



PART – A

1. Arrange the given words in alphabetical order and choose the one that comes last.

- A) Cover B) Collect C) Caught D) Callous

Directions : A foreign expression and four English phrases are given. Identify the meaning of the foreign expression from the choices.

2. per se

- A) By word of mouth B) Gossip
C) By itself D) Spontaneous

Directions : Identify the meaning of underlined word as used in the sentence, from among four alternatives.

3. The presence of hawkers on footpaths hinders both pedestrian and vehicular movement.

- A) buyers B) vendors C) beggars D) rag pickers

Directions : An idiom and four possible meaning are given, identify the meaning of the idiom from among the answer choices.

4. A man of the world

- A) highly trust worthy B) very popular because of success
C) a man of wit or genius D) highly experienced in many fields

Directions : Fill in the blanks in the given sentence to make it logically and grammatically correct.

5. Farmers know that changing winds _____ rain or drought.

- A) bring B) create C) form D) present

Directions : A sentence is written in four different forms. Only one of them is grammatically correct. Choose the correct sentence as your answer.

6.

- A) Each of the participants were given a gift
B) Everyone of the participants were given a gift
C) All of the participants was given a gift
D) Each of the participants was given a gift

Directions : Four alternative substitutes are given for the underline portion. Identify the choice that replace the underline part to form a logical and grammatically correct statement.

7. I am hoping to see you again tomorrow at the party.

- A) I am hoping to see you B) I may have seen you
C) I have been seeing you D) I hope to see you



Directions : A word and four jumbled choices are given. One of the choices, when properly arranged, give the meaning of the word. Identify the correct choice.

8. BUSY

A) EOTRPY

B) URDOO

C) DSTIOINSURU

D) AGLLEN

Directions : From the choices, select the most suitable synonym for the main word.

9. ADEPT

A) devious

B) wily

C) clumsy

D) dexterous

Directions : From the choices, select the most suitable antonym for the main word.

10. ELUCIDATE

A) impart

B) inflame

C) excite

D) baffle

Directions : There is a certain relation between two given words on one side of :: and one word is given on another side of :: while another word is to be found from the given alternatives, having the same relation with this word as the given pair has. Select the best alternative.

11. Acting : Theatre :: Gambling : ?

A) Casino

B) Club

C) Bar

D) Gym

Directions : There is a certain relation between two given numbers on one side of :: and one number is given on another side of :: while another number is to be found from the given alternatives , having the same relation with this number as the given pair has. Select the best alternative.

12. 25 : 125 :: 36 : ?

A) 206

B) 216

C) 226

D) 318

Directions : In the given question, four words have been given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

13.

A) Titan

B) Mercury

C) Earth

D) Jupiter

Directions : In the given question, four numbers are given. Out of these, three are alike in a certain way but the rest one is different. Choose the one which is different from the rest three.

14.

A) 324

B) 244

C) 136

D) 352

Directions : In the given question, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern.

15. 5,9,17,29,45, (.....)

A) 60

B) 65

C) 68

D) 70



26. Which of the following is not correct ?
- A) Research refers to a search for new knowledge
 - B) Research is an art of scientific investigation
 - C) Research is defined as a systematized effort to gain new knowledge
 - D) Research means searching the same fact again and again
27. Which of the following is correct ?
- A) The main aim of a research is to find out the hidden truth
 - B) The foremost objective of a research is to verify the known truth
 - C) The main purpose of a research is to conduct investigations only in scientific areas
 - D) The chief objective of a research is to know more about nonscientific fields
28. Which of the following is not correct as a motivation in research ?
- A) To enhance educational qualifications
 - B) To face the challenges in solving the unsolved problems
 - C) To make more money
 - D) To get intellectual satisfaction
29. Which of the following is not a type of research ?
- A) Descriptive vs. Analytical
 - B) Applied vs. Fundamental
 - C) Explanatory vs. Non-explanatory
 - D) Quantitative vs. Qualitative
30. The quantitative approach to a research includes
- A) Inferential approach
 - B) Experimental approach
 - C) Simulation approach
 - D) A, B, and C
31. Research has its special significance in solving various operational and planning problems of
- A) Business
 - B) Industry
 - C) Agriculture
 - D) A', 'B' and 'C'
32. Research methods and research methodology represent
- A) The same thing
 - B) The two different issues
 - C) The related issues
 - D) None of the above
33. Research methods include
- A) Methods for collecting the required data
 - B) Methods for finding relationship between the data and the unknowns
 - C) Methods for evaluating the accuracy of the results derived
 - D) All of the above



