



PART – A

1. Find the odd one out from the following :
A) sitting B) standing C) observing D) eating
2. Choose which of the conclusion/s logically follow/s from both the premises.
A. Some cushions are soft.
B. All pillows are soft.
Conclusion I: Some pillows are cushions.
Conclusion II : Some pillows are not cushions.
Conclusion III: No cushion is a pillow.
Conclusion IV: Some cushions may be pillows.
A) I and II B) I and III C) Only IV D) Only III

3. Read the short passages and answer the question that follow.

No one would confuse a glass of apple juice with Pinot Noir, a wine, but apple growers want you to believe they share one property to reduce the risk of heart disease. A study suggests that a quarter litre of apple juice works just as well as wine to reduce the risk of heart disease.

Which of the following would strengthen the argument ?

- A) The saying “An apple a day keeps the doctor away” must have some truth in it.
 - B) Apple juice is packed with powerful anti-oxidants known as flavonoids.
 - C) Apple juice like wine helps delay the formation of artery clogging plaque.
 - D) Wines made out of apples are packed with blood thinning agents.
4. Arrange the phrases to form a meaningful sentence.
A. they could not release their contents
B. tests on herbal supplements
C. or were so badly made that
D. half did not contain their listed ingredients
E. taken to reduce cholesterol confirmed that
A) DCBEA B) BEDCA C) ADECB D) BEACD

5. The passage is written by
A) an architect B) a historian C) a journalist D) a priest
6. For the word below, a contextual usage is provided. Pick the word from the alternatives given that is most APPROPRIATE in the given context.
Ignominy: Only after committing the crime was he aware of the ignominy and shame that it would bring to his family.
A) tranquillity B) satisfaction
C) embarrassment D) displeasure



7. Four statements with blanks are given followed by four words. Choose the word that fits the set of statements the maximum number of times.
- 1] Haggling always went against his _____
 - 2] We must all share the _____ for this deplorable situation.
 - 3] The prisoner proved his _____
 - 4] There is not a _____ of truth in this rumour.
- A) blame B) innocence C) wrong D) grain
8. In the below sentence, part/parts of the sentence is/are left blank. Choose the word for each blank that best fits the meaning of the sentence as a whole.
- Consumption of _____ food and _____ physical activities among the general public was contributing significantly to a greater incidence of heart disease among the populace.
- A) nutritious, strenuous B) unhygienic, desirable
C) junk, fewer D) delicious, restricted
9. Choose the grammatically correct and concise statement.
- A) It is appalling the fact that so many children have to suffer at the hands of adults.
 - B) It is appalling that so many children have to suffer in the hands of adults.
 - C) It is appalling that so many children have to suffer at the hands of adults.
 - D) It is appealing that so many children have to suffer under the hands of adults.
10. Three out of four words below are related to each other in some way and hence form a group. Find the odd one out.
- A) Pineapple B) Guava C) Grapes D) Papaya
11. How many players are there on each side in the game of Basketball ?
- A) 4 B) 5 C) 6 D) 7
12. Professor Amartya Sen is famous in which of the fields ?
- A) Biochemistry B) Electronics C) Economics D) Geology
13. Shankaracharya, the founder of the Bhakti movement belonged to
- A) Maharashtra B) Assam C) Bengal D) South India
14. Whose signature appears on ten-rupee currency note ?
- A) Minister of Finance B) Governor, RBI
C) Secretary, Ministry of Finance D) Prime Minister
15. India's longest road tunnel is located in the state of
- A) Arunachal Pradesh B) Sikkim
C) Meghalaya D) Jammu and Kashmir
16. If $2p + 3q = 18$ and $2p - q = 2$, then $2p + q = ?$
- A) 6 B) 7 C) 8 D) 10



