}{d^2}$

**A** -4-

16. When two capacitors 10 μF and 20 μF are connected in series what will be its equivalent capacitance ?

    A) 0.066 μF
    B) 6.66 mF
    C) 6.66 μF
    D) 66.66 μF

17. The ratio of intensity of magnetisation I to the magnetising force H is called

    A) Flux density
    B) Magnetic potential
    C) Permeance
    D) Susceptibility

18. Which parameter in magnetic circuit is analogous to resistivity in electric circuit ?

    A) Permeance
    B) Permeability
    C) Reluctivity
    D) Reluctance

19. Ratio of total flux to useful flux is

    A) MMF
    B) Retentively
    C) Coercive force
    D) Leakage coefficient

20. Which one is the Diamagnetic material ?

    A) Aluminium
    B) Nickel
    C) Bismuth
    D) Iron

21. Amplitude factor is the ratio of

    A) Average value and Maximum value
    B) RMS value and Average value
    C) Maximum value and RMS value
    D) Average value and Maximum value

22. The current flowing in a purely inductive circuit is

    A) $I_m \sin\left(\omega t + \dfrac{\pi}{2}\right)$
    B) $I_m \sin\left(\omega t - \dfrac{\pi}{2}\right)$
    C) $\sin\left(\omega t - \dfrac{\pi}{4}\right)$
    D) $I_m \sin\left(\omega t + \dfrac{\pi}{4}\right)$

23. The value of j is

    A) $\sqrt{-1}$
    B) $-1$
    C) $\sqrt[2]{-1}$
    D) $\sqrt{1}$

**A**

24. Q factor is the ratio of

    A) $\dfrac{Z}{R}$ 
    B) $\dfrac{R}{Z}$ 
    C) $\dfrac{L}{R}$ 
    D) $\dfrac{R}{L}$

25. A coil is connected in series with a pure capacitor. The combination is fed from a 10 V supply of 10000 Hz. It was observed that the maximum current of 2 A flows in the circuit when the capacitor is of value 1 microfarad. What is the value of R ?

    A) 10 Ω 
    B) 5 Ω

    C) 6 Ω 
    D) 5.5 Ω

26. The instantaneous value of voltage across a capacitor of 10F is $V_m \sin 314t$. What will be the reactance of the circuit ?

    A) $\dfrac{1}{1000}\Omega$ 
    B) $\dfrac{1}{100\pi}\Omega$

    C) $\dfrac{1}{1000\pi}\Omega$ 
    D) $\dfrac{1}{2000\pi}\Omega$

27. $R_{12}$, $R_{23}$ and $R_{31}$ are the three resistors in star configuration. What will be the expression of $R_1$ in delta configuration ?

    A) $\dfrac{R_{12}R_{31}}{R_{12}+R_{23}+R_{31}}$ 
    B) $\dfrac{R_{23}R_{12}}{R_{12}+R_{23}+R_{31}}$

    C) $\dfrac{R_{31}R_{23}}{R_{12}+R_{23}+R_{31}}$ 
    D) $\dfrac{R_{23}R_{12}}{R_{12}\times R_{23}\times R_{31}}$

28. What is the RMS value of rectified alternating current ?

    A) $\dfrac{I_m}{\pi}$ 
    B) $\dfrac{I_m}{\sqrt{2}}$ 
    C) $0.707 I_m$ 
    D) $\dfrac{I_m}{2}$

