

059/20

Question Booklet Alpha Code

A

Question Booklet Sl. No.

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.

059/20

A

1. If $\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, the value of $2x + 3y + 4z$ is
 A) 26 B) 27 C) 29 D) 28
2. The solution set of the system of equations $x - 4y - z = 11$, $2x - 5y + 2z = 39$, $-3x + 2y + z = 1$ is
 A) $\{-1, -5, 8\}$ B) $\{1, -5, 8\}$ C) $\{1, 5, 8\}$ D) $\{1, 5, -8\}$
3. The value of x for which the tangent to the curve $y = \frac{x}{(1-x)^2}$ will be parallel to the x -axis
 A) 1 B) -1 C) 0 D) 2
4. The coefficient of x^{-8} in the expansion of $\left(x - \frac{2}{x}\right)^{20}$
 A) $-C(20, 14)$ B) $C(20, 14)$ C) $C(20, 14)2^{14}$ D) $-C(20, 6)2^{14}$
5. $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$ is
 A) $\tan 11^\circ$ B) $\cot 11^\circ$ C) $\cot 56^\circ$ D) $\tan 56^\circ$
6. The local maximum and local minimum values of $4\sin x + \cos 2x$ are respectively
 A) $(3, -5)$ B) $(-3, 5)$ C) $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ D) $(-3, -5)$
7. $\int \frac{x - \sin x}{1 - \cos x} dx$ is
 A) $x \cot\left(\frac{x}{2}\right) + c$ B) $-x \tan\left(\frac{x}{2}\right) + c$ C) $-x \cot\left(\frac{x}{2}\right) + c$ D) $x \sin\left(\frac{x}{2}\right) + c$
8. The angle between the straight lines $y - \sqrt{3}x - 5 = 0$ and $x - \sqrt{3}y - 6 = 0$ is
 A) $\frac{\pi}{4}$ B) $\frac{\pi}{6}$ C) $\frac{\pi}{3}$ D) 0
9. The area bounded by the curve $y = \cos x$, the x -axis and the lines $x = 0$ and $x = 2\pi$ is
 A) 1 B) 0 C) $\frac{1}{2}$ D) 4
10. Solution of $3e^x \tan y \, dx + (1 - e^x) \sec^2 y \, dy = 0$
 A) $\tan y = (1 - e^x)^3 c$ B) $\tan y = 3(1 - e^x)$
 C) $3 \tan y = (1 - e^x) + c$ D) $\tan y = (1 - e^x) + c$

059/20

11. The _____ of cement is measured in terms of its specific surface which can be determined by various methods out of which Blaine's air permeability method is quite frequently used.
A) Soundness B) Fineness C) Heat of hydration D) Setting time
12. The modulus of elasticity of M25 concrete is
A) 25000 N/mm² B) 20000 N/mm²
C) 25000 kg/mm² D) 20000 kg/mm²
13. Gunter's chain is _____ long and consists of 100 links.
A) 66 foot B) 100 foot C) 660 foot D) 10 foot
14. _____ is the process of levelling in which the elevations of points are computed from vertical angles and horizontal distances measured in the field, just as the length of any side in any triangle can be computed.
A) Barometric levelling B) Spirit levelling
C) Indirect levelling D) Direct levelling
15. If the independent footing of two columns are connected by a beam, it is called a
A) Strap footing B) Strip footing
C) Pile footing D) Isolated footing
16. Heat addition at constant pressure occurs in
A) Carnot cycle B) Otto cycle
C) Diesel cycle D) Stirling cycle
17. Maximum fuel economy is obtained with
A) Chemically correct mixture B) Lean mixture
C) Rich mixture D) None of these
18. The size of exhaust valve of an engine in comparison to suction valve is
A) Less
B) More
C) Same
D) More or less depending on capacity of engine
19. Which one is boiler mounting ?
A) Pressure reducing valve B) Economiser
C) Steam trap D) Fusible plug
20. The moderator used in nuclear power plant is
A) Graphite B) Boron C) Cadmium D) Silver