17. In an examination, 35% of total students failed in Hindi, 45% failed in English and 20% in both. Find the percentage of those who passed in both the subjects.
A) 35% B) 40% C) 45% D) 50%
18. How long will it take a sum of money invested at 5% p.a. simple interest to increase its value by 40% ?
A) 5 years B) 6 years C) 7 years D) 8 years
19. A person has to pay 20% tax on first Rs. 4,500 earned, for amount earned between Rs. 4,500 and Rs. 7,500 the tax is 25% and for the amount earned more than Rs. 7,500, the tax is 30%. If he paid 23.33% of his income as tax, then what is his income?
A) Rs. 9,000 B) Rs. 8,500 C) Rs. 10,000 D) Rs. 10,500
20. A and B can do a piece of work in 45 days and 40 days respectively. They began to do the work together but A leaves after some days and then B completed the remaining work in 23 days. The number of days after which A left the work was
A) 6 B) 8 C) 9 D) 12
21. $5358 \times 51 = ?$
A) 273258 B) 273268 C) 273348 D) 273358
22. In a certain language, 36492 is written as SMILE and 058 is written as RUN. How are the 90089 coded in that language ?
A) NLLRN B) LRLNN C) LLRRN D) LRRNL
23. Pointing to an old man Kamal said. "His son is my son's uncle." How is the old man related to Kamal ?
A) Brother B) Uncle C) Father D) Grandfather
24. Statements :
1. The State Government has announced special tax package for the new industries to be set-up in the State.
 2. Last year the State Government had hiked the taxes for all industrial activities in the State.
- A) Statement I is the cause and statement II is its effect.
B) Statement II is the cause and statement I is its effect.
C) Both the statements I and II are independent causes.
D) Both the statements I and II are effects of independent causes.
25. Constitution is to Amendment as Book is to?
A) Errata B) Contents C) Preface D) Acknowledgement



PART – B

26. If $A = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ then which of the following is true ?

- A) $a_{11} A_{21} + a_{12} A_{22} + a_{13} A_{23} = A$
- B) $a_{21} A_{21} + a_{22} A_{22} + a_{23} A_{23} = A$
- C) $a_{31} A_{31} + a_{32} A_{32} + a_{33} A_{33} = 0$
- D) $a_{21} A_{31} + a_{22} A_{32} + a_{23} A_{33} = A$

27. The rank of the matrix $A = \begin{bmatrix} 0 & 1 & -5 & -3 \\ 1 & 0 & 1 & 1 \\ 5 & 1 & 0 & 2 \\ 1 & 1 & -4 & -2 \end{bmatrix}$ is

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

28. $\lim_{x \rightarrow 0} \frac{1 - \cos 2ax}{1 - \cos 2bx}$ is equal to

- A) $\frac{a}{b}$
- B) $\frac{b}{a}$
- C) $\frac{a^2}{b^2}$
- D) $\frac{2a}{b}$

29. If $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$, then y_n is equal to

- A) 0
- B) 1
- C) y
- D) none of these

30. Rolle's theorem is associated with his name. He is

- A) An English mathematician
- B) German mathematician
- C) French mathematician
- D) Russian mathematician

31. The 'c' of the mean value theorem for the function $f(x) = x(x - 2)$, when $a = 0, b = 3/2$ is

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

32. The curve $y = x^3 - 3x^2 - 9x + 9$ has a point of inflection at

- A) $x = -1$
- B) $x = 1$
- C) $x = -3$
- D) $x = 3$

33. The series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots$ is

- A) Convergent
- B) Divergent
- C) Oscillatory
- D) None of these



34. $\int \tan^3 x dx$ is equal to

A) $\frac{1}{2} \tan^2 x - \log \sec x + c$

B) $\frac{1}{2} \tan^2 x + \log \sec x + c$

C) $\log \sec x - \frac{1}{2} \tan^2 x + c$

D) $\log \sec x - \tan^2 x + c$

35. $I = \int_0^2 |1-x| dx$ is equal to

A) 0

B) $\frac{1}{2}$

C) 1

D) None of these

36. The value of the integral $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$ is

A) $\frac{\pi^2}{2}$

B) $\frac{\pi^2}{3}$

C) $\frac{\pi^2}{4}$

D) π^2

37. The volume of the solid generated by revolving the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$ about the x axis is equal to