29. The maximum value of instantaneous power of pure capacitive circuit is

    A) $\dfrac{V_m I_m}{2\pi}$ 
    B) $\dfrac{V_m I_m}{2}$

    C) $\dfrac{V_m I_m}{\pi}$ 
    D) $\dfrac{V_m I_m}{3\pi}$

30. In a three phase star connected system the angle between line voltage and its phase voltage is

    A) 90° 
    B) 60°

    C) 30° 
    D) 180°

**A**

31. One of the following meter is not used for measuring a dc electric quantity

    A) Voltmeter                           B) Ammeter

    C) Wattmeter                           D) Power factor meter

32. One of the following instrument gives multiple electric quantities from a connected circuit

    A) TOD meter                           B) Insulation tester

    C) Multimeter                          D) Synchroscope

33. The easiest way to identify a PMMC instrument is

    A) Uniform scale                       B) Non uniform scale

    C) Knife edge needle                   D) Parallax mirror fitted

34. In two wattmeter method of three phase power measurement, when the power factor is 0.5 lagging

    A) Both wattmeters will read equal power

    B) One wattmeter will read total power

    C) Readings of two wattmeters are equal and opposite

    D) None of the above

35. The range of a voltmeter can be extended by

    A) Connecting a high value resistor in series with the meter

    B) Connecting a low value resistor is parallel the meter

    C) Connecting a high value resistor is parallel the meter

    D) Connecting a low value resistor in series the meter

36. A synchroscope is used for

    A) Power factor measurements

    B) Energy measurements

    C) Frequency measurements

    D) None of the above

**A**

37. Which of the following meter having the possibility of creeping error ?

    A) Voltmeter                          B) Power factor meter

    C) Energy meter                       D) Wattmeter

38. Which of the following is a step-up transformer ?

    A) Distribution transformer           B) Potential transformer

    C) Current transformer                D) None of the above

39. A CRO is not used for

    A) Voltage measurement                B) Current measurement

    C) Phase measurement                  D) Frequency measurement

40. Which of the following can be used for inductance measurements ?

    A) Maxwell bridge                     B) Wheatstone bridge

    C) Wein bridge                        D) Schering bridge

41. Which of the following is an electrical safety requirement ?

    A) Use IS specified materials for all installation

    B) Common Fuse fitted for two or more sub circuit

    C) All the circuit must be wire up with one square mm wire

    D) The power circuit is connected through ELCB with 30mA rating in an industry

42. Which of the incorrect first aid provided to a person who have an electric hazard ?

    A) Immediately give drinking water

    B) Immediately remove the electrical contact from the body

    C) Immediately give CPR if needed

    D) Immediately bring into medical support

43. Which of the correct statement for an electrical installation ?

    A) Fuse or switch is must be provided in earth conductor

    B) No socket outlet is to be provided in the bathroom

    C) A switch board is to be installed so that its bottom lies 1.25 meter above the floor

    D) Don't use armored cable for internal installation

**A**

44. Which one of the following is wrong for testing of insulation resistance between the wiring and earth ?

    A) Main switch is in off position

    B) Main fuse is taken out

    C) All the switches are in off position

    D) All other fuses are in position

45. In a lighting sub circuit, the total load/No. of points shall be limited to

    A) 700 W/10 points          B) 800 W/10 points

    C) 900 W/12 points          D) 1000 W/12 points

46. Which one of the following is an indication of fully charged 12 V battery ?

    A) Terminal voltage is 12 V          B) Rise in temperature

    C) Specific gravity of electrolyte is 1.21          D) None of the above

47. Which of the following is an electrolyte in lead acid battery ?

    A) Dilute nitric acid          B) Dilute hydrochloric acid

    C) Dilute sulfuric acid          D) Distilled water

48. The capacity of battery is expressed in

    A) Watt hour          B) Kilo watt hour          C) Ampere hour          D) Volt ampere

49. Which type solar cell is more efficient ?

    A) Poly crystal          B) Mono crystal

    C) Thin film          D) None of the above

50. What number of cell required for get 24 V terminal voltage of a lead acid battery ?

    A) 10          B) 5

    C) 12          D) 24

51. One of the following is a temporary wiring

    A) Loop wiring          B) Concealed wiring

    C) Open conduit wiring          D) CTS or TRS wiring

**A**

52. Which type of wiring is not suitable where acid or alkalis are likely to be present ?

    A) Case and capping wiring
    B) Conduit wiring
    C) Cleat wiring
    D) Lead sheathed wiring

53. The IS specification of wire used for domestic wiring is

    A) 5A 240V PVC insulated wire
    B) 1 sq.mm 1100V PVC insulated wire
    C) 1 sq.mm 240V PVC insulated wire
    D) 5A 440V PVC insulated wire