A

21. If the current in a zero-resistance wire AB is increased, the voltage V_{AB} across the wire will
 A) Decrease B) Increase
 C) Remain constant D) None of these
22. Cutting an air gap in a magnetic circuit result in
 A) Reduction of reluctance B) Increase in reluctance
 C) No change in reluctance D) None of these
23. In a parallel RC circuit
 A) I_C lags I_R by 90 B) I_C leads I_R by 90
 C) I_C and I_R are in phase D) I_C lags I_R by 60
24. A 1000 W, 230 V electric kettle is connected in series with another similar kettle and the combination is connected to 230 V supply. The total power drawn by the combination will be
 A) 1000 W B) Less than 1000 W
 C) More than 1000 W D) Zero
25. The unit of the permittivity is
 A) Farad/metre B) Farad – metre C) Farad/(metre)² D) None of these
26. The coil span of dc armature winding is made equal to pole span in order to
 A) Distribute the windings uniformly under different poles
 B) Obtain a coil span of 180 electrical
 C) Ensure the addition of emfs of consecutive turns
 D) Obtain a full pitch winding
27. Which of the following type of generators does not require equalizers for satisfactory parallel operation ?
 A) Series B) Under compounded
 C) Over compounded D) Flat compounded
28. In a DC motor, unidirectional torque is produced with the help of
 A) Brushes B) Commutator
 C) End plates D) Both A) and B)

059/20

29. The torque Vs armature current (I_a) graph for a DC series motor is
 - A) Parabola from no load to overload
 - B) Straight line
 - C) Parabola up to full load and straight lines at overloads
 - D) Rectangular hyperbola
30. A 200 KVA transformer has an iron loss of 1 KW and full load copper loss of 2 KW. The KVA corresponding to maximum efficiency is
 - A) 200 KVA
 - B) 141.1 KVA
 - C) 100 KVA
 - D) 50 KVA
31. The all-day efficiency of the transformer depends on
 - A) Copper loss
 - B) Amount of load
 - C) Duration of load
 - D) Both B) and C)
32. A 3 phase induction motor is running at a slip of 4% and input to the rotor is 2000 watts. The mechanical power developed in the rotor is
 - A) 1920 W
 - B) 2000 W
 - C) 1000 W
 - D) 800 W
33. If the stator frequency and voltage of an induction motor are reduced proportionately, then
 - A) Locked rotor current is reduced
 - B) Torque developed is increased
 - C) Magnetising current is decreased
 - D) Both A) and B)
34. In a squirrel cage induction motor, the starting torque with auto transformer starting is _____ times the torque with direct switching, K being the transformation ratio of the auto transformer.
 - A) K^2
 - B) $1/K$
 - C) $1/K^2$
 - D) K
35. The power factor of an alternator under short conditions is
 - A) Unity
 - B) Almost zero lagging
 - C) Almost zero leading
 - D) None of these
36. In a synchronous machine, the angle between the synchronously rotating stator flux and rotor poles is called
 - A) Synchronizing angle
 - B) Torque angle
 - C) Load angle
 - D) Slip angle

45. An RLC series circuit remains predominantly inductive
 - A) At resonant frequency
 - B) Below resonant frequency
 - C) Above resonant frequency
 - D) At a lower half power frequency
46. Steady state stability of a power system is enhanced by
 - A) Reducing the fault clearing time
 - B) Using double circuit lines
 - C) Single pole switching
 - D) Decreasing generator inertia
47. A hydel power plant of run off river type should be provided with a pondage so that
 - A) Firm capacity of the plant is increased
 - B) Operating head is controlled
 - C) Pressure inside the turbine remains constant
 - D) Kinetic energy of running water is fully utilized
48. Which one is not a unconventional source of energy ?
 - A) Tidal power
 - B) Geothermal energy
 - C) Fossil fuel
 - D) Wind power
49. The pin which provides reset option in 8051 micro-controller is
 - A) Pin 1
 - B) Pin 9
 - C) Pin 11
 - D) Pin 8
50. In sodium vapour lamp, neon gas
 - A) Acts as a shield around the filament
 - B) Assists in developing enough heat to vaporize the sodium
 - C) Change the colour of light
 - D) Prevents the vaporization of filament
51. In a single-phase full wave rectifier, during blocking state the peak inverse voltage of diode is V_m is the peak voltage.
 - A) V_m
 - B) $2V_m$
 - C) $V_m/\sqrt{2}$
 - D) $\sqrt{2}V_m$
52. In a single-phase full converter, if α and β are the firing angle and extinction angles respectively, then the load current is
 - A) Discontinuous if $(\beta - \alpha) < \pi$
 - B) Discontinuous if $(\beta - \alpha) > \pi$
 - C) Discontinuous if $(\beta - \alpha) = \pi$
 - D) Continuous if $(\beta - \alpha) < \pi$

