

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Subject Code :

2 8

Test Booklet No. : 00294

TEST BOOKLET

STATISTICS

Time Allowed : 2 (Two) Hours

Full Marks : 200

INSTRUCTIONS

1. The name of the Subject, Roll Number as mentioned in the Admission Certificate, Test Booklet No. and Subject Code shall be written legibly and correctly in the space provided on the Answer Sheet with black ball pen.
2. **Space provided for Series in the Answer Sheet is not applicable for Optional Subject. So the space shall be left blank.**
3. All questions carry equal marks. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet.
4. No candidate shall be admitted to the Examination Hall/Room 20 minutes after commencement of distribution of the paper. The Supervisor of the Examination Hall/Room will be the time-keeper and his/her decision in this regard is final.
5. No candidate shall leave the Examination Hall/Room without prior permission of the Supervisor/Invigilator. No candidate shall be permitted to hand over his/her Answer Sheet and leave the Examination Hall/Room before expiry of the full time allotted for each paper.
6. No Mobile Phone, Pager, etc., are allowed to be carried inside the Examination Hall/Room by the candidates. Any Mobile Phone, Pager, etc., found in possession of the candidate inside the Examination Hall/Room, even if on off mode, shall be liable for confiscation.
7. No candidate shall have in his/her possession inside the Examination Hall/Room any book, notebook or loose paper, except his/her Admission Certificate and other connected paper permitted by the Commission.
8. Complete silence must be observed in the Examination Hall/Room. No candidate shall copy from the paper of any other candidate, or permit his/her own paper to be copied, or give, or attempt to give, or obtain, or attempt to obtain irregular assistance of any kind.
9. After you have completed filling in all your responses on the Answer Sheet and the Examination has concluded, you should hand over to the Invigilator *only the Answer Sheet*. You are permitted to take away with you the Test Booklet.
10. Violation of any of the above Rules will render the candidate liable to expulsion from the Examination Hall/Room and disqualification from the Examination, and according to the nature and gravity of his/her offence, he/she may be debarred from future Examinations and Interviews conducted by the Commission for appointment to Government Service.
11. Smoking inside the Examination Hall/Room is strictly prohibited.
12. **This Test Booklet contains one sheet (two pages) for Rough Work at the end.**

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

[No. of Questions : 100]

SEAL

1. Statistical results are

- (A) absolutely correct
- (B) not true
- (C) true on the average
- (D) universally true

2. The approximate value of mode can be obtained from

- (A) ogive
- (B) histogram
- (C) pie diagram
- (D) frequency polygon

3. Which measure of dispersion ensures the highest degree of reliability?

- (A) Range
- (B) Mean deviation
- (C) Quartile deviation
- (D) Standard deviation

4. For a positively skewed distribution

- (A) Mean = Median = Mode
- (B) Mean > Median > Mode
- (C) Mean < Median < Mode
- (D) Mean \neq Mode \neq Median

5. If AM of two numbers is 6.5 and GM is 6, then the numbers are

- (A) 6 and 7
- (B) 9 and 4
- (C) 8 and 5
- (D) 10 and 3

6. A study based on complete enumeration is known as

- (A) sample survey
- (B) pilot survey
- (C) census survey
- (D) simple random sampling

7. Mean deviation is independent of

- (A) change of origin
- (B) change of scale
- (C) both (A) and (B)
- (D) none of origin and scale

