

STATISTICS 12th CLASS - 1st Annual 2023 **TIME: 20 MINUTES**
MARKS: 17

DGK-11-23

OBJECTIVE

NOTE: You have four choices for each objective type question as A , B , C and D . The choice which you think is correct , fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

QUESTION NO. 1

- 1 Correlation co-efficient between X and X is
 (A) 0 (B) -1 (C) +1 (D) -1 to +1
- 2 Co-efficient of association Q lies between
 (A) 0 to +1 (B) -1 and +1 (C) -∞ and +1 (D) -∞ to +∞
- 3 The shape of χ^2 - distribution depends upon
 (A) Mean (B) Degrees of freedom (C) Number of cells (D) S.D
- 4 A sudden decrease in supplies due to floods is
 (A) Secular trend (B) Seasonal variations (C) Cyclical variations (D) Irregular variations
- 5 A sequence which follow regular variations is called
 (A) Signal (B) Noise (C) Model (D) Trend
- 6 One byte equals
 (A) 8 bits (B) 4 bits (C) 6 bits (D) 12 bits
- 7 Shape of normal curve is
 (A) J (B) L (C) Bell (D) Circle
- 8 In a normal distribution $E(x - \mu)^2$ is
 (A) Q.D (B) S.D (C) Variance (D) M.D
- 9 The maximum ordinate of standard normal curve is at
 (A) 0 (B) 1 (C) μ (D) σ
- 10 In sampling with replacement the population becomes
 (A) Infinite (B) Existent (C) Finite (D) Hypothetical
- 11 Non probability form of sampling is
 (A) Quota sampling (B) Random sampling (C) Stratified sampling (D) Systematic sampling
- 12 In sampling with replacement $\sigma_{\bar{x}} = \dots\dots\dots$
 (A) $\frac{\sigma}{n}$ (B) $\frac{\sigma}{\sqrt{n}}$ (C) $\frac{\sigma^2}{n}$ (D) $\frac{\sigma}{\sqrt{n}} \cdot \frac{N-n}{N-1}$
- 13 A formula or function used to estimate a parameter is called
 (A) Estimate (B) Estimation (C) Bias (D) Estimator
- 14 Which of the following cannot be null hypothesis
 (A) $\theta \leq \theta_0$ (B) $\theta \geq \theta_0$ (C) $\theta = \theta_0$ (D) $\theta \neq \theta_0$
- 15 Probability of rejecting true hypothesis is called
 (A) Critical region (B) Level of significance (C) Test statistic (D) Power of test
- 16 In the regression equation $Y = a + bx$, " a " is the
 (A) Y-intercept (B) Slope (C) X-intercept (D) Trend
- 17 In least squares regression line $\Sigma(Y - \hat{Y})^2$ is always
 (A) Negative (B) Non-negative (C) Zero (D) Fractional

DAK-11-23

QUESTION NO. 2 Write short answers any Eight (8) parts of the following

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- i Describe relationship between Mean , Median and Mode of the normal distribution
- ii If $X \sim N(15, 4)$, Find the value Z , if $x = 18$
- iii What is standard normal distribution ?
- iv Write down the lower and upper quartile of the normal distribution
- v In normal distribution , $\mu = 9$, $Q_3 = 171$ Find standard deviation
- vi Define Estimation
- vii What is point estimation ?
- viii Explain statistical inference
- ix Define composite hypothesis
- x What is type-I error ?
- xi Define input devices
- xii Distinguish between hardware and software

QUESTION NO. 3 Write short answers any Eight (8) parts of the following

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- i Find standard error of \bar{X} if $N = 5$, $n = 2$, $\sigma^2 = 10$ if sampling is done without replacement
- ii Define probability sampling and non-probability sampling
- iii Define simple random sampling and stratified random sampling
- iv Write formulae of mean and variance of sampling distribution of mean without replacement
- v What are two disadvantages of non-probability sampling ?
- vi Distinguish between probability and non-probability sampling
- vii What is objective of correlation and of regression ?
- viii Write any two properties of intercept a_{yx}
- ix How would you interpret $a_{yx} = 3$?
- x Find γ if $b_{xy} = 4$, $S_y = 2$, $S_x = 10$
- xi Write any two real life applications of regression
- xii Define intercept and slope of a regression line. Write formulae of a_{yx}

