

SCHOOL OF DATA ANALYTICS – CAT QUESTIONS

M.Sc. Data Science & Analytics

(Select the Correct Answer from among the four choices given)

- The product of the two binary numbers 0011010 and 001100 is:
[A] 110111000 [B] 100111010
[C] 100111000 [D] 100111100.
- If 1, 2, 3 are the eigen values of the matrix $\begin{bmatrix} 2 & 0 & d \\ 0 & 2 & 0 \\ d & 0 & 2 \end{bmatrix}$, the value of d is:
[A] 1 [B] 2 [C] 3 [D] 4.
- If $x \log_2 4 = 2 \log_2 (1-2^x)$, then x is equal to:
[A] -1 [B] 1 [C] 3 [D] 0.
- In testing hypotheses which of the following is a correct assertion ?
[A] Power of a test is Probability of a correct decision
[B] Power of a test is Probability of Type II error
[C] Power of a test is 1- Probability of Type I error
[D] Power of a test is Probability of a wrong decision.
- In a single throw of three fair coins the probability of getting at least one head is:
[A] 1/8 [B] 1/3 [C] 1/2 [D] 7/8.
- Out of 20 students in a class 5 students know SPSS. If three students are selected from the class, the probability that at least one among the three know SPSS is:
[A] 11/114 [B] 137/228 [C] 137/1368 [D] 1/114.

7. The decimal sum of the following two hexadecimal numbers $4A6 + 1B3$ is:
 [A] 659 [B] 1620 [C] 609 [D] 1625.
8. The word *Bit* denotes:
 [A] Binary system [B] Byte
 [C] Binary digit [D] Binary unit.
9. X takes the value 0, 1, 2, 3 with respective probabilities 0.2, 0.3, 0.4 and 0.1.
 Then the mean of $Y = X^2 + 2X + 5$ is:
 [A] 10.6 [B] 5.6 [C] 10.0 [D] 13.4
10. The Maximum Likelihood Estimator of θ based on a random sample of size n from $U(0, \theta)$ is:
 [A] $\text{Mean}(X_1, X_2, \dots, X_n)$ [B] $\text{Median}(X_1, X_2, \dots, X_n)$
 [C] $\text{Maximum}(X_1, X_2, \dots, X_n)$ [D] $\text{Minimum}(X_1, X_2, \dots, X_n)$
11. In the textile industry, a manufacturer is interested in the number of blemishes or flaws occurring in each 100 feet of material. The appropriate probability distribution of applying to this situation is a
 [A] normal distribution [B] binomial distribution
 [C] Poisson distribution [D] uniform distribution.
12. Which of the following is not a property of a binomial experiment?
 [A] the experiment consists of a sequence of n identical trials
 [B] each outcome can be referred to as a success or a failure
 [C] the probabilities of two outcomes can change from one trial to other.
 [D] the trials are independent.
13. If one of the roots of the equation $x^2 + ax + b = 0$ is $1 + i$. The values of a and b are:
 [A] $a = b = -2$ [B] $a = 2, b = -2$ [C] $a = -2, b = 2$
 [D] $a = b = 2$.

14. If A and B are two independent events such that $P(A) = 0.5$, $P(B) = k$ and $P(A \cup B) = 0.8$, then the value of k is
[A] $1/5$ [B] $2/5$ [C] 1 [D] 0.3 .

15. The Central Limit Theorem tells that the sampling distribution of the sample mean is approximately normal. Which of the following conditions are necessary for the theorem to be valid?

- [A] Sample size has to be large.
- [B] Population from which the samples are drawn is normal.
- [C] Population variance has to be small.
- [D] Population from which the samples are drawn is symmetric.

16. Let $X_1 \sim N(\mu = 2, \sigma^2 = 1)$ and $X_2 \sim N(\mu = 3, \sigma^2 = 2)$ and X_1 and X_2 are independent. Then the distribution of $3X_1 - 2X_2$ is:

- [A] $N(12, 17)$ [B] $N(12, 1)$ [C] $N(0, 1)$ [D] $N(0, 17)$.

17. A family of distributions for which the first 3 moments are equal:

- [A] Binomial [B] Poisson
- [C] Normal [D] Geometric.

18. If c is a constant, then a solution to the differential equation

$$(1-x)dy + (1-y)dx = 0 \text{ is:}$$

- [A] $xy = c$ [B] $\log[(1-x)y] = c$
- [C] $\log[x(1-y)] = c$ [D] $(1-x)(1-y) = c$.

19. Let X follow $U\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then $Y = \tan(X)$ is distributed as:

- [A] Beta [B] Pareto [C] Cauchy [D] Gamma.

20. The distinct characteristic roots of the following matrix are

$$\begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

- [A] 0 and 1
[C] 1 and -1

- [B] 1 and 2
[D] 0 and 2

21. For the pair of random variables (X, Y) the conditional means $E(Y/X)$ and $E(X/Y)$ represents:

- [A] Regression curves [B] Normal equations
[C] Regression coefficients [D] Coefficient of determination

22. Let $S =$ set of all rational numbers. Which of the following is true?

- [A] S is a bounded set [B] S is a countable set
[C] S is finite set [D] S is a closed set.