A) $\frac{16}{35} \pi a^3$

B) $\frac{106}{105} \pi a^3$

C) $\frac{32}{105} \pi a^3$

D) None of these

38. The surface of the sphere obtained by revolving the circle $x = r \cos \theta$, $y = r \sin \theta$ about x axis is equal to

A) $4\pi r^2$

B) $\frac{4}{3} \pi r^3$

C) $4\pi r^3$

D) πr^3

39. The solution of the differential equation $(x+1) dy + (y-1) dx = 0$, with constant k, may be written as

A) $(y-1)(x+1) = k$

B) $(y+1)(x+1) = k$

C) $(y+1)(x-1) = k$

D) $(y-1)(x-1) = k$

40. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x$ under the condition that $y = 1$

when $x = 1$, is

A) $4xy = x^3 + 3$

B) $4xy = y^4 + 3$

C) $4xy = x^4 + 3$

D) $4xy = y^3 + 3$



41. If $u_n = \int_0^{\pi/4} \tan^n \theta d\theta$ then $u_n + u_{n-2}$ equals
- A) 1 B) n C) $\frac{1}{n}$ D) $\frac{1}{n-1}$
42. If $u = f\left(\frac{y}{x}\right)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ equals
- A) 0 B) 1 C) x D) y
43. If A is a square matrix of order n with $|A| \neq 0$ then $|\text{adj } A|$ equals
- A) $|A|$ B) $|A|^n$ C) $|A|^{n-1}$ D) $\frac{1}{|A|}$
44. $\lim_{x \rightarrow a} \left(2 - \frac{x}{a}\right)^{\tan \frac{\pi x}{2a}}$ equals
- A) 1 B) 0 C) $e^{2/\pi}$ D) $\frac{\pi}{2}$
45. Cayley-Hamilton theorem states that
- A) Every square matrix can be reduced to normal form
B) Every square matrix satisfies its characteristic equation
C) Every square matrix can be written as sum of a symmetric and a skew symmetric matrix
D) Not every square matrix is invertible
46. A family has two children. What is the conditional probability that both are boys given that atleast one of them is a boy ?
- A) 0 B) 0.25 C) 0.33 D) 0.5
47. There are three coins in a box. One is a two-headed coin, another is a fair coin, and the third is a biased coin that comes up heads 75 percentage of time. When one of the three coins is selected at random and flipped, it shows heads. What is the probability that it was the two-headed coin ?
- A) 1/9 B) 2/9 C) 1/3 D) 4/9
48. Let X be a random variable with probability density function
- $$f(x) = \begin{cases} c(1-x^2), & -1 < x < 1 \\ 0 & \text{otherwise} \end{cases}, \text{ then value of } c \text{ is}$$
- A) 1/4 B) 1/2 C) 3/4 D) 1



