

COMMON P. G. ENTRANCE TEST – 2020

Test Booklet No. :

**DEPT. OF HIGHER EDUCATION, GOVT. OF ODISHA
TEST BOOKLET**

Subject Code **44**

Subject **STATISTICS**

Time Allowed : **90 Minutes**

Full Marks : **70**

: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. You have to enter your **Hall Ticket No.** on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
3. YOU ARE REQUIRED TO FILL UP & DARKEN HALL TICKET NO. & TEST BOOKLET NO. IN THE ANSWER SHEET AS WELL AS FILL UP TEST BOOKLET SERIAL NO. & ANSWER SHEET SERIAL NO. IN THE ATTENDANCE SHEET CAREFULLY. WRONGLY FILLED UP ANSWER SHEETS ARE LIABLE FOR REJECTION AT THE RISK OF THE CANDIDATE.
4. This Test Booklet contains 70 items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question).
5. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
6. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. **There is no negative marking.**
7. **After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the Answer Sheet issued to you. You are allowed to take with you the candidate's copy / second page of the Answer Sheet along with the Test Booklet, after completion of the examination, for your reference.**
8. Sheets for rough work are appended in the Test Booklet at the end.

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

1. If X and Y are independent gamma variated with parameters μ_1 and μ_2 respectively, then the variable $Z = \frac{X}{X+Y}$ is a :
- (A) $\beta_1(\mu_1, \mu_2)$ variate (B) $\gamma(\mu_1 + \mu_2)$ variate
 (C) $\beta_1(0, \mu_1 + \mu_2)$ variate (D) None of these
2. For a normal distribution, quartile deviation, M. D. and S. D. are in the ratio :
- (A) $\frac{4}{5} : \frac{2}{3} : 1$
 (B) $\frac{2}{3} : \frac{4}{5} : 1$
 (C) $1 : \frac{4}{5} : \frac{2}{3}$
 (D) $\frac{2}{3} : 1 : \frac{4}{5}$
3. The formula $(x_1, x_2, \dots, x_n)^{1/n}$ is related to the following measure of central tendency :
- (A) Arithmetic mean
 (B) Geometric mean
 (C) Harmonic mean
 (D) Median
4. The point of intersection of the less than and the greater than ogive corresponds to :
- (A) The median
 (B) The mean
 (C) The geometric mean
 (D) None of these
5. For a Symmetric distribution :
- (A) $y_2 > 0$
 (B) $y_2 < 0$
 (C) $y_2 = 0$
 (D) None of these

6. When the correlation coefficient $r = \pm 1$, then the regression lines ?
- (A) Are perpendicular to each other
 (B) Coincide
 (C) Are parallel to each other
 (D) Do not exist
7. If $r > 0$, then as X increases :
- (A) Y also increases (B) Y decreases
 (C) No change in Y (D) None of these
8. If $N = 50$, $(A) = 35$, $(B) = 25$, $(AB) = 15$, then the attributes A and B are said to be :
- (A) Correlated (B) Independent
 (C) -vely associated (D) +vely associated
9. Attributes A and B are said to be independent if :
- (A) $(AB) > \frac{(A) \times (B)}{N}$
 (B) $(AB) = \frac{(A) \times (B)}{N}$
 (C) $(AB) < \frac{(A) \times (B)}{N}$
 (D) None of these
10. A coin is tossed three times in succession, the number of sample points in sample space is :
- (A) 6 (B) 3
 (C) 8 (D) None of these
11. In the simultaneous tossing of two perfect dice, the probability of obtaining 4 as the sum of the resultant faces is :
- (A) $\frac{1}{3}$ (B) $\frac{1}{12}$
 (C) $\frac{1}{4}$ (D) $\frac{1}{6}$

