

10. $E(2x + 3)$ is

a) $E(2x)$

b) $2E(x) + 3$

c) $E(3)$

d) $2x + 3$.

11. A random variable X has $E(X) = 2$ and $E(X^2) = 8$, its standard deviation is

a) 4

b) 6

c) 8

d) 2.

12. Variance of a constant C is.

a) 0

b) 1

c) C

d) C^2 .

13. The moment generating function for the discrete random variable is given by

a) $\sum_{r=0}^{\infty} \frac{t^r}{r!} \mu_r'$

b) $\sum_{r=0}^{\infty} \frac{t^r}{r} \mu_r'$

c) $\sum_{r=0}^{\infty} \frac{t^r}{r} \mu_r$

d) $\sum_{r=0}^{\infty} \frac{t^r}{r!} \mu_r$.

14. A random variable X has the density function $f(x) = Ax^3$, $0 < x < 1$, then the value of A is

a) 4

b) 3

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

d) $\frac{1}{3}$.

15. The trials in a binomial distribution are

a) mutually exclusive

b) non-mutually exclusive

c) independent

d) non-independent.

16. In a binomial distribution if the number of independent trials is n , then the probability of n success is
- a) ${}^n C_x p^x q^{n-x}$ b) 1
- c) p^n d) q^n .
17. The mean of the binomial distribution ${}^{15} C_x \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{15-x}$ in which $p = \frac{2}{3}$ is
- a) 5 b) 10
- c) 15 d) 3.
18. Poisson distribution corresponds to
- a) rare event b) certain event
- c) impossible event d) almost sure event.
19. If the expectation of a Poisson variable (mean) is 1 then $P(X < 1)$ is
- a) e^{-1} b) $1 - 2e^{-1}$
- c) $1 - \frac{5}{2} e^{-1}$ d) none of these.
20. Total area under the normal probability curve is
- a) less than one b) unity
- c) greater than one d) 0.
21. For the normal distribution
- a) mean = median = mode b) mean < median < mode
- c) mean > median > mode d) mean > median < mode.

28. Test statistic for difference between two proportions is

a) $\frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

b) $\frac{p - P}{\sqrt{\frac{PQ}{n}}}$

c) $\frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$

d) $\frac{p_1 - p_2}{\sqrt{\hat{P} \hat{Q} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$

29. Large sample theory is applicable when

a) $n > 30$

b) $n < 30$

c) $n < 100$

d) $n < 1000$

30. The test statistic for testing single mean in large samples when population S.D. σ is not known, is

a) $\frac{\bar{x} - \mu}{S^2 / n}$

b) $\frac{\bar{x} - \mu}{\sigma^2 / n}$

c) $\frac{\bar{x} - \mu}{S / \sqrt{n}}$

d) $\frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

31. Which of the following tests is (are) discussed in large sample tests ?

a) Test of significance for proportion

b) Test of significance for mean

c) Test of significance for difference between two means

d) all of these.

32. t -values lie in between

a) $-\infty$ to ∞

b) $-\infty$ to 0

c) 0 to ∞

d) 0 to 1.

33. The difference of two means in case of small samples is tested by the formula

$$a) \quad t = \frac{\bar{x}_1 - \bar{x}_2}{S}$$

$$b) \quad t = \frac{\bar{x}_1 - \bar{x}_2}{S} \sqrt{\frac{n_1 + n_2}{n_1 - n_2}}$$

$$c) \quad t = \frac{\bar{x}_1 - \bar{x}_2}{S} \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

$$d) \quad t = \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

34. The mean difference between 9 paired observations is 15.0 and the standard deviation of differences is 5.0. The value of statistic t is

$$a) \quad 27$$

$$b) \quad 9$$

$$c) \quad 3$$

$$d) \quad 0.$$

35. The test statistic $F = \frac{S_1^2}{S_2^2}$ is used for testing

$$a) \quad H_0 : \mu_1 = \mu_2$$

$$b) \quad H_0 : \sigma_1^2 = \sigma_2^2$$

$$c) \quad H_0 : \sigma_1 = \sigma_2$$

$$d) \quad H_0 : \sigma^2 = \sigma_0^2$$

36. The Yate's correction are generally made when the number of degrees of freedom is

$$a) \quad 5$$

$$b) \quad < 5$$

$$c) \quad 1$$

$$d) \quad 4.$$

37. The calculated value of χ^2 is

$$a) \quad \text{always positive}$$

$$b) \quad \text{always negative}$$

$$c) \quad \text{can be either positive or negative}$$

$$d) \quad \text{none of these.}$$

45. If for the two attributes A and B , $(AB) = \frac{(A)(B)}{N}$, then the attributes are
- independent
 - positively associated
 - negatively associated
 - no conclusion.
46. In case of two attributes A and B the class frequency $(AB) = 0$ the value of Q is
- 1
 - 1
 - 0
 - $- 1 \leq Q \leq 1$.
47. If $N = 500$, $(A) = 300$, $(B) = 250$ and $(AB) = 40$, the data are
- consistent
 - positively associated
 - negatively associated
 - inconsistent.
48. Which of the following criteria does not apply to decision making under uncertainty ?
- Maximin return
 - Maximax return
 - Minimax return
 - Maximize expected return.
49. Decision theory is concerned with
- the amount of information that is available
 - criteria for measuring the 'goodness' of a decision
 - selecting optimal decisions in sequential problems
 - all of these.
50. Maximin return, maximax return and minimax regret are criteria that
- lead to the same optimal decision
 - cannot be used with probabilities
 - both (a) and (b)
 - none of these.

