

P.G. ENTRANCE EXAMINATION, APRIL 2024

M.C.A.

Time : Two Hours

Maximum : 400 Marks

*Answer all the questions.**Each question carries 4 marks.**1 mark will be deducted for each wrong answer.*1. n th derivative of $\sinh(x)$ is :

(A) $0.5(e^x - e^{-x})$.

(B) $0.5(e^{-x} - e^x)$.

(C) $0.5(e^x - (-1)^n e^{-x})$.

(D) $0.5((-1)^n e^{-x} - e^x)$.

2. The first and second derivatives of a quadratic polynomial at $x = 1$ are 1 and 2 respectively. Then the value of $f(1) - f(0)$ is given by

(A) $3/2$.

(B) $1/2$.

(C) 1.

(D) 0.

3. A function $f: \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = x^3 - 1$ is :

(A) Neither one-one nor onto.

(B) An onto function.

(C) A one-one function.

(D) A bijection.

4. If a matrix A is both symmetric and skew-symmetric, then :(A) A is a square matrix.(B) A is a diagonal matrix.(C) A is scalar matrix.(D) A is a zero matrix.

5. The number of commutative binary operations that can be defined on a set of 2 elements is :

(A) 2.

(B) 6.

(C) 8.

(D) 4.

6. $\sin^{-1}\left(\frac{-1}{2}\right) =$

(A) π .

(B) $-\frac{\pi}{6}$.

(C) $\frac{\pi}{3}$.

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

Turn over

7. $2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) =$

(A) $\tan^{-1}\left(\frac{44}{29}\right)$.

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

(C) 0.

(D) $\frac{\pi}{4}$.

8. Principal value of $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is :

(A) $\frac{\pi}{4}$.

(B) $\frac{3\pi}{4}$.

(C) $\frac{5\pi}{4}$.

(D) None.

9. If A and B are matrices of the same order, then $(AB' - BA')$ is a :

(A) Null matrix.

(B) Symmetric matrix.

(C) Skew-symmetri matrix.

(D) Unit matrix.

10. If A and B are 2×2 matrices, then which of the following is true ?

(A) $(A + B)^2 = A^2 + B^2 + 2AB$.

(B) $(A - B)^2 = A^2 + B^2 - 2AB$.

(C) $(A - B)(A + B) = A^2 + AB - BA - B^2$.

(D) $(A + B)(A - B) = A^2 - B^2$.

11. If $A^2 - A + 1 = 0$, then the inverse of A is :

(A) $A - 1$.

(B) $1 - A$.

(C) $A + 1$.

(D) A.

12. If A is an $m \times n$ matrix such that AB and BA are both defined, then B is a ———.

(A) $n \times m$ matrix

(B) $m \times n$ matrix.

(C) $m \times m$ matrix

(D) $n \times n$ matrix

13. We can add two matrices having real numbers A and B if ———.

(A) Rows are same.

(B) Elements are same.

(C) Order is same.

(D) Columns are same.

14. Which of the following conditions holds true for a system of equations to be consistent ?
- (A) It should have one or more solutions.
 - (B) It should have no solutions.
 - (C) It should have exactly two solutions.
 - (D) It should have exactly one solution.
15. The area of a triangle with vertices $(-3, 0)$, $(3, 0)$ and $(0, k)$ is 9 sq.units. The value of k will be :
- (A) 0.
 - (B) 9.
 - (C) 3.
 - (D) -9.
16. A system of linear equations $AX = B$ is said to be inconsistent, if the system of equations has :
- (A) Trivial solutions.
 - (B) Infinite solutions.
 - (C) No solution.
 - (D) Unique solutions.
17. Using determinants, find the equation of the line joining the points $(1, 2)$ and $(3, 6)$:
- (A) $x = 3y$.
 - (B) $4x - y = 5$.
 - (C) $y = 2x$.
 - (D) $y = x$.
18. If A is a symmetric matrix, then $A^T =$
- (A) $-A$.
 - (B) $|A|$.
 - (C) Diagonal matrix.
 - (D) A .
19. $f(x) = \left(\frac{e^{2x} - 1}{e^{2x} + 1} \right)$ is :
- (A) An even function.
 - (B) A decreasing function.
 - (C) An increasing function.
 - (D) None of these.
20. The function which is neither decreasing nor increasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2} \right)$ is :
- (A) $\operatorname{cosec} x$.
 - (B) $\tan x$.
 - (C) X^2 .
 - (D) $|X - 1|$.