8. Correlation coefficient always lies between

- (A) -1 and +1
- (B) 0 and 1
- (C) 5 and 10
- (D) -1 and 0

9. The geometric mean of two regression coefficients is
- coefficient of skewness
 - coefficient of correlation
 - coefficient of kurtosis
 - coefficient of standard deviation
10. The coordinate (\bar{x}, \bar{y}) satisfies the lines of regression of
- y on x
 - x on y
 - both y on x and x on y
 - \bar{x} on \bar{y}
11. If A and B are two mutually exclusive events, then
- $P(AB) = 0$
 - $P(AB) = P(A) \cdot P(B)$
 - $P(AB) = P(A) + P(B)$
 - $P(AB) = P(A) \cdot P\left(\frac{B}{A}\right)$
12. If $P(E) = 1$, then the event E is
- an impossible event
 - a certain event
 - a mutually exclusive event
 - an exhaustive event
13. If two unbiased dice are rolled, then the probability that the sum of numbers on the two dice is 9 is
- $\frac{2}{9}$
 - $\frac{3}{4}$
 - $\frac{1}{9}$
 - $\frac{3}{10}$
14. When a and c are constants, then $V(ax + c)$ is
- $a^2V(x)$
 - $aV(x) + c$
 - $a^2V(x) + c$
 - $a^2V(x) + c^2$
15. If x is a random variable having p.d.f. $f(x)$, then $E(x)$ is called
- arithmetic mean
 - geometric mean
 - harmonic mean
 - first quartile
16. When $p = q$, the binomial distribution will be
- Poisson distribution
 - symmetrical distribution
 - skewed distribution
 - normal distribution

17. For a Poisson distribution
- (A) Mean = $2 \times$ Variance
 - (B) Mean = Standard deviation
 - (C) Mean > Variance
 - (D) Mean = Variance
18. The distribution possessing the memoryless property is
- (A) binomial distribution
 - (B) beta distribution
 - (C) exponential distribution
 - (D) Poisson distribution
19. Gamma distribution is
- (A) positively skewed
 - (B) negatively skewed
 - (C) symmetrical
 - (D) both positively and negatively skewed
20. The sum of two independent gamma variates is
- (A) beta distribution of first kind
 - (B) gamma variate
 - (C) beta distribution of second kind
 - (D) chi-square variate

21. If the population size is N and sample size is n , then the finite population correction is
- (A) $\frac{n}{N}$
 - (B) $1 - \frac{1}{N}$
 - (C) $1 - \frac{n}{N}$
 - (D) $1 - \frac{1}{n}$
22. Simple random sampling is suitable when the population is
- (A) homogeneous
 - (B) heterogeneous
 - (C) finite
 - (D) infinite
23. The number of possible samples of size n from a population of size N with replacement is
- (A) N^n
 - (B) n^N
 - (C) ∞
 - (D) $N!$
24. In case of proportional allocation, the size of the sample from each stratum depends on
- (A) total population size
 - (B) total sample size
 - (C) size of the stratum
 - (D) both population size and sample size

25. If each and every unit of a population has an equal chance of being included in the sample, it is known as

- (A) simple random sampling
- (B) systematic sampling
- (C) purposive sampling
- (D) stratified random sampling

26. Precision of an estimate can be obtained only for

- (A) judgement sample
- (B) random sample
- (C) quota sample
- (D) purposive sample

27. A population consists of N individuals whose mean is μ and variance is σ^2 . A random sample of size n is drawn without replacement. The standard error of sample mean is

- (A) $\frac{\sigma}{\sqrt{n}}$
- (B) $\sqrt{\frac{(N-n) \cdot \sigma^2}{(N-1) \cdot n}}$
- (C) $\frac{\sigma^2}{n}$
- (D) $\frac{\sigma^2}{N-1}$

28. For a stratified random sampling

- (A) $V(\bar{y}_{st})_P \leq V(\bar{y}_{st})_N$
- (B) $V(\bar{y}_{st})_R \leq V(\bar{y}_{st})_N$
- (C) $V(\bar{y}_{st})_P \geq V(\bar{y}_{st})_N$
- (D) $V(\bar{y}_{st})_R \geq V(\bar{y}_{st})_N$

29. For a SRS of size 15 drawn from a population of size 1000, the sample mean is 46.79. Then the estimated population mean is

- (A) 46.79
- (B) 467.9
- (C) 46790
- (D) 467900

30. Systematic sampling means

- (A) selection of n contiguous units
- (B) selection of n units situated at equal distance
- (C) selection of n largest units
- (D) selection of n middle units in a sequence