53. A forward voltage can be applied to SCR after its
A) Anode current reduces to zero B) Gate recovery time
C) Anode voltage reduces to zero D) Reverse recovery time
54. Synchronous motor is normally used for driving
A) Cranes B) Lathes
C) Fans D) Rotating compressors
55. In moving iron instrument, the deflecting torque is proportional to
A) I^2 B) I
C) $1/I^2$ D) None of these
56. Corona loss increases with
A) Increase in supply frequency and conductor size
B) Increase in supply frequency but reduction in conductor size
C) Decrease in supply frequency and conductor size
D) Decrease in supply frequency but increase in conductor size
57. If the excitation of a synchronous generator fails, it acts as a
A) Synchronous motor B) Synchronous generator
C) Induction generator D) Induction motor
58. The device that does not have the gate terminal is
A) Triac B) FET C) SCR D) Diac
59. A string insulator has 5 units. The voltage across the bottom most unit is 25% of the total voltage. String efficiency is
A) 25% B) 50%
C) 80% D) 75%
60. Resistance switching is normally employed in the case of
A) Bulk oil circuit breaker B) Minimum oil circuit breaker
C) Air blast circuit breaker D) All of the above
61. An ohmmeter is a
A) Moving iron instrument B) Moving coil instrument
C) Dynamometer instrument D) None of the above

62. In a single-phase power factor meter, the phase difference between the currents in the two pressure coils is
- A) Exactly 0°
 - B) Approximately 0°
 - C) Exactly 90°
 - D) Approximately 90°
63. In PLC Ladder logic programming consists of
- A) Logic gate symbols and connecting lines
 - B) Virtual relay contacts and coils
 - C) Function blocks and connecting lines
 - D) Text based codes
64. The equipment or element which can reduce Ferranti effect
- A) Relay
 - B) Circuit breaker
 - C) Resistors
 - D) Current limiting reactors
65. Transmission lines are transposed to
- A) Reduce copper loss
 - B) Reduce skin effect
 - C) Prevent interference with neighbouring telephone lines
 - D) Prevent short circuit between any two lines
66. An isolated device used to protect a PLC from incoming surge from fields
- A) Transformer
 - B) Transducer
 - C) ADC
 - D) DAC
67. Which of the following represent active transducer ?
- A) Strain gauge
 - B) Thermistor
 - C) LVDT
 - D) Thermocouple
68. Fusing factor is defined as the ratio between
- A) Maximum fusing current and rated voltage
 - B) Maximum fusing current and rated current
 - C) Minimum fusing current and rated current
 - D) Minimum fusing current and rated voltage

69. The illumination is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux.
Above statement is associated with
- A) Planck's law
 - B) Macbeth's law of illumination
 - C) Bunsen's law of illumination
 - D) Lambert's cosine law
70. Capacitors of optimal size are installed at suitable locations in a distribution system for
- 1. Improved voltage regulation
 - 2. Reduction in distribution power losses
 - 3. Reduction of KVA rating of distribution transformers.
- A) 1 alone
 - B) 1 and 2
 - C) 1, 2 and 3
 - D) 3 alone
71. The use of zener diode connected in a UJT circuit used for triggering an SCR is to
- A) Delay the generation of triggering pulse
 - B) Speed up the generation of triggering pulse
 - C) Supply constant voltage to UJT for correct firing
 - D) Supply a variable voltage to UJT as source voltage varies
72. The input impedance of a CRO is
- A) Zero
 - B) Around 100 ohms
 - C) Around 1 kilo ohms
 - D) Around 1 Mega ohms
73. A mirror is provided behind the pointer in measuring instruments for
- A) With the help of the mirror it may be seen whether the pointer is bent or not
 - B) The scale is illuminated through the mirror
 - C) Reading errors due to inclined observation are eliminated by removing parallax between the pointer and its image in the mirror
 - D) None of these
74. For proper earthing, the earth wire should not be of size smaller than
- A) 10 SWG copper
 - B) 8 SWG copper
 - C) 6 SWG copper
 - D) 4 SWG copper

059/20

75. The most economical DC distribution system is
- A) Interconnected system
 - B) Radial system
 - C) Ring system
 - D) None of the above
76. Due to sag between two supports the conductor takes the form of
- A) Catenary
 - B) Semi-circle
 - C) Triangle
 - D) Ellipse
77. In suspension type insulators, the string efficiency can be improved by
- 1. Grading of insulator discs
 - 2. Reducing the cross-arm length
 - 3. Using guard rings
 - 4. Using a longer cross arm.
- A) 2 and 3 are correct
 - B) 1, 3 and 4 are correct
 - C) 2, 3 and 4 are correct
 - D) 1 and 2 are correct
78. Electric power for steam locomotive is provided through
- A) Overhead wire
 - B) Battery system
 - C) Small turbo-generator
 - D) Diesel engine generator
79. The vertical core type induction furnace requires supply at
- A) Normal frequency
 - B) High frequency
 - C) Very low frequency
 - D) Independent of frequency
80. Pin type insulators are mainly used in
- A) Distribution system
 - B) Transmission system
 - C) Transmission and distribution system
 - D) EHV transmission system
81. The 8051 uses which RAM locations for register R0-R7 on powering up ?
- A) 00-2F
 - B) 00-07
 - C) 00-7F
 - D) 00-0F