34. Research methodology consists of
- A) Research methods
 - B) Assumptions of research methods
 - C) Relevance of the research methods
 - D) All the above
35. Research process begins with
- A) Formulation of the research problem
 - B) Literature review
 - C) Development of working hypothesis
 - D) Preparing the research design
36. Research process ends at
- A) Data collection
 - B) Data analysis
 - C) Preparation of the report or the thesis
 - D) Hypothesis testing
37. A working hypothesis is defined as
- A) Central point of conclusion
 - B) Tentative assumption about the target population
 - C) Literature review
 - D) None of the above
38. A null hypothesis denotes
- A) The neutral hypothesis
 - B) No hypothesis
 - C) The desired hypothesis
 - D) B or C
39. Research design aims at
- A) Conceptual structure within which research would be carried out
 - B) Formulation of strategy for drawing conclusion
 - C) The data collection stage
 - D) The preparation of report
40. Population means
- A) A group of objects having some common characteristics
 - B) Number of persons living in a place
 - C) Number of only citizens of a country
 - D) Only children of a country
41. A sample represents
- A) A part of a population
 - B) A smaller part that represents a population
 - C) Only a smaller part of a population
 - D) None of the above



42. A sample design is
- A) A definite strategy for selecting a sample from a given population
 - B) Decided after the data collection
 - C) Not important for the data collection
 - D) A or B
43. A sample size is denoted by
- A) N
 - B) n
 - C) α
 - D) β
44. A population size is represented by
- A) n
 - B) μ
 - C) N
 - D) α
45. A sampling method could be based on
- A) Probability
 - B) Without the concept of probability
 - C) Either 'A' or 'B'
 - D) Neither 'A' nor 'B'
46. Simple random sampling is a method of
- A) Probability sampling
 - B) Non-probability sampling
 - C) Both 'A' and 'B'
 - D) Neither 'A' nor 'B'
47. Quota sampling is a method of
- A) Probability sampling
 - B) Non-probability sampling
 - C) Both 'A' and 'B'
 - D) Neither 'A' nor 'B'
48. Usually an experiment is conducted in a laboratory following
- A) Latin square design
 - B) Randomized block design
 - C) Completely randomized design
 - D) None of the above
49. In a survey schedules are used when the replies of the questions are entered by
- A) Investigators
 - B) Respondents
 - C) Both 'A' and 'B'
 - D) Neither 'A' nor 'B'
50. In a survey questionnaires are used when the replies of the questions are entered by
- A) Investigators
 - B) Respondents
 - C) Both 'A' and 'B'
 - D) Neither 'A' nor 'B'



PART – B

51. The odds that the person X speaks the truth are 3 : 2 and the odds that the person Y speaks the truth are 5 : 3. In what percentage of cases are they likely to contradict each other on an identical point ?
A) 47.5% B) 52.5% C) 25% D) 75%
52. Ms. Sunita figures that there is a 30 percent chance that her company will set up a branch office in Delhi. If it does, she is 60 percent certain that she will be made manager of this new operation. What is the probability that Ms.Sunita will be a Delhi branch manager ?
A) 0.82 B) 0.54 C) 0.9 D) 0.18
53. If E and F are independent events such that $P(E \cap F) = 0.16$ and $P(E \cup F) = 0.64$, then the values of $P(E)$ and $P(F)$ are, respectively
A) 0.4 and 0.4 B) 0.2 and 0.8 C) 0.8 and 0.2 D) 0.8 and 0.8
54. Suppose X is a real-valued random variable. Which of the following values cannot be attained by $E(X)$ and $E(X^2)$, respectively ?
A) 1,3 B) 2,4 C) 3,10 D) 3,6
55. Let X be a random variable such that $E(X^2) = E(X) = 1$. Then $E(X^{2017})$ equals to
A) 0 B) 2^{2017} C) $2^{2017} - 1$ D) 1
56. If $P(s)$ is the probability generating function of a random variable X, then the probability generating function of $Y = 2X$ is
A) $P(s)$ B) $P(s^2)$ C) $sP(s)$ D) $P(\sqrt{s})$
57. If $X \sim B(n, p)$, then the distribution of $Y = n - X$ is
A) $B(n, p)$ B) $B(2n, p)$ (C) $B(n, 1 - p)$ D) $B(2n, 1 - p)$
58. If X is a non-degenerate random variable with $E(X) = 2$, which one of the following is always true ?
A) $E(X^2) = 3$ B) $E(X^2) > 4$ C) $E(X^2) < 4$ D) $E(X^2) = 4$
59. The moment generating function of a random variable X is $M_X(t) = \frac{1}{8}(1 + 2e^t + 5e^{2t})$.
The expected value of X is
A) $3/2$ B) $2/3$ C) $1/3$ D) $3/4$
60. If X and Y are independent Poisson random variates, then the conditional distribution of X, given $X + Y$ is
A) Poisson B) Geometric
C) Hypergeometric D) Binomial