31. If A is a subset of B , then the probability of $P\left(\frac{A}{B}\right)$ is

- (A) $\frac{P(A)}{P(B)}$
- (B) $\frac{P(B)}{P(A)}$
- (C) $\frac{P(A)}{P(AB)}$
- (D) $\frac{P(AB)}{P(B)}$

32. In distributing 3 balls in 3 cells, the probability that no cells remain empty is

(A) $\frac{1}{9}$

(B) $\frac{2}{9}$

(C) $\frac{1}{3}$

(D) $\frac{1}{27}$

33. In a leap year, the probability of getting 52 Sundays is

(A) $\frac{1}{366}$

(B) $\frac{52}{366}$

(C) $\frac{1}{7}$

(D) $\frac{2}{7}$

34. For two variables X and Y , $V(X - Y)$ is

(A) $V(X) - V(Y)$

(B) $V(X) + V(Y)$

(C) $V(X) - V(Y) - 2\text{cov}(X, Y)$

(D) $V(X) + V(Y) - 2\text{cov}(X, Y)$

35. If X is a random variable, then

(A) $E(X^2) \geq [E(X)]^2$

(B) $E(X^2) \leq [E(X)]^2$

(C) $E(X^2) = [E(X)]^2$

(D) $E[X - E(X)]^2 \leq 1$

36. If X is a random variable, then $E(e^{itX})$ is known as

(A) characteristic function

(B) moment generating function

(C) cumulant generating function

(D) probability generating function

37. If X is a continuous random variable in the interval $(-\infty, \infty)$ with p.d.f. $f(x)$, then

$$\int_{-\infty}^{\infty} f(x) dx$$

is equal to

(A) 0

(B) 1

(C) ∞

(D) $-\infty$

38. If X is a standard normal variate, then $\frac{1}{2}X^2$ is a gamma variate with parameters

(A) $1, \frac{1}{2}$

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

(C) $\frac{1}{2}, \frac{1}{2}$

(D) 1, 1

39. The probability of an event always lies in between
- (A) $-\infty$ to ∞
 (B) 0 to ∞
 (C) 0 to 1
 (D) -1 to 1
40. If X is a normal variate with mean 5 and variance 49, then the standard normal variate Z will be
- (A) $\frac{X-49}{5}$
 (B) $\frac{X-5}{49}$
 (C) $\frac{X-5}{7}$
 (D) $\frac{X-49}{7}$
41. Mailed questionnaire method of enquiry can be used if respondents
- (A) live in village
 (B) have low income
 (C) are known
 (D) are literate
42. For two variables, there can be at most
- (A) one regression line
 (B) two regression lines
 (C) three regression lines
 (D) an infinite number of regression lines
43. If there exists a perfect positive correlation between two variables, then the value of correlation coefficient between two variables will be
- (A) 0
 (B) 1
 (C) ± 1
 (D) ∞
44. If $b_{xy} = -.4$ and $b_{yx} = -.9$, then the correlation coefficient between x and y is
- (A) .36
 (B) .6
 (C) $-.6$
 (D) $-.36$
45. Mean deviation is minimum when deviations are taken from
- (A) mean
 (B) median
 (C) mode
 (D) zero
46. If each observation of a set is multiplied by 10, then the mean of the new set of observations
- (A) remains same
 (B) becomes ten times of the origin mean
 (C) becomes one-tenth of the origin mean
 (D) becomes ten more than the origin mean

47. Measures of association usually deal with

- (A) variables
- (B) numbers
- (C) attributes
- (D) quantitative factors

48. If X is a random variable and r is a positive integer, then $E(X^r)$ represents

- (A) r th raw moment
- (B) r th central moment
- (C) neither raw moment nor central moment
- (D) r th factorial moment

