

STATISTICS OLYMPIAD -2023

Organized by

**P.G. Department of Statistics, Utkal University
& Utkal Statistics Alumni Association (USAA)**

134

Name of the Candidate (In Block Letters):

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Entrance Roll No. :

Date of Examination: 05.11.2023

Signature of the Invigilator

FULL MARKS -100

TIME: 90 MINUTES

IMPORTANT INSTRUCTIONS

(This booklet contains five pages and 50 questions.)

1. Check the question booklet for any kind of error. If error is found, then report it to the invigilator within five minutes of distribution of booklet and ask for a new booklet. No such claim will be entertained after commencement of the examination.
2. The booklet contains 50 MCQ's and each question has four choices A, B, C and D.
3. The correct answers should be marked by rounding the correct alternative in the appropriate space provided for the same. For example, if option (C) is the correct answer, then the candidate should mark as follows.

(A) Option A (B) Option B **(C) Option C** (D) Option D
4. Any other kind of marking the answers will not be awarded any mark.
5. No additional paper will be given.
6. There is no negative marking.

Total Marks secured

In figures

In words

Signature of the Scrutinizer

Signature of the Examiner



1. Who was the Indian-American Mathematician and Statistician conferred on the U.S. National medal of Science in 2002 by the then U.S. President?
 (A) V.S. Huzurbazar (B) S.S. Shrikhande
 (C) P.C. Mahalanobis (D) C.R. Rao
2. The difference between schedule and questionnaire is
 (A) Nil (B) Questionnaires are sent through enumerators
 (C) Schedules are sent through enumerators (D) Answers to the questions in the schedule are filled in by the respondent himself.
3. In a statistical table, the heading of a row is called
 (A) Caption *column* (B) Stub
 (C) Title (D) Body
4. In a two-dimensional diagram
 (A) only height is considered (B) Height, width and thickness are considered
 (C) both height and width are considered (D) only width is considered
5. The ogives constructed by the "less than" type and the "more than" type distribution intersect at
 (A) Origin (B) Median
 (C) Mean (D) Mode
6. For a negatively skewed distribution
 (A) $Mean \leq Median \leq Mode$ (B) $Mean > Median > Mode$
 (C) $Mode > Median > Mean$ (D) Nothing can be said exactly
7. For a moderately asymmetric distribution having values of mean and median 6 and 10 respectively, the value of mode is equal to
 (A) 2 (B) 38
 (C) 42 (D) None of these
8. The sum of the squares of the deviations of a set of values is minimum when taken about
 (A) Mode (B) Median
 (C) G.M. (D) Mean

9. In a class of 50 students of statistics, 10 have failed and their average mark is 15. The total marks secured by the entire class was 1950. The average mark of those who passed is
 (A) 40 (B) 45
 (C) 39 (D) None of these
10. In a series of 25 values, each value is divided by 5, then the C.V. is decreased by
 (A) $\sqrt{5}\%$ (B) 5%
 (C) 0% (D) 3%
11. The S.D. of a distribution is 5. The value of the fourth central moment, in order that the distribution be mesokurtic should be
 (A) Equal to 3 (B) Greater than 1875
 (C) Equal to 1875 (D) Equal to Zero
12. In a perfectly symmetrical distribution, 50% of the items are above 60 and 75% of the items are below 75. Therefore, the coefficient of Q.D. is
 (A) 0.25 (B) 0.75
 (C) 0.5 (D) Zero
13. The first four moments of a distribution about $x = 4$ are 1, 4, 10 and 45. Then the fourth central moment is
 (A) 25 (B) 26
 (C) 0 (D) None of these
14. A car travels 100kms at a speed of 40 kms per hour and another 400 kms at a speed of 50 kms per hour. So the average speed for the entire journey is
 (A) 45 kms/hr (B) 44.72 kms/hr
 (C) 47.62 kms/hr (D) 44.44 kms/hr
15. The population of a country has increased by 10% in the first year and 20% in the second year. The average rate of increase in the population over the two years is
 (A) 15 % (B) 14.14 %
 (C) 14.89 % (D) None of these
16. The number of integers between 10 and 100(both inclusive) consisting of distinct odd digits is
 (A) 20 (B) 45
 (C) 14 (D) None of these
17. A man has 8 children. The number of ways in which he can go to see a movie taking with him none, one or more of them is
 (A) 255 (B) 256
 (C) 127 (D) None of these