21. A feasible solution to an LP problem :
- (A) Must optimize the value of the objective function.
 - (B) Need not satisfy all of the constraints, only some of them.
 - (C) Must satisfy all of the problem's constraints simultaneously.
 - (D) Must be a corner point of the feasible region.
22. The maximum value of $Z = 4x + 2y$ subject to the constraints $2x + 3y \leq 18, x + y \geq 10, x, y \leq 0$ is :
- (A) None of these.
 - (B) 40.
 - (C) 36.
 - (D) 30.
23. Feasible region in the set of points which satisfy :
- (A) Some the given constraints.
 - (B) All of the given constraints.
 - (C) None of these.
 - (D) The objective functions.
24. $\int_1^2 \frac{dx}{x^2} dx =$
- (A) 1.
 - (B) -1.
 - (C) 2.
 - (D) $\frac{1}{2}$.
25. Area bounded by the line $y = |x|$ and $y = 1 - |x - 1|$ is equal to :
- (A) 2 sq. units.
 - (B) 8 sq. units.
 - (C) 4 sq. units.
 - (D) 6 sq. units.
26. $\int e^x \sec x (1 + \tan x) dx =$
- (A) $e^x \cos x + c.$
 - (B) $e^x \sec x + c.$
 - (C) $e^x \sin x + c.$
 - (D) $e^x \tan x + c.$
27. If there is an error of 2 % in measuring the length of a simple pendulum :
- (A) 2 %.
 - (B) 3 %.
 - (C) 4 %.
 - (D) 1 %.
28. Area of the region in the first quadrant enclosed by the x -axis, the line $y = x$ and the circle $x^2 + y^2 = 32$ is :
- (A) 16π sq. units.
 - (B) 4π sq. units.
 - (C) 32π sq. units.
 - (D) 24π sq. units.

29. The area bounded by the curves $y^2 = 4x$ and $y = x$ is equal to :
- (A) $\frac{1}{3}$. (B) $\frac{8}{3}$.
- (C) $\frac{35}{6}$. (D) None of these.
30. Can two different vectors have the same magnitude ?
- (A) Cannot be determined. (B) None of the above.
- (C) No. (D) Yes.
31. What is the full form of PROM ?
- (A) Program Read Only Memory.
- (B) Primary Read Only Memory.
- (C) Programmable Read Only Memory.
- (D) Program Read Output Memory.
32. Program read-output memory :
- (A) Digital Image Processing. (B) Analog Image Processing.
- (C) Both (A) and (B). (D) None of these.
33. A nibble is equal to ——— bits.
- (A) 16. (B) 32.
- (C) 4. (D) 4.
34. Which of the following is a popular relational database management system ?
- (A) MySQL. (B) C++.
- (C) JAVA (D) Python.
35. In computer science, what does the term 'algorithm' refer to ?
- (A) A specific programming language.
- (B) A type of data storage.
- (C) A set of instructions to solve a problem.
- (D) A network protocol.
36. What is the primary purpose of a proxy server in a computer network ?
- (A) To increase network speed. (B) To enhance network security.
- (C) To provide additional storage. (D) To improve network performance.

37. Which part of the computer is used for calculating and comparing ?
(A) ALU. (B) Disk Unit.
(C) Control unit. (D) Modem.
38. From the following, which one is the fastest :
(A) CD-ROM. (B) Registers.
(C) RAM. (D) Cache.
39. BIOS is used by _____.
(A) Operating System. (B) Interpreter.
(C) Compiler. (D) Application software.
40. Which one of the following groups contains graphical file extensions ?
(A) JPG, CPX, GCM. (B) GIF, TCE, WMF.
(C) TCP, JPG, BMP. (D) JPG, GIF, BMP.
41. A hard disk drive can be directly connected to a PC via a _____.
(A) SCSI interface. (B) WAN interface.
(C) Parallel interface. (D) USB interface.
42. What does 'DFT' stand for in the context of signal processing ?
(A) Discrete Fourier Transform. (B) Discrete Feature Transform.
(C) Discrete Frequency Transform. (D) Discrete Format Transform.
43. Which one of the following printers is suitable for printing sprocket-fed carbon copies ?
(A) Normal printer. (B) Dot-Matrix printer.
(C) Solid Ink printer. (D) Business Inkjet printer.
44. _____ is a small, portable flash memory card that plugs into a computer's USB port and functions as a portable hard drive.
(A) Flash drive. (B) DVD-ROM.
(C) CD-RW. (D) CD-ROM.
45. In computer networks, what does the term 'DHCP' stand for ?
(A) Dynamic Host Configuration Provider.
(B) Dynamic Host Configuration Policy.
(C) Dynamic Host Configuration Protocol.
(D) Dynamic Host Configuration Platform.