23. Computer program that converts assembly language to machine language is called

- [A] Compiler [B] Interpreter
[C] Comparator [D] Assembler.

24. Which of the pairs of the following sets are equivalent?

- [A] $\{1, 2, \dots, 10\}$ & $\{1, 3, 5, \dots, 99\}$ [B] $\{1, 2, \dots, 10\}$ & $[0, 1]$
[C] $\{1, 2, 3, \dots, \infty\}$ & $[0, 1]$ [D] $[-1, 1]$ & $[-a, a]$.

25. The functions f , g and h are related by $f'(x) = g(x - 1)$, $g'(x) = h(x + 1)$.

Then $f''(2x)$ equals:

- [A] $h(2x + 1)$ [B] $2h'(2x)$
[C] $2h(2x)$ [D] $4h(2x)$.

26. Among the designs CRD, RBD and LSD which allows two way elimination of heterogeneity:

- [A] CRD [B] RBD
[C] LSD [D] All the above.

27. For the observations X_1, X_2, \dots, X_n , $\sum_{i=1}^n (X_i - A)^2$ is minimum, when A is:
[A] Median [B] Mode
[C] Mean [D] Range.
28. The unit playing the role of brain of a computer system is known as:
[A] ALU [B] Memory
[C] Control unit [D] CPU.
29. The 2's complement of a binary number is obtained:
[A] by adding 1 to each bit [B] by adding 1 to 1's complement
[C] by adding 0 to 1's complement [D] by changing 1 to 0 and 0 to 1
30. One byte is equivalent to:
[A] 8 bit [B] 16 bit [C] 32 bit [D] 64 bit.
31. The file "iostream" in C++ program is used for:
[A] Inclusion of the set of files to control outputs of programs
[B] The declarations for inclusion of the basic standard input-output library
[C] Inclusion of the set of files to control logical operators in the programs
[D] None of these.
32. Which pair of distributions given below possess the lack of memory property?
[A] Poisson & Exponential [B] Poisson & Geometric
[C] Geometric and negative binomial [D] Geometric & Exponential
33. For any random variable with finite moments which of the following is always valid?
[A] $E(X^2)$ and $E^2(X)$ are non comparable [B] $E(X^2) \geq E^2(X)$
[C] $E(X^2) \leq E^2(X)$ [D] $E(X^2) = E^2(X)$
34. The equation $x^3 - 30x^2 + 108x - 104 = 0$ has:
[A] Three distinct real roots [B] Exactly one real root

[C] No real roots [D] one repeated root.

35. If a random variable X follows $N(0, \sigma^2)$, then $E(|X|)$ is:

[A] $\sqrt{\frac{2}{\pi}}$ [B] $\sqrt{2\pi}\sigma$ [C] $\sqrt{\frac{2}{\pi}}\sigma$ [D] 0

36. Apples and mangoes are sold in packets. The cost of one packet of 5 apples and 4 mangoes is Rs.36.00 and that of another packet of 7 apples and 8 mangoes is Rs. 48.00. If you want to buy 2 dozen apples and 2 dozen mangoes what would be the amount to be paid?

[A] Rs.145.60 [B] Rs.118.80 [C] Rs. 118 [D] Rs 168

37. The property of a function in C++ that can be used for different computations is known as:

[A] Overloading [B] Multiple functions
[C] Variable function [D] Dynamic function.

38. The correct operator to compare two variables in C++ is:

[A] = [B] == [C] := [D] equal.

39. If a random variable X assumes only positive integral values with the probability $P(X=x) = (2/3)(1/3)^{x-1}$; $x=1,2,3,\dots$; then $E(X)$ is:

[A] 2/9 [B] 2/3 [C] 1 [D] 3/2

40. Which is an output operator in C++?

[A] << [B] >> [C] < [D] >

41. The power of x which has the greatest coefficient in the expansion of $[1 + (1/2)x]^{12}$ is:

[A] x^2 [B] x^3
[C] x^4 [D] x^{10} .

42. If A and B are triangular matrices and k is a scalar then which of the following is not always TRUE:

- [A] $A+B$ need not be triangular [B] $A*B$ is always triangular
[C] kA & kB are triangular [D] A^T+B^T is triangular.