18. In how many ways can 3 packets of different cash value be distributed among 10 students, each student being given only one packet is
 (A) 120 (B) 360
 (C) 1000 (D) 720
19. From 5 consonants and 3 vowels, how many different words can be formed each consisting of 2 consonants and 2 vowels
 (A) 30 (B) 120
 (C) 480 (D) 720
20. Find the coefficient of the middle term in the expansion of $(1 - \frac{2}{5}x)^8$.
 (A) $\frac{224}{125}$ (B) $\frac{480}{125}$
 (C) $\frac{240}{125}$ (D) $\frac{1120}{125}$
21. Find the incorrect statement from undermentioned data
 (A) $C(n,0) + C(n,1) + \dots + C(n,n) = 2^n$ (B) $C(n,r) = C(n,n-r)$
 (C) The total number of combinations of 'n' different objects taking some or all at a time is 2^{n-1} (D) $C(n+1, r) = C(n, r) + C(n-1, r-1)$
22. The sum of the infinite series $1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots$ is
 (A) $\frac{e^2+1}{2e}$ (B) $\frac{(e+1)^2}{2e}$
 (C) $\frac{(1-e)^2}{2e}$ (D) None of these
23. A number is chosen at random among the first 120 natural numbers. The probability of the number chosen being a multiple of 5 or 15 is
 (A) $\frac{1}{5}$ (B) $\frac{1}{8}$
 (C) $\frac{1}{16}$ (D) $\frac{1}{9}$
24. What is the probability that a bridge hand contains one card of each denominations (i.e. one ace, one king, one queen....., one three, one two)?
 (A) $\frac{13!}{13^{13}}$ (B) $\frac{C(52,4)}{C(52,13)}$
 (C) $\frac{4^{13}}{C(52,13)}$ (D) $\frac{13^4}{C(52,13)}$

25. The odd against a certain event is 5 to 2 and odds in favour of another independent event is 6 to 5. What is the chance that at least one of the event will happen?
 (A) $52/77$ (B) $64/77$
 (C) $12/77$ (D) None of these
26. A group of 'n' students sit at random table. Find the odds against two specified students sitting next to each other.
 (A) $2 / (n-1)$ (B) $(n-3) : 2$
 (C) $1 / (n-1)$ (D) $(n-2) : 1$
27. Three numbers are randomly selected from the set of first 14 positive integers without replacement. The probability that at least one of them will exceed 8 is
 (A) $3/7$ (B) $11/13$
 (C) $5/7$ (D) $6/7$
28. Two cards are drawn at random from a full pack of 52 cards. The probability that both are of spade is
 (A) $\frac{2}{52}$ (B) $\frac{2}{13}$
 (C) $\frac{1}{17}$ (D) $\frac{4}{13}$
29. In the simultaneous tossing of two perfect dice, the probability that the sum of numbers on the resultant face 4, is
 (A) $4/36$ (B) $5/36$
 (C) $6/36$ (D) $3/36$
30. If A and B are independent events, then
 (A) Only A and $\bar{B}$ are independent (B) Only $\bar{A}$ and B are independent
 (C) Only $\bar{A}$ and $\bar{B}$ are independent (D) All the three statements are correct
31. An unbiased die is thrown twice. Given that the first throw resulted in an even number, the probability that the sum obtained 8, is
 (A) $5/36$ (B) $12/36$
 (C) $1/6$ (D) $7/36$
32. Three unbiased dice are thrown simultaneously. The mathematical expectations of the product of the number of points on them is
 (A) $\frac{7}{2}$ (B) $(\frac{1}{2})^3$
 (C) $21/2$ (D) $\frac{(7/2)}{3}$

33. If X and Y be any two random variables and a & b are two constants, then

- (A) $\text{Var}(aX \pm bY) = a^2 \text{Var}(X) \pm b^2 \text{Var}(Y)$ (B) $\text{Var}(aX \pm bY) = a^2 \text{Var}(X) + b^2 \text{Var}(Y)$
 (C) $\text{Var}(aX \pm bY) =$ (D) $\text{Var}(aX \pm bY) =$
 $a^2 \text{Var}(X) + b^2 \text{Var}(Y) - 2ab \text{Cov}(X, Y)$ $a^2 \text{Var}(X) + b^2 \text{Var}(Y) \pm 2ab \text{Cov}(X, Y)$