54. As per IS specification maximum current carrying capacity of 1.5 sq.mm copper wire is

    A) 5A
    B) 10A
    C) 15A
    D) 20A

55. The material used for fuse element is

    A) Alloy of lead and copper
    B) An alloy of tin and lead
    C) An alloy of tin and aluminum
    D) Thin copper conductor

56. The most commonly used fuse in house wiring is

    A) HRC fuse
    B) Drop holder fuse
    C) Kit-kat fuse
    D) Cartridge fuse

57. One of the material is not used as a filler in the HRC fuse

    A) Calcium carbonate
    B) Sand
    C) Quartz
    D) Graphite powder

58. The one of the switch is used as isolator of star delta starter

    A) SPST
    B) DPST
    C) ICTP
    D) ICDP

59. Standard size of copper plate for plate earthing is

    A) $50 \times 50$ cm 6.3 mm
    B) $60 \times 60$ cm 3.15 mm
    C) $60 \times 60$ cm 6.3 mm
    D) $50 \times 50$ cm 3.13 mm

60. MCB used for an electrical installation is

    A) Electric shock protection
    B) Over current protection
    C) Over voltage protection
    D) All of the above

**A**

61. In d.c. machine the yoke is made of
    A) Cast steel
    B) Soft iron
    C) Silicon steel
    D) None of the above

62. The armature of a d.c. machine is laminated in order to reduce
    A) Copper loss
    B) Eddy current loss
    C) Hysteresis loss
    D) Frictional loss

63. In d.c. machine the armature winding is placed on rotor to
    A) Reduce the armature reaction
    B) Facilitate commutation
    C) Save iron
    D) Reduce losses

64. In a d.c. machine, the number of armature segments is equal to
    A) Number of conductors
    B) Twice the number of poles
    C) Number of coils
    D) None of the above

65. The parallel paths of an 8 pole duplex lap winding will be
    A) 4
    B) 8
    C) 16
    D) 32

66. Carbon brushes are preferable to copper brushes due to
    A) They have longer life
    B) They reduce armature reaction
    C) They have lower resistance
    D) They reduce sparking

67. The speed of a d.c. motor can be controlled by
    A) Applied voltage
    B) Its flux
    C) Armature circuit resistance
    D) All of the above

68. Motor starters are essential for
    A) Starting the motor
    B) Accelerating the motor
    C) Avoiding excessive starting current
    D) Preventing fuse blowing

69. The efficiency of a d.c. motor when developing maximum mechanical power will be
    A) Less than 50%
    B) 50%
    C) More than 50%
    D) 100%

70. If the load current and magnetic flux of a d.c. motor are held constant and voltage applied across its armature is increased by 5%, the speed of the motor will
    A) Remain unaltered
    B) Decrease by 5%
    C) Depend on other factors
    D) Increase by 5%

71. The primary and secondary of a transformer are coupled
    A) Electrically
    B) Magnetically
    C) Electrically and magnetically
    D) None of the above

**A**

72. A two winding transformer operates at maximum efficiency when its
    A) Hysteresis loss equal eddy current loss
    B) Voltage regulation is minimum
    C) Copper loss equals iron loss
    D) Primary resistance equals secondary resistance

73. The transformer that does not provide electric isolation is
    A) Power transformer
    B) Potential transformer
    C) Current transformer
    D) Auto transformer

74. The synchronous speed of a three phase induction motor having 20 poles and connected to a 50 Hz source is

    A) 300 r.p.m.      B) 600 r.p.m.      C) 1000 r.p.m.      D) 1200 r.p.m.

75. In a squirrel cage induction motor, the maximum torque developed under running condition is
    A) Equal to starting torque
    B) Full-load torque
    C) Much higher than full load torque
    D) Less than starting torque

76. The purpose of starting winding in a single phase induction motor is to
    A) Produce rotating flux in conjunction with main winding
    B) Reduce losses
    C) Limit temperature rise of the machine
    D) None of the above

77. The stator of an alternator is identical to that of a
    A) d.c. generator
    B) three phase induction motor
    C) single phase induction motor
    D) none of the above

78. An under excited alternator supplies
    A) Lagging VAR
    B) No reactive power
    C) Leading VAR
    D) None of the above