61. Let X_1, \dots, X_n be independently and identically distributed (iid) exponential random variables with parameter θ . Then the distribution of $Y = \min \{X_1, \dots, X_n\}$ is
A) Gamma B) Exponential C) Uniform D) Normal
62. If X is a continuous random variable with distribution function F , then the distribution of $Y = F(X)$ is
A) Cauchy B) Exponential C) Uniform D) Normal
63. If X and Y are two independent Poisson random variables, each with parameter equal to 2, then the value of $E(X - Y)^2$ is
A) 2 B) 4 C) 6 D) 8
64. Which of the following distributions has lack of memory property ?
A) Exponential B) Poisson C) Bernoulli D) Binomial
65. Which of the following distributions has linear hazard rate ?
(A) Exponential B) Weibull C) Rayleigh D) Gamma
66. Chebyshev's inequality can be applied to a distribution if it is
A) only Poisson
B) only normal
C) only exponential
D) any distribution for which the mean and variance are defined
67. If X and Y are independently and identically distributed $N(0,1)$ random variables, then $X + Y$ and $cX - Y$ are independent if c equals to
A) 0 B) 1 C) -1 D) 2
68. Which of the following functions $F : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ is not a linear transformation ?
A) $F(x, y) = (x + y, x - y)$ B) $F(x, y) = (x + y, x)$
C) $F(x, y) = (2x - y, x)$ D) $F(x, y) = (x, 1 + y)$
69. The dimension of the vector space of all 3×3 real skew-symmetric matrices is
A) 9 B) 6 C) 3 D) 4
70. If $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$ is an eigenvector of $M = \begin{pmatrix} 1 & -1 \\ -3 & n \end{pmatrix}$, then n is
A) 1 B) -1 C) 0 D) 2
71. Which of the following statements is false about a vector space of dimension n ?
A) Any set of $n + 1$ or more vectors is linearly dependent
B) Any linearly independent set with $n - 1$ elements is also a basis
C) Any linearly independent set is a part of a basis
D) A linearly independent set with n elements is a basis



72. If $M = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$, then M^{2017} is

- A) $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ D) $\begin{pmatrix} 1 & 2017 \\ 0 & 1 \end{pmatrix}$

73. Let M be a real 2×2 matrix. If $-i$ (where $i = \sqrt{-1}$) is an eigen value of M , then the determinant of M is

- A) 1 B) -1 C) 0 D) 2

74. Let M be a 3×3 matrix with eigenvalues 1, -1 , and 0. Then the trace of M^{2017} is

- A) 0 B) -1 C) 1 D) 2

75. Which of the following is a correct statement ?

- A) The set of all integers is countable
B) The set of all real numbers is countable
C) The set of all irrational numbers is countable
D) Every infinite subset of an uncountable set is uncountable

76. The sequence $\{a_n\}$, where $a_n = 1 + (-1)^n$, $n \in \mathbb{N}$

- A) is bounded above by 1 B) has only one limit point
C) is bounded and convergent D) has 0 and 2 as the only limit points

77. The series $\sum_{n=1}^{\infty} \frac{n+1}{n^p}$ is convergent for

- A) $0 < p < 1$ B) $1 < p < 2$ C) $p = 2$ D) $p > 2$

78. Every convergent sequence has

- A) at least one limit point B) at most one limit point
C) unique limit point D) infinitely many limit points

79. If $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = |x| + |x - 1|$, for all $x \in \mathbb{R}$, then

- A) f is not continuous B) f is not differentiable
C) f is continuous but not differentiable D) f is neither continuous nor differentiable