49. The Moment Generating Function (MGF) of the sum of independent random variables is
- A) Sum of individual MGF
 - B) Difference of individual
 - C) Product of individual MGF
 - D) Sum of individual products of MGF taken two at a time
50. Let X and Y are independent Poisson random variables with means m_1 and m_2 respectively, then $X + Y$ follows Poisson distribution with parameter
- A) $m_1 \cdot m_2$
 - B) $m_1 + m_2$
 - C) $m_1 - m_2$
 - D) m_1/m_2
51. An examination paper has 100 multiple choice questions of 3 marks each, with each question having four choices. Each incorrect answer fetches -1 mark. Suppose 5000 students choose all their answers randomly with uniform probability. The sum of the expected marks obtained by all these students is
- A) 0
 - B) 2500
 - C) 5000
 - D) 10000
52. Let Z_1, \dots, Z_n , are independent standard normal random variables, then the random variable $Z_1^2 + Z_2^2 + \dots + Z_n^2$ follows
- A) t-distribution
 - B) F- distribution
 - C) Chi-Square distribution
 - D) Normal distribution
53. The mean and the variance of a binomial distribution are 4 and 3 respectively, then the probability of a success is
- A) 1
 - B) 0
 - C) 0.75
 - D) 0.25
54. The number of students who will get an A in a probability course is a random variable, X . The professor has estimated the mean and variance of X to be 18 and 6.25 respectively. Chebyshev's inequality tells us that $P(8 < X < 28)$ cannot be less than
- A) 0.9375
 - B) 0.9500
 - C) 0.9750
 - D) 0.9900
55. Let X be a continuous random variable with $P(X < -1) = 0.25$ and $P(X \leq +1) = 0.75$. Let $Y = X^2$. Then $P(Y \leq 1)$ equals
- A) 0.25
 - B) 0.50
 - C) 0.75
 - D) 1
56. Poisson distribution is a limiting case of Binomial distribution under the conditions
- A) $n \rightarrow \infty, p \rightarrow 0, np \rightarrow \lambda$ (finite)
 - B) $n \rightarrow 0, p \rightarrow \infty, np = \lambda$ (finite)
 - C) $n \rightarrow \infty, p \rightarrow \infty, np = \lambda$ (finite)
 - D) None of the above
57. The equations $2x + 6y + 11 = 0$; $6x + 20y - 6z + 3 = 0$; $6y - 18z + 1 = 0$ are
- A) Consistent
 - B) Inconsistent
 - C) Both Consistent and Inconsistent
 - D) Neither Consistent nor Inconsistent



58. The general solution of the differential equation $(D^2 + D - 2)y = e^x$ is

A) $y = c_1 e^x + c_2 e^{-x} + \frac{1}{3} e^x$

B) $y = c_1 e^x + c_2 e^{-x} + \frac{1}{3} x e^x$

C) $y = c_1 e^x + c_2 e^{-2x} + \frac{1}{3} e^x$

D) $y = c_1 e^x + c_2 e^{-2x} + \frac{1}{3} x e^x$

59. In the case of perfect correlation, the lines of regression

A) coincide

B) are parallel

C) are perpendicular

D) do not exist

60. X and Y are two independent variables with the following observations

Values of X : 6 4 13 46 15 16 73

Values of Y : 7 9 23 32 56 12 10

Then the Correlation Coefficient takes the following value

A) - 0.67

B) - 0.72

C) - 0.76

D) 0

61. If f satisfies the conditions of Lagrange's mean value theorem and if $f'(x) > 0 \forall x \in [a, b]$, then which of the following statement is true ?

A) f is constant on $[a, b]$

B) f is strictly increasing on $[a, b]$

C) f is strictly decreasing on $[a, b]$

D) none of these

62. If A is a square matrix of order n then A^{-1} exists if

A) Rank $A = 0$

B) Rank $A = n$

C) Rank $A < 0$

D) None of these

63. The Eigen values of matrix $\begin{bmatrix} a & h & g \\ 0 & b & 0 \\ 0 & c & c \end{bmatrix}$ are

A) $a, 0, c$

B) $a, b, -c$

C) a, b, c

D) $a, -b, -c$

64. F distribution is

A) highly negatively skewed

B) highly positively skewed

C) symmetrical

D) none of the above

65. If sum of the product of deviations of X and Y series from their means is zero, the coefficient of correlation will be