12. A continuous random variable X follows the probability law $f(x) = Ax^2$, $0 \leq x \leq 1$, then the value of A will be :
- (A) 0.2
 (B) 0.25
 (C) 0.3
 (D) None of these
13. The m. g. f. of the Binomial distribution is :
- (A) $(q + pe^t)$ (B) $(q + pe^t)^n$
 (C) $(qe^t + p)$ (D) $(qe^t + p)^n$
14. Let x_1, x_2, \dots, x_n be a random sample from a $\mu(\mu, \sigma^2)$ population, then 99% confidence limits for μ (when σ^2 is known) are :
- (A) $\bar{x} \pm 2.58 \frac{\sigma}{\sqrt{n}}$ (B) $\bar{x} \pm 2.58 \sigma \sqrt{n}$
 (C) $\bar{x} \pm 2.58 \frac{\sqrt{n}}{\sigma}$ (D) None of these
15. The probability of accepting H_0 when H_0 is false is :
- (A) Power of the test
 (B) Type I error
 (C) Type II error
 (D) None of these
16. The mean of a χ^2 distribution with n d.f. is :
- (A) $2n$ (B) n^2
 (C) n (D) \sqrt{n}
17. If X and t distribution, then X^2 has :
- (A) t distribution
 (B) F distribution
 (C) y^2 distribution
 (D) None of these

18. The total variation in any set of numerical data is due to :
- (A) Assignable causes
 - (B) Chance causes
 - (C) Both (A) and (B)
 - (D) None of these
19. For the validity of F-test in ANOVA, the assumption that the observations are independent is :
- (A) Always true
 - (B) Sometimes true
 - (C) Never true
 - (D) None of these
20. Which of the following series represent a ratio scale ?
- (A) 1, 2, 3, 5, 8 etc.
 - (B) 1, 2, 4, 8, 15, 30 etc.
 - (C) 1, 2, 3, 5, 9, 15 etc.
 - (D) 1, 2, 4, 8, 16, 32, 64 etc.
21. A bag contains 5 white and 3 black balls. Two balls are drawn at random one after the other without replacement. The probability that both the balls drawn are black :
- (A) $\frac{3}{28}$
 - (B) $\frac{3}{8}$
 - (C) $\frac{2}{7}$
 - (D) None of these
22. 'A' speaks truth in 60 percent cases and 'B' in 70 percent cases. The percentage of cases in which they contradict each other in stating the same fact is :
- (A) $\frac{14}{50}$
 - (B) $\frac{9}{50}$
 - (C) $\frac{23}{50}$
 - (D) None of these

23. The following test is used to test the significance of correlation coefficient :
- (A) χ^2 test (B) t test
(C) F test (D) Z test
24. In the least square linear trend equation $y_t = a + bx$, if b is positive it indicates :
- (A) Declining trend
(B) Rising trend
(C) No trend at all
(D) All of these
25. The most important factors causing seasonal variations are :
- (A) Growth of population
(B) Technological improvements
(C) Whether and social customs
(D) Change in fashions
26. Laspeyres Index is based on :
- (A) Base year quantities (B) Current year quantities
(C) Both (A) and (B) (D) None of these
27. Time reversal test is satisfied when :
- (A) $P_{01} \times P_{10} = 0$
(B) $P_{01} \times P_{10} = 1$
(C) $P_{01} \times P_{10} < 1$
(D) $P_{01} \times P_{10} > 1$
28. The Gross Reproduction rate is more than 1, it indicates :
- (A) Population would increase
(B) Population would decrease
(C) Neither increase nor decrease
(D) None of these

29. For comparing the health conditions of two towns we have to calculate :
- (A) Crude death rate (B) Crude birth rate
(C) Standard birth rate (D) Standardized death rate
30. The Lower Control Limit for C-chart is given by :
- (A) $\bar{C} + \sqrt{\bar{C}}$ (B) $\bar{C} - \sqrt{3\bar{C}}$
(C) $\bar{C} + \sqrt{3\bar{C}}$ (D) None of these
31. The relationship among A. M., G. M. and H. M. is :
- (A) A. M. \geq G. M. \geq H. M. (B) A. M. \leq G. M. \leq H. M.
(C) A. M. \leq H. M. \leq G. M. (D) A. M. \geq H. M. \geq G. M.
32. If the correlation coefficient between the variable X and Y is zero, then the correlation coefficient between X^2 and Y^2 is :
- (A) Greater than 1
(B) Less than zero
(C) Zero
(D) None of these
33. When there is a perfect positive association between two attributes Q would be :
- (A) Zero (B) - 1
(C) + 1 (D) None of these
34. If the m. g. f. is $M(t) = \frac{1}{3}e^{-t}(e^{-t} - \frac{2}{3})^{-1}$, then the distribution is :
- (A) Geometric with $p = \frac{1}{3}$
(B) Geometric with $p = \frac{2}{3}$
(C) Binomial with $n = 3, p = \frac{1}{3}$
(D) Binomial with $n = 3, p = \frac{2}{3}$