80. The number of limit points of the set $\left\{ \frac{1}{2^m} + \frac{1}{3^n}, m, n \in \mathbb{N} \right\}$ is

- A) infinite B) only two C) only one D) exactly three



81. Which of the following is false about the convergence of sequence of random variables ?
- A) Convergence in probability implies convergence in distribution
 - B) Almost sure convergence implies convergence in probability
 - C) Almost sure convergence implies convergence in distribution
 - D) Convergence in probability implies convergence in almost sure
82. Which of the following statements is true ?
- A) Unbiased estimator always exists
 - B) Unbiased estimator is unique
 - C) Unbiased estimator is consistent
 - D) Biased estimator may be consistent
83. Let $X \sim N(0, \sigma^2)$ and assume that we have one observation. Then an unbiased estimator of σ^2 is
- A) $T(X) = X$
 - B) $T(X) = 2X^2 + 1$
 - C) $T(X) = X^2$
 - D) $T(X) = X^2 - 1$
84. Maximum likelihood estimators
- A) are unique
 - B) always exist
 - C) are unbiased
 - D) exhibit invariance property
85. If a random variable X follows $B(3, p)$, where $0 < p < 1$, then the maximum likelihood estimator of p based on X is
- A) $X/3$
 - B) $1 - X/3$
 - C) $(1 - X)/3$
 - D) $1 - X$
86. If X_1, \dots, X_n be iid Poisson random variates with parameter 1, then as $n \rightarrow \infty$ the value of $\sum_{k=0}^n \frac{e^{-n} n^k}{k!}$ is
- A) $\frac{1}{2}$
 - B) $\frac{1}{3}$
 - C) 1
 - D) 0
87. Let X_1, X_2 , and X_3 be a random sample of size 3 from a population with finite mean μ . What is the value of λ for which $T = \frac{1}{5}(\lambda X_1 + 2X_2 + 2X_3)$ is an unbiased estimator of μ ?
- A) 1
 - B) 1/5
 - C) 1/2
 - D) -1
88. In hypothesis testing, a Type-I error occurs when
- A) The null hypothesis is not rejected when the null hypothesis is true
 - B) The null hypothesis is rejected when the null hypothesis is true
 - C) The null hypothesis is not rejected when the alternative hypothesis is true
 - D) The null hypothesis is rejected when the alternative hypothesis is true



95. The set of all feasible solutions to a linear programming problem (LPP) is

- A) a concave set
- B) a convex set
- C) a bounded set
- D) an infinite set only

96. The optimal solution of the LPP: maximize $Z = x_1 + 2x_2$, such that $x_1 + x_2 \leq 1$, $x_1 - x_2 \geq 1$, $x_1, x_2 \geq 0$, is

- A) unbounded
- B) $x_1 = 1, x_2 = 0$
- C) $x_1 = 0, x_2 = 0$
- D) $x_1 = 0, x_2 = 1$

97. If $X(t)$ is the number of customers in a M/M/1 queue with arrival rate λ and service rate μ , then the average number of customers in the system is

- A) $\frac{1}{\mu - \lambda}$
- B) $\frac{\lambda}{\mu - \lambda}$
- C) $\frac{\lambda}{\mu(\mu - \lambda)}$
- D) $\frac{\lambda^2}{\mu(\mu - \lambda)}$

98. Which of the following is a transition matrix ?

- A) $\begin{pmatrix} 1/2 & 0 \\ 0 & 1/2 \end{pmatrix}$
- B) $\begin{pmatrix} 1/3 & 1/3 \\ 0 & 1 \end{pmatrix}$
- C) $\begin{pmatrix} 1/4 & 3/4 \\ 1/2 & 1/2 \end{pmatrix}$
- D) $\begin{pmatrix} 1/4 & 1/4 \\ 3/4 & 1/4 \end{pmatrix}$

99. Consider a Markov chain with state space $S = \{0, 1\}$ and transition matrix $P = \begin{pmatrix} 1/2 & 1/2 \\ 1/3 & 2/3 \end{pmatrix}$.

Then the stationary distribution of π_0 is

- A) 2/7
- B) 2/5
- C) 2/3
- D) 1/3

100. In a complete randomized design, for three treatments whose effects are $\beta_1, \beta_2 + \beta_3$, which of the following is testable ?

- A) $\beta_1 = 2$
 - B) $\beta_1 + \beta_2 = \beta_3$
 - C) $\frac{\beta_1 + \beta_2}{2} = \beta_3$
 - D) $\beta_1 + \beta_2 + \beta_3 = 0$
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SPACE FOR ROUGH WORK