46. The time for the actual data transfer after receiving the request for data from secondary storage is referred to as the disk's _____.
(A) Transfer time. (B) Access time.
(C) Movement time. (D) Data input time.
47. Which of the following shortcut key shows the properties of a file ?
(A) Alt + Ctrl. (B) Alt + F3.
(C) Alt + P. (D) Alt + Enter.
48. Which of the following processor has a fixed length of instructions ?
(A) Main processor. (B) Dual core.
(C) COM. (D) RISC.
49. HLDA stands for ?
(A) High-Level Data Application.
(B) Hold Link Data Application.
(C) High-Level Definition Application.
(D) HOLD Knowledge.
50. Which of the following statement is correct about the URL ?
(A) URL is a software that connects to the internet.
(B) URL is the domain name.
(C) URL is the address of the web page.
(D) All of the above.
51. What kind of the does the "BAK" extension refer to ?
(A) System file. (B) Boot file.
(C) Backup file. (D) Binary file.
52. In image processing, what does the term 'filtering' generally refer to ?
(A) Removing noise from an image.
(B) Adding text to an image.
(C) Changing colour scheme of an image.
(D) Resizing an image.
53. Which of the following natural element is the primary element in computer chips ?
(A) Silicon. (B) Iron.
(C) Carbon. (D) Uranium.

54. What is the decimal equivalent of the binary number 10111 ?
(A) 21. (B) 23.
(C) 43. (D) 41.
55. The address of a variable temp of type float is :
(A) *temp. (B) Float & temp.
(C) &temp. (D) Float temp &.
56. To connect own computer through the Internet from another location, use _____.
(A) E-mail. (B) Instant message.
(C) FTP. (D) Telnet.
57. The three main parts of the processor are _____.
(A) ALU, Control Unit & Registers.
(B) Cache, Control Unit & Registers.
(C) ALU, Control Unit & RAM.
(D) Control Unit, Registers & RAM.
58. Which of the following devices translate does not programs that humans can understand into a form that the computer can process ?
(A) Display. (B) Input.
(C) Output. (D) None of these.
59. What is the permanent memory built into your computer called ?
(A) RAM. (B) Floppy.
(C) ROM. (D) CD-ROM.
60. In image processing, what does 'Morphological Operation' typically involve ?
(A) Colour manipulation. (B) Object recognition.
(C) Noise reduction. (D) Image segmentation.
61. When the mean of a number is 18, what is the mean of the sampling distribution ?
(A) 24. (B) 18.
(C) 27. (D) 23.
62. If the probability of hitting an object is 0.8, find the variance :
(A) 0.18. (B) 0.16.
(C) 0.14. (D) 0.12.

63. The mean of a constant 'x' is :
(A) 0. (B) $x/2$.
(C) x . (D) 1.
64. If $P(1) = P(2)$ in Poisson's distribution, find the value of mean :
(A) $\sqrt{2}$. (B) $\sqrt{4}$.
(C) $\sqrt{3}$. (D) $\sqrt{5}$.
65. The mean of a random variable K is given by equation :
(A) $E(K)$. (B) $E(K)^2$.
(C) $E^2 - K^2$. (D) None of these.
66. Find the variance of the constant 'K' :
(A) 1. (B) 0.
(C) K^2 . (D) $K/2$.
67. Poisson distributin is applied for :
(A) Regular random variable. (B) Constant time function.
(C) Discrete random variable. (D) Irregular random variable.
68. If the distribution of sample and population changes then the mean of sampling distribution must be equal to _____.
(A) Standard deviation of population.
(B) Variance of population.
(C) Sample of population.
(D) Mean of population.
69. The shape of the Normal Curve is _____.
(A) Bell shaped. (B) Flat.
(C) Circular. (D) Spiked.
70. For a standard normal variance, the value of mean is ?
(A) ∞ . (B) 1.
(C) 0. (D) Not defined.
71. The capacity of a body to do work is known as :
(A) Energy. (B) Power.
(C) Momentum. (D) Strength.

72. When a body slides against a rough horizontal surface, the work done by friction is _____.
(A) Positive. (B) Zero.
(C) Negative. (D) Constant.
73. A gardener pushes a lawn roller through a distance of 20 m. If he applies a force of 20 kg. weight in a direction inclined at 60° to the ground, find the work done by him. ($g = 9.8 \text{ m/s}^2$)
(A) 400 J. (B) 1960 J.
(C) 250 J. (D) 2514 J.
74. A bullet fired from a gun can pierce a target due to its _____.
(A) Mechanical energy. (B) Heat energy.
(C) Kinetic energy. (D) Acceleration.
75. Time period of a simple pendulum is 2 sec. If its length is increased by 4 times, then its period becomes _____.
(A) 8 sec. (B) 12 sec.
(C) 16 sec. (D) 4 sec.
76. The composition of two simple harmonic motions of equal periods at the right angle to each other and with a phase difference of π results in the displacement of the particle along.
(A) Circle. (B) Figure of eight.
(C) Straight line. (D) Ellipse.
77. The maximum velocity of a particle, executing simple harmonic motion with amplitude 7 mm., is 4.4 m/s. The period of oscillation is ?
(A) 0.01s. (B) 0.1s.
(C) 10s. (D) 100s.
78. If the frequency of oscillation of a particle doing simple harmonic motion is n , the frequency of kinetic energy is ?
(A) $2n$. (B) n .
(C) $n/2$. (D) $2/n$.
79. The phase difference between the instantaneous velocity and acceleration of a particle executing simple harmonic motion is _____.
(A) 0.5π . (B) π .
(C) 0.707π . (D) 0.61π .