PART - II

Note : i) Answer any *fifteen* questions.

ii) Each question carries *two* marks.

$15 \times 2 = 30$

51. State the addition theorems on probability.
52. Two dice are thrown. What is the probability of getting the sum 9 ?
53. Define probability density function.
54. Write a short note on MGF.
55. A random variable X has the following probability distribution. Find the expected value of X .

$X = x$	5	2	1
$P(x)$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

56. In a binomial distribution the mean and the standard deviation are 12 and 2 respectively. Find n and p .
57. State any two characteristics of Poisson distribution.
58. Find the area under the normal curve between $Z = -1.5$ and $Z = 2.6$.
59. Define Null hypothesis and alternative hypothesis.
60. Define critical value.
61. In a test if $Z_o \leq Z_e$, what is your conclusion about the Null hypothesis ?
62. Define Student's t -statistic.
63. Write any two applications of t -distribution.

64. Define chi-square variate.
65. Name the different methods of measuring seasonal variation.
66. What is cyclic variation ?
67. Give Yule's co-efficient of association.
68. From the following data, find out the types of association of A and B.
 $N = 800, (A) = 160, (B) = 300, (AB) = 50.$
69. What is pay-off matrix ?
70. Explain the meaning of 'statistical decision theory'.

PART - III

Note : i) Answer any six questions.

ii) Each question carries five marks.

$6 \times 5 = 30$

71. An urn contains 4 black balls and 6 white balls. If 3 balls are drawn at random, find the probability that
- all are black
 - all are white.
72. In a continuous distribution, whose probability density function is given by $f(x) = \frac{3}{4}x(2-x), 0 < x < 2$. Find the expected value of x .
73. The probability of the evening college student will be a graduate is 0.4. Determine the probability that out of 5 students
- none
 - at least one
- will be a graduate.

74. If a random variable X follows Poisson distribution such that $P(X = 1) = P(X = 2)$, find (i) the mean of the distribution and (ii) $P(X = 0)$.
75. In a hospital 480 female and 520 male babies were born in a week. Do these figure confirm the hypothesis that males and females are born in equal number ?
76. The standard deviations calculated from two samples of sizes 9 and 13 are 2 and 1.8 respectively. Should the samples be regarded as drawn from normal populations with the same standard deviation ?
77. Calculate the trend value to the following data by the method of semi-averages :

Year	1995	1996	1997	1998	1999	2000	2001
Expenditure (Rs. in lakhs)	1.5	1.8	2.0	2.3	2.4	2.6	3.0

78. Given $N = 1500$, $(A) = 383$, $(B) = 360$ and $(AB) = 35$. Prepare 2×2 contingency table and compute Yule's coefficient of association and interpret the result.

79. Given the following pay-off of 3 acts : A_1, A_2, A_3 and their events E_1, E_2, E_3 .

States of Nature	Act		
	A_1	A_2	A_3
E_1	35	- 10	- 150
E_2	200	240	200
E_3	550	640	750

The probabilities of the states of nature are respectively 0.3, 0.4 and 0.3. Calculate and tabulate EMV and conclude which of the acts can be chosen as the best.

PART - IV

Note : i) Answer any four questions.

ii) Each question carries ten marks.

$4 \times 10 = 40$

80. Two cards are drawn at random from a pack of 52 cards. Find the probability that the cards drawn are

- i) a diamond and a spade
- ii) a king and a queen
- iii) 2 aces.

81. Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored —

- i) more than 60 marks ?
- ii) less than 56 marks ?
- iii) between 45 and 65 marks ?

82. An examination was given to two classes consisting of 40 and 50 students respectively. In the first class the mean marks were 74 with a standard deviation of 8, while in the second class the mean marks were 78 with a standard deviation of 7. Is there a significant difference between the performance of the two classes at a level of significance of 0.05 ?
83. Ten flower stems are chosen at random from a population and their heights are found to be (in cms) 63, 63, 66, 67, 68, 69, 70, 70, 71 and 71. Discuss whether the mean height of the population is 66 cms.
84. The following figures relate to production in kg of three varieties A, B and C of wheat sown in 12 plots.

A :	20	18	19		
B :	17	16	19	18	
C :	20	21	20	19	18

Is there any significant difference in the production of the three varieties ?

85. Fit a straight line trend by the method of least squares to the following data :

Year :	1996	1997	1998	1999	2000	2001
Profit :	300	700	600	800	900	700

Estimate the profit for the year 2004.

86. A magazine distributor assigns probabilities to the demand for a magazine as follows :

Copies demanded	2	3	4	5
Probability	0.4	0.3	0.2	0.1

A copy of magazine which he sells at Rs. 8 costs Rs. 6. How many should he stock to get maximum possible expected profit, if the distributor can return back unsold copies for Rs. 5 each ?