A) +1

B) -1

C) 0

D) none of these



66. A problem in Statistics is given to 5 students A, B, C, D and E. Their chances of solving it are $1/2$, $1/3$, $1/4$, $1/5$ and $1/6$ respectively. What is the probability that the problem will be solved if all of them try independently ?
- A) $1/6$ B) $5/6$ C) $2/3$ D) None of the above.
67. The points of inflection of normal curve are
- A) $\mu \pm \sigma$ B) $\mu \pm 3\sigma$ C) $\mu \pm 2/3\sigma$ D) $\mu \pm 2\sigma$
68. The series $\sum_{n=1}^{\infty} \frac{\log n}{n^p}$ is convergent when
- A) $p > 1$ B) $p < 1$ C) $p > 2$ D) $p = 1$
69. The sequence $\left\{ \frac{n}{n+1} \right\}$ is
- A) Convergent B) Divergent
C) Oscillatory D) May converge or diverge
70. The series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$ is
- A) Divergent B) Convergent
C) Absolutely convergent D) Conditionally convergent
71. The maximum and minimum of $x^5 - 5x^4 + 5x^3 - 1$ respectively are at
- A) $x = 1$ and $x = 2$ B) $x = 1$ and $x = 4$
C) $x = 1$ and $x = 3$ D) $x = 0$ and $x = 1$
72. The function $f(x) = \sin \left(\frac{1}{x} \right)$, for every $x > 0$ defined on \mathbb{R}^+ is
- A) Continuous on \mathbb{R}^+
B) Uniform continuous on \mathbb{R}^+
C) Both continuous as well as uniform continuous on \mathbb{R}^+
D) Continuous but not uniform continuous on \mathbb{R}^+
73. Find the value of $P(X < 1)$, in case the joint density function of X and Y is given by $f(x, y) = \begin{cases} e^{-(x+y)} & x > 0, y > 0 \\ 0 & \text{elsewhere} \end{cases}$
- A) $(1 - e^{-1})^2$ B) $(1 - e^{-1})$ C) $(1 - e)$ D) $(1 - e)^2$



74. The covariance between two variables X and Y is denoted by $\text{Cov}(X, Y)$. Then the value of $\text{Cov}(pX + q, rY + s)$ is given by
- A) $(pr + qs) \text{Cov}(X, Y)$ B) $(pr/qs) \text{Cov}(X, Y)$
C) $pr \cdot \text{Cov}(X, Y)$ D) $(pq/rs) \text{Cov}(X, Y)$
75. What is the expectation of the number of failures preceding the first success in an infinite series of independent trials with constant probability $p (= 1 - q)$ of success in each trial ?
- A) $\frac{1}{p}$ B) $\frac{q}{p}$ C) $\frac{p}{q^2}$ D) $\frac{1}{q}$
76. If X is a χ^2 variate with n d.f. then for a large n, $\sqrt{2X}$ follows
- A) $N(0, 1)$ B) $N(\sqrt{2n}, 1)$ C) $N(\sqrt{2n}, n)$ D) $N(\sqrt{2n}, 2)$
77. The distribution said to lack memory is
- A) Binomial B) Poisson C) Normal D) Geometric
78. If f is continuous on $[a, b]$ then f is
- A) Bounded on $[a, b]$
B) Attains its infimum
C) Attains its supremum
D) Bounded as well as attains its infimum and supremum
79. An Integrating factor of $(xy^2 + 2x^2y^3) dx + (x^2y - x^3y^2)dy = 0$ is
- A) $\frac{1}{3xy^2}$ B) $\frac{1}{3x^2y^2}$ C) $\frac{1}{3x^3y}$ D) $\frac{1}{3x^3y^3}$
80. The general solution of $yp - xp^2 - a = 0$ where $p = \frac{dy}{dx}$ is
- A) $x = cy + a/c$ B) $y = cx + a/c$ C) $y^2 = x^2 + c/a$ D) $y = cx - \frac{a}{c}$
81. For a normal distribution, quartile deviation, mean deviation, standard deviation are in the ratio
- A) 12 : 10 : 15 B) 12 : 15 : 10 C) 10 : 12 : 15 D) 10 : 15 : 12
82. If the regression coefficients are b_1 and b_2 , then the correlation coefficient r is
- A) b_1b_2 B) b_1/b_2 C) b_2/b_1 D) $\pm \sqrt{b_1b_2}$