35. Let the random variable X has possible values 1, 2, 3 and $P(X = j) = \frac{1}{2^j}$, $j = 1, 2$. Then

$P(X = \text{even})$ is :

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$
(C) $\frac{1}{4}$ (D) $\frac{3}{4}$

36. The characteristic function of Cauchy distribution is :

- (A) e^{-t} (B) $e^{-|t|}$
(C) e^t (D) $e^{|t|}$

37. Using the CLT, value of $\left(\lim_{n \rightarrow \infty} e^{-n} \sum_{k=0}^n \frac{n^k}{k!} \right)$ is :

- (A) 1 (B) $\frac{1}{2}$
(C) 2 (D) None of these

38. The power of a BCR for testing a simple hypothesis against a simple alternative is :

- (A) Less than its size (B) Equal to its size
(C) Never less than its size (D) None of these

39. The range of χ^2 variate is :

- (A) $-\infty$ to $+\infty$
(B) $-\infty$ to 0
(C) 0 to 1
(D) -0 to ∞

40. The systematic sampling would be more efficient as compared with srswor if :

- (A) $\rho < -\frac{1}{(nk-1)}$ (B) $\rho > -\frac{1}{(nk-1)}$
(C) $\rho = -\frac{1}{(nk-1)}$ (D) $\rho < -\left(\frac{1}{n-1}\right)$

41. The bias in the case of a ratio estimate :
- (A) Decreases as the sample size increases
 - (B) Increases as the sample size increases
 - (C) Constant as the sample size increases
 - (D) None of these
42. In the case of post-stratification, the number of strata is normally :
- (A) Decreased
 - (B) Increased
 - (C) Kept constant
 - (D) None of these
43. If T is a consistent estimator of a parameter θ , then a constant estimate of $a\theta + b$ where a and b are constants is :
- (A) aT
 - (B) $T + b$
 - (C) $aT + b$
 - (D) None of these
44. In a random sample from a distribution with p. d. f. $f(x, \theta) = \theta e^{-\theta x}$, $x \geq 0$, then m.l.e. for θ is :
- (A) \bar{x}
 - (B) $\sum x_i$
 - (C) $\frac{1}{\bar{x}}$
 - (D) None of these
45. Every UMP critical region is necessarily unbiased. The statement is :
- (A) Always true
 - (B) Sometimes true
 - (C) Never true
 - (D) None of these
46. In a Markov transition matrix, the sum of the elements in each row is equal to :
- (A) 0
 - (B) $\frac{1}{2}$
 - (C) 1
 - (D) None of these

47. If $P(s)$ is the probability generating function of a r. u. X , then probability generating function of the r.u. $(X + 1)$ is :
- (A) $S^2P(S)$ (B) $P(S)$
 (C) $SP(S)$ (D) $P(S)^2$
48. The interval between the successive occurrences of a Poisson process $\{N(t)\}$ having parameter λ has a negative exponential distribution with mean :
- (A) $\frac{1}{\lambda}$ (B) λ
 (C) λ^2 (D) None of these
49. If $X \sim N(\mu, \bar{Z})$ then $Y = cX$ for C non-singular is distributed according to :
- (A) $N(\mu, CC')$
 (B) $N(\mu, C\Sigma C')$
 (C) $N(C\mu, C\Sigma C')$
 (D) None of these
50. In deriving the bivariate normal distribution the assumption that the regression of Y and X is non-linear is :
- (A) Always true (B) Sometimes true
 (C) Never true (D) None of these
51. To test the randomness of a given by set of observations the appropriate test is :
- (A) Sign test (B) Run test
 (C) U test (D) Median test
52. SQC helps in detecting :
- (A) Chance variation (B) Assignable variation
 (C) Both chance and assignable variation (D) None of these
53. While preparing control charts we generally have :
- (A) 2σ limits (B) 2.58σ limits
 (C) 3σ limits (D) None of these