43. Which of the following is not a computer language?
[A] Medium Level Language [B] High Level Language
[C] Machine Language [D] Low Level Language.
44. Which of the following is always TRUE?
[A] Orthogonal matrices need not be square.
[B] Diagonal elements of a symmetric matrix are zeros.
[C] Diagonal elements of a skew symmetric matrix are zeros.
[D] The determinant of a matrix with at least one diagonal element zero is 0.
45. The average age of the 40 students in a class is 20 year while it is increased by 1 year when the class teacher also is included. Then the age of the class teacher is:
[A] 21 [B] 40 [C] 60 [D] 61.
46. Which of the following measures depends on the unit of measurement?
[A] Skewness measure [B] Kurtosis measure
[C] Second order central moment [D] Coefficient of variation.
47. A computer processes ----- into information:
[A] Data [B] Numbers
[C] Programs [D] Pictures
48. The number of solutions for the system of equations $x-3y=4$, $-2x+6y=5$ is:
[A] One solution [B] Two solutions
[C] No solution [D] Infinitely many solutions.
49. Which of the following properties is not valid in the case of matrices?
[A] addition is associative [B] multiplication is commutative
[C] multiplication is associative [D] addition is commutative.
50. The convenient sampling scheme to get a sample very quickly is:
[A] Simple random sampling [B] Systematic
[C] Stratified [D] any one of them.

51. The Pearson coefficient of correlation = 0 implies:
 [A] Variables are independent [B] Absence of all kinds of relations
 [C] Absence of any linear relationship [D] Any one of the three.
52. Given the two lines of regression as $3X - 4Y + 8 = 0$ and $4X - 3Y = 1$, the means of X and Y are:
 [A] $\bar{X} = 4, \bar{Y} = 5$ [B] $\bar{X} = 3, \bar{Y} = 4$
 [C] $\bar{X} = \frac{4}{3}, \bar{Y} = \frac{5}{4}$ [D] $\bar{X} = \frac{3}{4}, \bar{Y} = \frac{4}{5}$.
53. Name of the component essential for a computer to "boot" :
 [A] Compiler [B] Loader
 [C] Operating System [D] Assembler.
54. The limit $\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n^2}\right)^{n+1}$ equals
 [A] e^{-1} [B] $e^{-\frac{1}{2}}$ [C] e^{-2} [D] 1
55. $\lim_{n \rightarrow \infty} \left(\frac{1^2 + 2^2 + \dots + n^2}{2n^3}\right)$ is equal to:
 [A] $\frac{1}{2}$ [B] $\frac{1}{3}$ [C] $\frac{1}{5}$ [D] $\frac{1}{6}$.
56. In C++ the statement which is used to terminate the control from a loop is:
 [A] Break [B] Continue [C] Goto [D] Exit.
57. The level of significance of a test is the:
 [A] Maximum allowable probability of Type II error
 [B] Maximum allowable probability of Type I error
 [C] Same as the confidence coefficient
 [D] Same as the p-value.
58. Application of the chi-square distribution is:
 [A] making inferences about a single population variance
 [B] testing for goodness of fit

- [C] testing for the independence of two variables
- [D] All of these alternatives are correct.

59. For a negatively skewed data set:
[A] mean < median < mode [B] mean > mode > median
[C] mean > median > mode [D] median < mean < mode.
60. Which type of statement does not occur in computer programs?
[A] selection [B] loop [C] sequence [D] denial
61. Time reversal and Factor reversal tests for an Index number are satisfied by:
[A] Paasche's index number [B] Marshall-Edgeworth index number
[C] Fisher's index number [D] Laspeyre's index number.
62. The producer's risk is the:
[A] probability of rejecting a good lot [B] probability of accepting a good lot
[C] probability of rejecting a bad lot [D] probability of accepting a bad lot.
63. The mean and standard deviation of a Chi-square distribution with 10 degrees of freedom are respectively:
[A] 20, 10 [C] 20, 20 [B] 10, 10 [D] 10, 20.
64. A father is twice as old as his son. 20 years ago, the age of the father was 12 times the age of the son. The present age of the father (in years) is
[A] 44 years [B] 22 years [C] 32 years [D] 45 years
65. A train travelling at 48 kmph completely crosses another train having half its length and travelling in opposite direction at 42 kmph, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the platform is
[A] 400 m [B] 560 m [C] 450 m [D] 600 m
66. The average score of a cricketer in two matches is 27 and in three other matches is 32. Then, find the average score in all the five matches.
[A] 25 [B] 20 [C] 30 [D] 35

67. If $A:B = 2:3$, $B:C = 4:5$ and $C:D = 6:7$, then find the value of $A:B:C:D$

[A] 15:24:30:35

[B] 16:24:30:35

[C] 17:24:30:35

[D] 18:24:30:35

68. A pump can fill a tank with water in 2 hours. Because of a leak, it took 2 hours to fill the tank. The leak can drain all the water of the tank in:

[A] 14 hrs

[B] 12 hrs

[C] 10 hrs

[D] 8 hrs

69. Consider the statements: Some desks are caps. No cap is red.
Conclusions: 1. Some caps are desks. 2. No desk is red. Which is true?

[A] Only conclusion 1 follows [B] Only conclusion 2 follows

[C] Either 1 or 2 follows [D] Neither 1 nor 2 follows

70. 4 men & 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?

[A] 35 days [B] 40 days

[C] 30 days

[D] 25 days