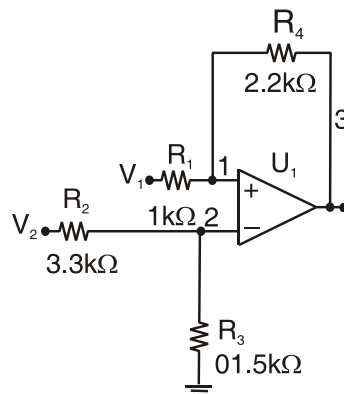
82. The function of a filter in a rectifier is to
 A) Limit the total current in the rectifier
 B) Limit the peak voltage of the rectifier
 C) Limit the DC current
 D) Reduce the ripple voltage in the output
83. The transistor amplifier stage has lowest input impedance in
 A) CB Configuration
 B) CC Configuration
 C) CE Configuration
 D) Same in all Configurations
84. Barkhausen criteria for sustained oscillations gives
 A) $A\beta = -1$
 B) $A\beta = \infty$
 C) $A\beta = 0$
 D) $A = \frac{1}{\beta}$
85. Octal equivalent of decimal $(51)_{10}$ is
 A) 63_8
 B) 41_8
 C) 67_8
 D) 69_8
86. Which of the following statement is incorrect ?
 A) $A + \bar{A}B = A$
 B) $A(\bar{A} + B) = AB$
 C) $AB + A\bar{B} = A$
 D) $CA + C\bar{A}B = CA + CB$
87. Astable multivibrator may be used as
 A) Frequency to voltage converter
 B) Voltage to frequency converter
 C) Squaring circuit
 D) Comparator circuit
88. Which of the following logic gate dissipates minimum power ?
 A) RTL
 B) TTL
 C) MOS
 D) ECL
89. The minimised expression for the given K-map is

AB \ CD	00	01	11	10
00		1	1	
01		1	x	
11	1	1	x	x
10	1		x	x

- A) $\bar{C}B + BD + CD$
 B) $\bar{B}C + BC + CD$
 C) $C\bar{B} + B\bar{C} + AC$
 D) $C\bar{B} + B\bar{C} + CD$

059/20

90. In a T flip-flop, ratio of frequency of the input pulse to the frequency of output pulse is
 A) $\frac{1}{2}$ B) 1 C) 2 D) 3
91. The 2's complement of binary number 0.01011 is
 A) 1.10101 B) 0.10101
 C) 0.10100 D) 1.10100
92. Universal gates are
 A) NOR B) AND
 C) NAND D) Both A) and C)
93. In a BJT with $I_{CO} = 1\mu A$, $\alpha = 0.99$, the value of I_{CEO} is
 A) $0.01\mu A$ B) $0.1\mu A$
 C) $1\mu A$ D) $100\mu A$
94. What is the output voltage V_0 of the circuit shown in figure ? The input voltages are $V_1 = 2.5\text{ V}$ and $V_2 = 1\text{ V}$



- A) -3.5 V B) -2.5 V
 C) -4.5 V D) -5.5 V
95. In a full wave rectifier, the peak inverse voltage per diode is
 A) V_m B) $\frac{V_m}{2}$
 C) $2V_m$ D) $\sqrt{2}V_m$

A

96. What is CDMA ?
- A) Code Diversified Multiple Access
 - B) Code Division Multiple Access
 - C) Code Divergence Multiplex Access
 - D) Code Direction Multiple Access
97. Register that is used to hold the memory address of the next instruction to be executed is
- A) Program memory
 - B) Program counter
 - C) Control unit
 - D) Instruction decoder
98. A PWM switching scheme is used in single phase inverters to
- A) Reduce the total harmonic distortion with modest filtering
 - B) Minimise the load on the dc side
 - C) Increase the life of the batteries
 - D) Reduce low order harmonics and increase high order harmonics
99. In a transistor, β may be expressed in terms of α as below
- A) $\frac{\alpha}{1+\alpha}$
 - B) $\frac{\alpha}{1-\alpha}$
 - C) $\frac{1+\alpha}{\alpha}$
 - D) $\frac{1-\alpha}{\alpha}$
100. Load impedance must match amplifier output impedance in order that
- A) Minimum power is transferred to the load
 - B) Maximum power is transferred to the load
 - C) Collector circuit efficiency is highest
 - D) Signal to noise ratio is maximum
-

059/20

Space for Rough Work