49. Sum of deviations of a variable from its mean is

- (A) minimum
- (B) maximum
- (C) zero
- (D) one

50. Coefficient of variation is defined as

- (A) $\left(\frac{\bar{x}}{\sigma_x}\right) \times 100$
- (B) $\left(\frac{\sigma_x}{\bar{x}}\right) \times 100$
- (C) $\frac{\bar{x}}{\sigma_x}$
- (D) $\frac{\sigma_x}{\bar{x}}$

51. The theory of AOV was introduced by

- (A) R. A. Fisher
- (B) Yates
- (C) Liapounoff
- (D) Kolmogorov

52. For AOV, one can use

- (A) F -test
- (B) t -test
- (C) χ^2 -test of goodness of fit
- (D) sign test

53. In LSD, local control is applied in

- (A) one-way direction
- (B) two-way direction
- (C) three-way direction
- (D) multi-way direction

54. In a $t \times r$ RBD with one missing observation, the error degrees of freedom will be

- (A) $tr - t - r + 1$
- (B) $tr - t - r$
- (C) $tr - t - r - 1$
- (D) $tr - t - r - 2$

55. The number of basic principles of design of experiment is

- (A) 5
- (B) 2
- (C) 1
- (D) 3

56. A completely randomized design is also known as

- (A) unsystematic design
- (B) non-restricted design
- (C) single-block design
- (D) double-block design

57. The missing value of an experiment is estimated by the method of

- (A) minimizing the error mean square
- (B) analysis of variance
- (C) analysis of covariance
- (D) maximizing the error mean square

58. In a 2^3 -factorial experiment, the number of interaction effects is

- (A) 5
- (B) 6
- (C) 4
- (D) 3

59. The method of confounding is a device to reduce the size of

- (A) experiments
- (B) replications
- (C) blocks
- (D) treatments

60. In a 2^3 -factorial experiment with the factors A, B and C, the main effect C is defined as

- (A) $\frac{1}{4}(a+1)(b+1)(c-1)$
- (B) $\frac{1}{4}(a-1)(b-1)(c+1)$
- (C) $\frac{1}{8}(a+1)(b+1)(c-1)$
- (D) $\frac{1}{8}(a-1)(b-1)(c+1)$

61. Moving average method is used to determine

- (A) irregular variation
- (B) cyclical variation
- (C) trend
- (D) seasonal variation

62. Irregular variation in a time series is due to

- (A) lockouts and strikes
- (B) epidemics
- (C) flood
- (D) All of the above

63. In which component of time series 'an era of prosperity' would be associated?
- (A) Secular
(B) Seasonal
(C) Cyclical
(D) Irregular
64. The best method for finding out seasonal variation is
- (A) simple average method
(B) ratio to moving average method
(C) ratio to trend method
(D) link relative method
65. The number of components in time series data is
- (A) 3
(B) 4
(C) 5
(D) 6
66. Index number is a
- (A) measure of relative change
(B) special type of average
(C) percentage relative
(D) All of the above
67. If Laspeyres' price index is 324 and Paasche's price index is 144, then Fisher's ideal index number is
- (A) 234
(B) 180
(C) 216
(D) 298
68. Laspeyres' index formula uses the weights of
- (A) base year
(B) current year
(C) arithmetic mean of base year and current year
(D) geometric mean of base year and current year
69. Fisher's ideal formula does not satisfy
- (A) time reversal test
(B) factor reversal test
(C) circular test
(D) unit test
70. For consumer price index numbers, price quotations are collected from
- (A) retailers
(B) wholesalers
(C) fair price shops
(D) government depots

71. Vital rates are generally expressed as

- (A) percentage
- (B) per million
- (C) per thousand
- (D) per lakh

72. For comparing the overall death rates of two regions, generally one can use

- (A) crude death rate
- (B) specific death rate
- (C) standardized death rate
- (D) age-specific death rate

73. In India, the collection of vital statistics started for the first time in

- (A) 1840
- (B) 1948
- (C) 1886
- (D) 1951

74. Population growth is mainly concerned with

- (A) number of births
- (B) number of male births
- (C) number of female births
- (D) number of female population