80. Frequency of vibration is usually expressed in :
(A) Number of cycles per hour. (B) Number of cycles per minute.
(C) Number of cycles per second. (D) None of the above.
81. ——— formula can be calculated if the molar mass is known after having an empirical formula.
(A) Molecular. (B) Empirical.
(C) Simpler. (D) Shorter.
82. Which of the following is an empirical formula ?
(A) $C_6H_{12}O_6$. (B) H_2O_2 .
(C) CH_4 . (D) C_2H_6 .
83. In glucose simplest ratio between C, H and O is ———.
(A) 6 : 12 : 6. (B) 3 : 4 : 3.
(C) 1 : 2 : 1. (D) 2 : 3 : 2.
84. Due to the presence of an unpaired electron, free radicals are :
(A) Chemically reactive. (B) Chemically inactive.
(C) Anions. (D) Cations.
85. During the process of electrodynamic refining of copper, some metals present as impurity settle as 'anode mud'. These are :
(A) Sn and Ag. (B) Pb and Zn.
(C) Ag and Au. (D) Fe and Ni.
86. Two solutions of a substance (non electrolyte) are mixed in the following manner, 480 ml of 1.5 M first solution + 520 mL of 1.2 M second solution. What is the molarity of the final mixture ?
(A) 1.20 M. (B) 1.50 M.
(C) 1.344 M. (D) 2.70 M.
87. Heating mixture of Cu_2O and Cu_2S will give :
(A) $Cu + SO_2$. (B) $Cu + SO_3$.
(C) $CuO + CuS$. (D) Cu_2SO_3 .
88. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromatic solution is :
(A) + 4. (B) + 6.
(C) + 2. (D) + 3.

89. The number of hydrogen atom(s) attached to phosphorus atom in hypophosphorous acid is :
- (A) 0. (B) 2.
(C) 1. (D) 3.
90. Which of the following is fully fluorinated polymer ?
- (A) Neoprene. (B) Teflon.
(C) Thiokol. (D) PVC.
91. If PINK is coded as 1691411, then RED will be coded as _____.
- (A) 1963. (B) 1854.
(C) 1853. (D) 1954.
92. Pointing to an image Madhu tells Sohan, "I am the only daughter of this lady, and her son is your maternal uncle." How is the Madhu related to Sohan's father ?
- (A) Sister. (B) Wife.
(C) Sister-in-law. (D) None of the above.
93. Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7 ?
- (A) $13/90$. (B) $12/90$.
(C) $78/90$. (D) $77/90$.
94. A deck of 5 cards (each carrying a distinct number from 1 to 5) is shuffled thoroughly. Two cards are then removed one at time from the deck. What is the probability that the two cards are selected with the number on the first card being one higher than the number on the second card ?
- (A) $1/5$. (B) $4/25$.
(C) $1/4$. (D) $2/5$.
95. All 32 students in a class are standing in a row facing north. Akash is 12th from the right end while Priya is 18th from the left end. How many people are standing between Akash and Priya ?
- (A) 2. (B) 4.
(C) 3. (D) 5.
96. Six friends A, B, C, D, E and F are standing in a circle facing the centre. B is between F and C, A is between E and D, and F is to the immediate left of D. Who is between A and F ?
- (A) D. (B) E.
(C) C. (D) B.

97. Which of the following option will replace the question mark ? MILD : NROW :: BACK : ?
(A) CNEA. (B) YZXP.
(C) CMJA. (D) YPFX.
98. Find the missing number in the following series ?
3, 5, 5, 19, 7, 41, 9, ?
(A) 71. (B) 61.
(C) 79. (D) 69.
99. Two bus tickets from city A to B and three tickets from city A to C cost Rs. 77 has three tickets from city A to B and two tickets from city A to C cost Rs. 73. What are the fares for cities B and C from A ?
(A) Rs. 4, Rs. 23. (B) Rs. 13, Rs. 17.
(C) Rs. 15, Rs. 14. (D) Rs. 17, Rs. 13.
100. One morning after sunrise, Suresh was standing facing a pole. The shadow of the pole fell exactly to his right. To which direction was he facing ?
(A) East. (B) West.
(C) South. (D) North.

(100 × 4 = 400 marks)