34. If X and Y be any two random variables, then

- (A) $\text{Cov}\left(\frac{3X+5}{4}, \frac{2Y-7}{3}\right) = \frac{1}{12}[6\text{Cov}(X, Y) - 2]$ (B) $\text{Cov}\left(\frac{3X+5}{4}, \frac{2Y-7}{3}\right) = 6\text{Cov}(X, Y)$
 (C) $\text{Cov}\left(\frac{3X+5}{4}, \frac{2Y-7}{3}\right) = \frac{1}{2}\text{Cov}(X, Y)$ (D) $\text{Cov}\left(\frac{3X+5}{4}, \frac{2Y-7}{3}\right) = \frac{1}{2}\text{Cov}(X, Y) - 2$

35. The correlation coefficient between X and Y is 0.6. Their covariance is 4.8. The variance of X is 9. Then S.D. of Y is

- (A) $\frac{4.8}{9 \times 0.6}$ (B) $\frac{3}{4.8 \times 0.6}$
 (C) $\frac{0.6}{4.8 \times 0.3}$ (D) $\frac{4.8}{3 \times 0.6}$

36. Probable error of correlation coefficient 'r' is

- (A) $0.6745 \times \frac{1-r^2}{n}$ (B) $0.6745 \times \frac{1-r^2}{\sqrt{n}}$
 (C) $0.6547 \times \frac{1-r^2}{n}$ (D) $0.6754 \times \frac{1+r^2}{\sqrt{n}}$

37. The regression coefficients are b_1 and b_2 then correlation coefficient 'r' is

- (A) $\frac{b_1}{b_2}$ (B) $\frac{b_2}{b_1}$
 (C) $b_1 \times b_2$ (D) $\pm \sqrt{b_1 b_2}$

38. The mean of a Poisson variate is:

- (A) Greater than S.D. (B) less than S.D.
 (C) Equal to S.D. (D) None of these

39. The mean of a Binomial distribution $\binom{10}{x} \left(\frac{2}{5}\right)^x \left(\frac{3}{5}\right)^{10-x}$; $x=0,1,2,\dots,10$ is

- (A) 6 (B) 5
 (C) 0 (D) 4

40. For a Normal distribution:

- (A) M.D. : S.D. : Q.D. :: 12:15:10 (B) M.D. : S.D. : Q.D. :: 10:12:15
 (C) M.D. : S.D. : Q.D. :: 12:10:15 (D) M.D. : S.D. : Q.D. :: 15:12:10

41. Non-Sampling errors are present
 (A) Only in census survey (B) Only in sample survey
 (C) Both in complete enumeration and sample surveys (D) Occasionally in census survey
42. In SRSWOR the probability that a specified unit of the population of size 'N' is included in the sample of size 'n' is
 (A) $1/N$ (B) N/n
 (C) $1/n$ (D) n/N
43. In optimum allocation for a fixed total size in case of stratified random sampling
 (A) $n_i \propto N_i$ (B) $n_i \propto N_i S_i$
 (C) $n_i \propto S_i$ (D) None of these
44. In stratified random sampling
 (A) Proportional allocation gives better estimates than Neyman's optimum allocation
 (B) Neyman's optimum allocation gives better estimates than proportional allocation
 (C) Sometimes Proportional allocation is better, sometimes optimum allocation is better
 (D) Nothing can be said exactly
45. The component of time series associated with "An after Easter sale in a department store" is
 (A) Cyclical (B) Random
 (C) Seasonal (D) Long term movement
46. The measurement of seasonal fluctuation by the method of simple average is based on the basic assumption that the data do not contain
 (A) Long term movement only (B) Random component
 (C) Cyclic component (D) Trend and cyclic component
47. Among all the methods of measuring seasonal fluctuations, the method which is the most satisfactory, flexible and widely used is
 (A) Ratio to moving average (B) Link to relative
 (C) Ratio to trend (D) Simple averages
48. If with rise of 10% in prices, the wages are increased by 20%, the real wage increase is by
 (A) 10% (B) More than 10%
 (C) less than 10% (D) Exactly 20 %

49. Which one is the correct statement?

(A) Fisher's Index number lies between Laspeyre's and Passsche's index number

(C) Passsche's index number lies between Fisher's index and Laspeyre's number

(B) Laspeyre's index number lies between Passsche's and Fisher's Index number

(D) None of these

50. Consumer Price Index Numbers study

(A) The standard of living

(C) The effect of change in the prices of the purchasing power of a particular class of people

(B) The cost of livelihood

(D) None of these