54. In double sampling plan, if the number of defects is in between C_1 and C_2 :

- (A) Accept the lot (B) Reject the lot
(C) Take another example (D) None of these

55. In the case of a BIBD, the following parametric relation is true :

- (A) $vr = bk$
(B) $vb = rk$
(C) $vk = rb$
(D) None of these

Where v = no. of treatments

r = no. of replications

b = no. of blocks

k = block size

56. The total number of factorial effects in 2^n experiments is :

- (A) 2^n (B) $2^n - 1$
(C) $2^n + 1$ (D) 2^{n-1}

57. The efficiency of a RBD, relative to the CRD for the same experiment is always :

- (A) Greater than one
(B) Less than one
(C) Greater than equal to one
(D) None of these

58. The series $\left(\sum_{n=2}^{\infty} \frac{1}{n(\log n)^d} \right)$ converges if :

- (A) $\alpha < 1$ (B) $\alpha > 1$
(C) $\alpha = 1$ (D) None of these

59. The differential co-efficient of $\sin^{-1} \frac{2x}{1+x^2}$ is :

- (A) $\frac{1}{1+x^2}$ (B) $\frac{2}{1+x^2}$
(C) $\frac{2x+1}{1+x^2}$ (D) None of these

60. The value of the integral $\int_0^2 (2x + 3x^2) dx$ is :

(A) 12

(B) 10

(C) 24

(D) None of these

61. The general solution for the differential equation $p^2 - 7p + 10 = 0$ is

(A) $(y - c)(y - 5x - c) = 0$

(B) $(y - 2x - c)(y - 5x - c) = 0$

(C) $(y - 2x - c)(y - 5x) = 0$

(D) None of these

62. If λ is a characteristic root of a non-singular matrix A, then a characteristic root of A^{-1} is :

(A) $\frac{1}{\lambda^2}$

(B) λ^{-1}

(C) λ^2

(D) None of these

63. The vectors (1, 2, 3) and (2, -2, 0) are :

(A) Linearly dependent

(B) Linearly independent

(C) May be linearly dependent and linearly independent

(D) None of these

64. The determinant of the matrix of a positive definite form is :

(A) Zero

(B) Negative

(C) Positive

(D) None of these

65. The value of $\left(\lim_{x \rightarrow \infty} x \cdot \sin \frac{1}{x} \right)$ is :

(A) 1

(B) 0

(C) ∞

(D) None of these

66. The radius of convergence of the series $\sum \frac{x^n}{2^n + 1}$ is :
- (A) 2
 (B) 1/2
 (C) e
 (D) 1/e
67. Which standard library function will you use to find the last occurrence of a character in a string in C ?
- (A) Strnchar ()
 (B) Strchar ()
 (C) Strrchar ()
 (D) Strrchr ()
68. A do-while loop is useful when we want that the statements within the loop must be executed ?
- (A) Only once
 (B) At least once
 (C) More than once
 (D) None of these
69. If the regression coefficients are b_1 and b_2 , then the correlation coefficient r is :
- (A) b_1/b_2
 (B) b_2/b_1
 (C) $b_1 b_2$
 (D) $\pm \sqrt{b_1 b_2}$
70. In ANOVA, the C. F. is defined as :
- (A) $\frac{G^2}{N}$
 (B) $\frac{G}{N}$
 (C) $\frac{G}{N^2}$
 (D) None of these

Where G is the grand total of all the observed values and N is the total number of observations.



SPACE FOR ROUGH WORK