83. The value c of the Rolle's Theorem for $f(x) = x(x - 2)e^{3x/4}$ on $(0, 2)$ is
A) $2/3$ B) $3/4$ C) $4/3$ D) $1/2$
84. If $X \sim N(\mu, \sigma)$ then \bar{X} follows normal with
A) $N(\mu, \sigma^2/n)$ B) $N(\mu, \sigma^2/\sqrt{n})$
C) $N(\mu/n, \sigma^2/n)$ D) $N(\mu/n, \sigma^2)$
85. The Chi-square and F distributions are used primarily to make inferences about population
A) means B) variances
C) medians D) proportions
86. If A is a square matrix then
A) $A + A^T$ is symmetric and $A - A^T$ is skew symmetric
B) $A + A^T$ and $A - A^T$ are skew symmetric
C) $A + A^T$ and $A - A^T$ are symmetric
D) None of these
87. The general solution of the equation $\frac{dy}{dx} = -\frac{x}{y}$ is
A) $x^2 + y^2 = a^2$ B) $x^2 - y^2 = a^2$
C) $-x^2 + y^2 = a^2$ D) $x + y = a^2$
88. For the sequence $\langle x_n \rangle$, where $x_n = (-1)^n \left(1 + \frac{1}{n}\right)$, $\lim(\text{Inf}) =$
A) $-\infty$ B) -1 C) $+\infty$ D) $+1$
89. A function $f(x)$ has the continuity at $x = a$ if
A) $f(a+) = f(a-) = f(a)$ B) $f(a+) + f(a-) \neq f(a)$
C) $f(a+) \neq f(a)$ D) $f(a-) \neq f(a)$
90. If X has an F distribution with m and n degrees of freedom then $1/X$ has
A) F distribution with n and m degrees of freedom
B) χ^2 distribution with $(mn - 1)$ degree of freedom
C) t distribution with $(m + n - 2)$ degree of freedom
D) None of the above
91. What is the probability that a leap year, selected at random, will contain 54 Sundays?
A) $1/7$ B) $2/7$ C) $3/7$ D) 0



92. The value of k for the probability distribution $dF = ke^{-|x|}dx, -\infty < x < \infty$ is
A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) 2 D) $\frac{1}{2}$
93. Exponential distribution is a particular case of Chi-square distribution for
A) $n = 2$ B) $n = \frac{1}{4}$ C) $n = 1$ D) $n = \frac{1}{2}$
94. Suppose the distribution function of X is given by $F(b) = \begin{cases} 0 & b < 0 \\ 0.5 & 0 \leq b \\ 1 & b \geq 1 \end{cases}$
Then the value of $P[X = 0]$ is
A) 0 B) 0.5 C) 1 D) None
95. A researcher writes the following statement “There will be no significant relationship between value of money to an individual and happiness”. Is this likely to be ?
A) A two-tailed hypothesis B) A null hypothesis
C) An alternate hypothesis D) A one-tailed hypothesis
96. Which of the following risks a Type II error ?
A) Rejecting a null hypothesis that is true
B) Rejecting a null hypothesis that is false
C) Not rejecting a null hypothesis that is true
D) Not rejecting a null hypothesis that is false
97. In a triangle test a tester is presented with three food samples, two of which are alike, and is asked to pick out the odd one by testing. If a tester has no well-developed sense and can pick the odd one only, by chance, what is the probability that in five trials he will make four or more correct decisions ?
A) $11/243$ B) $1/243$ C) $10/243$ D) $233/243$
98. If $X \sim B(6, p)$ and $9P[X = 4] = P[X = 2]$ then the value of p is
A) $1/4$ B) $3/4$ C) $1/2$ D) $1/6$
99. Let X and Y be independent random variables with $X \sim N(0, 1)$ and $Y \sim N(0, 1)$. Then
A) $P(X - Y < 1) < P(X + Y < 1)$ B) $P(X - Y < 1) > P(X + Y < 1)$
C) $P(X - Y < 1) = P(X + Y < 1)$ D) $P(X - Y < 1) = 0.5$
100. If X follows $P(\lambda)$, then the modes of X are
A) $\lambda - 1$ and λ B) $\lambda + 1$ and $\lambda - 1$ C) λ and $\lambda + 1$ D) λ and 2λ
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SPACE FOR ROUGH WORK