79. Damper windings are used in alternators to
    A) Prevent hunting
    B) Reduce winding losses
    C) Achieve synchronism
    D) None of the above

80. A resistance split phase induction motor is used for
    A) High inertial loads
    B) Low inertial loads
    C) Very high inertial loads
    D) None of the above

**A**

81. The decimal equivalent of $(101111.1101)_2$ is

    A) $42.625_{10}$     B) $43.8125_{10}$     C) $45.250_{10}$     D) $47.8125_{10}$

82. Nibble is

    A) A string of 4 bits          B) A string of 8 bits

    C) A string of 16 bits         D) A string of 64 bits

83. If A and B are the inputs of an EXCLUSIVE OR gate circuit, its output Y is given by

    A) $Y = A\overline{B} + \overline{A}B$          B) $Y = AB + \overline{A}B$

    C) $Y = A + B + AB$          D) $Y = A + B + \overline{A}B$

84. The Boolean expression Y = A(A + B) when it simplified it becomes

    A) $A + B$          B) $\overline{A} + \overline{B}$          C) $AB$          D) $A$

85. The minimum number of flip-flop required to build a mode 20 counter is

    A) 2          B) 3          C) 4          D) 5

86. The fan out of a logic gate is

    A) The number of subsequent circuits which the gate can drive

    B) The number of inputs connected to the gate without any degradation of voltage level

    C) Number of connection to the package

    D) None of the above

87. How many 7483 IC's are required to add two bytes data ?

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

88. By placing an inverter to the input of an SR flip-flop, the resulting flip-flop becomes
    A) JK flip-flop          B) D flip-flop
    C) T flip-flop          D) M/S JK flip-flop

89. The number of flip-flop needed to divide input frequency by 64 is

    A) 8          B) 16          C) 4          D) 6

90. Which of the following is not a specification of a D/A or A/D converter ?

    A) Gain          B) Drift          C) Speed          D) Accuracy

**A**

91. In a thyristor

    A) Latching current $I_L$ is associated with turn off process and holding current $I_H$ is associated with turn on process

    B) Both $I_L$ and $I_H$ associated with turn off process

    C) $I_H$ is associated with turn off process and $I_L$ is associated with turn on process

    D) Both $I_H$ and $I_L$ are associated with turn on process

92. For an UJT employed for triggering of an SCR, Intrinsic strand off ratio $\eta = 0.64$ and dc source voltage = 20 V. The UJT would trigger when the emitter voltage is

    A) 12.8 V

    B) 13.5 V

    C) 10 V

    D) 5 V

93. In a properly biased JFET will acts as a

    A) Current controlled current source

    B) Voltage controlled voltage source

    C) Voltage controlled current source

    D) Current controlled voltage source

94. The structure of IGBT is a

    A) N-N-P-P structure connected by a MOS gate

    B) PNP structure connected by a MOS gate

    C) PNPN structure connected by a MOS gate

    D) N-P-N-P structure connected by a MOS gate

95. The anode current through a conducting SCR is 10 A, if its gate current is made one-fourth, then what will be the anode current ?

    A) 0 A

    B) 5 A

    C) 10 A

    D) 20 A

**A**

96. Which of the following device is used for triggering of TRIAC ?

    A) FET

    B) IGBT

    C) DIAC

    D) SCR

97. A boost regulator has an input voltage of 5 V and the average output of 15 V. The duty cycle is

    A) 3/2                                    B) 2/3

    C) 5/2                                    D) 15/2

98. For a full bridge inverter with the following load R = 4Ω, XL = 10Ω, XC = 6Ω

    A) The output voltage lags the current by 45°

    B) The output current lags the voltage by 45°

    C) The output current lags the voltage by 90°

    D) The output current lags the voltage by more than 90°

99. Which one is used to protect a thyristor from di/dt condition ?

    A) Inductor

    B) Snubber circuit

    C) Fuse

    D) Zener diode

100. 6Ah in an UPS battery specification means

    A) 6 A for one hour

    B) 1 A for six hours

    C) The output power is 6 w

    D) It requires 5 hours to charge fully

**A**

**Space for Rough Work**