75. The value of $NRR < 1$ indicates

- (A) increase in population
- (B) reduction in population
- (C) constancy in population
- (D) stable population

76. A population has a constant size and constant age-sex composition over time. Then the population may be considered as

- (A) primary population
- (B) stable population
- (C) stationary population
- (D) secondary population

77. Given,

The total fertility rate =
2251 per thousand

The No. of male births = 105

The No. of female births = 100

The gross reproduction rate is

- (A) 1.567
- (B) 1.098
- (C) 0.567
- (D) - 1.095

78. A psychological scale is

- (A) an interval scale
- (B) a ratio scale
- (C) a metric scale
- (D) a probability scale

79. The mean and standard deviation of a set of σ -scores are respectively
- (A) 1 and 0
 - (B) 0 and 1
 - (C) 100 and 50
 - (D) 50 and 10
80. If the normalized standard scores are converted into a distribution with mean 50 and standard deviation 10, we get
- (A) percentile scores
 - (B) Z-scores
 - (C) T-scores
 - (D) stanine scores
81. The maximum likelihood estimators are necessarily
- (A) unbiased
 - (B) sufficient
 - (C) consistent
 - (D) most efficient
82. The minimum chi-square estimates are not necessarily
- (A) efficient
 - (B) consistent
 - (C) unbiased
 - (D) unique
83. Size of the critical region is known as
- (A) power of the test
 - (B) size of the type II error
 - (C) critical value of the test statistics
 - (D) size of the test
84. Ordinary sign test utilizes
- (A) normal distribution
 - (B) binomial distribution
 - (C) Poisson distribution
 - (D) exponential distribution
85. Least squares estimators of the parameters of a linear model are
- (A) unbiased
 - (B) BLUE
 - (C) UMVU
 - (D) biased
86. Consistent estimators are not necessarily
- (A) unbiased
 - (B) sufficient
 - (C) efficient
 - (D) unique

87. If t is a consistent estimator of θ , then
- t is also a consistent estimator of θ^2
 - t^2 is a consistent estimator of θ
 - t^2 is a consistent estimator of θ^2
 - t^2 is a consistent estimator of θ^3
88. The concepts of efficiency, consistency and sufficiency are due to
- R. A. Fisher
 - C. R. Rao
 - J. Neyman
 - Yates
89. The power $(1 - \beta)$ is a function of
- null hypothesis
 - alternative hypothesis
 - type I error
 - type II error
90. Sufficient estimator is a function of
- maximum likelihood estimator
 - consistent estimator
 - least squares estimator
 - minimum likelihood estimator
91. Run test is a test of
- randomness
 - correlation test
 - regression test
 - Z-test
92. Kolmogorov-Smirnov test is a
- left-sided test
 - right-sided test
 - two-sided test
 - All of the above
93. Errors in a statistical model are always
- independent
 - distributed $N(0, \sigma_e^2)$
 - both (A) and (B)
 - dependent
94. The type of estimates is
- point estimate
 - interval estimate
 - estimation of confidence region
 - All of the above

95. If T is an unbiased estimator of θ , then T^2 is
- (A) an unbiased estimator of θ^2
 - (B) a biased estimator of θ^2
 - (C) a consistent estimator of θ^2
 - (D) an unbiased estimator of θ^3
96. Estimate and Estimator are
- (A) synonyms
 - (B) different
 - (C) related to finite population
 - (D) related to infinite population
97. The estimator $\sum X/n$ of the population mean is
- (A) an unbiased estimator
 - (B) a consistent estimator
 - (C) both (A) and (B)
 - (D) a biased estimator
98. The minimum chi-square estimators are
- (A) consistent
 - (B) asymptotically normal
 - (C) efficient
 - (D) All of the above
99. The error committed by rejecting a true hypothesis is called
- (A) type I error
 - (B) type II error
 - (C) standard error
 - (D) type III error
100. Neyman-Pearson lemma provides
- (A) an unbiased test
 - (B) an admissible test
 - (C) an optimum test
 - (D) a most powerful test