QUESTION NO. 4 Write short answers any Six (6) parts of the following

12

- i Define ultimate class frequency
- ii Discuss negative association
- iii The value of $r_s = 0.19$ for 8 students in two subjects. Find Σd^2
- iv Give two examples of secular trend
- v What is seasonal variation ?
- vi Write down the components of time series
- vii What is Historigram ?
- viii What do you mean by analysis of time series ?
- ix Given $\hat{y} = 50 + 2x$ with origin at 1983 and unit of x is one year. Shift the origin at 1980

SECTION-II

Note: Attempt any Three questions from this section

8x3 = 24

- Q. 5(a) Let X be normally distributed with mean 8 and standard deviation 4 .
Find (i) $P[4 \leq X \leq 12]$ (ii) $P[X \leq 3]$
- Q. 6(a) Let $X \sim N(40, 64)$ then find the single point which has 90 % area below it
- Q. 6(a) The random variable X has the following probability distribution
- | | | | | |
|--------|-----|-----|-----|-----|
| x | 4 | 5 | 6 | 7 |
| $P(x)$ | 0.2 | 0.4 | 0.3 | 0.1 |
- Find the mean μ_x , variance σ_x^2 and standard errors σ_x of the mean \bar{X} for a random sample of size 36
- (b) Suppose that 60 % of a city population favours public finding for a proposed recreational facility. If 150 persons are to be randomly selected and interviewed , what is the mean and standard errors of the sample proportion favouring this issue
- Q. 7(a) A random sample of size 36 is taken from a normal population with a known variance $\sigma^2 = 25$. If the mean of the sample is 42.6 , find 95 % confidence limits for the population mean
- (b) A random sample of nine from the men of a large city gave a mean height of 68" and variance $s^2 = 4.5$ (inches)² . Test $H_0 : \mu = 68.5$ against $H_1 : \mu \neq 68.5$
- Q. 8(a) Find regression equation of Y on X of the following data
- | | | | | | |
|-----|---|---|----|----|----|
| X | 1 | 2 | 3 | 4 | 5 |
| Y | 5 | 8 | 14 | 13 | 18 |
- (b) Find the correlation co-efficient r_{xy} for a given set of data of two regression lines
- $$\hat{Y} = 20.8 - 0.219 X$$
- $$\hat{X} = 16.2 - 0.785 Y$$
- Also show that r is symmetrical and interpret the results
- Q. 9(a) Find the rank correlation co-efficient for the following set of data
- | | | | | | | | | | | | |
|----------|---|---|----|----|---|---|---|---|---|---|---|
| Rank (X) | 8 | 3 | 10 | 11 | 5 | 9 | 7 | 1 | 4 | 2 | 6 |
| Rank (Y) | 6 | 1 | 10 | 11 | 2 | 9 | 8 | 5 | 7 | 3 | 4 |
- (b) Fit a linear trend to the following information for the year 1986 to 1992 (both inclusive)
 $\Sigma x = 0$, $\Sigma y = 245$, $\Sigma x^2 = 28$ and $\Sigma xy = 66$. Also compute the trend values

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

QUESTION NO. 1

D9K-22

- 1 Research journals and newspapers are the sources of
(A) Primary data (B) Secondary data (C) Grouped data (D) Un-grouped data
- 2 The number of values falling against a particular class is called
(A) Mid point (B) Class mark (C) Class limit (D) Frequency
- 3 In the construction of ogive are marked along Y-axis
(A) Frequency (B) Class boundaries (C) Cumulative frequency
(D) upper class boundaries
- 4 First quartile is equal to
(A) P_{25} (B) D_3 (C) D_5 (D) Median
- 5 For open end frequency distribution cannot be calculated
(A) Median (B) Arithmetic mean (C) Mode (D) Upper quartile
- 6 Harmonic mean cannot be computed if any value in the data is
(A) Negative (B) Fractional (C) Positive (D) Zero
- 7 Second moment about mean is
(A) Zero (B) One (C) Variance (D) Standard deviation
- 8 $SD(bx) = \dots\dots\dots$
(A) $|b|SD(x)$ (B) $bSD(x)$ (C) $SD(x)$ (D) $b^2SD(x)$
- 9 A frequency distribution is leptokurtic if
(A) $b_2 < 3$ (B) $b_2 > 3$ (C) $b_2 = 3$ (D) $b_1 = 0$
- 10 Most suitable average for index numbers is
(A) Mean (B) Median (C) Mode (D) G.M
- 11 Base year quantities are used as weights in
(A) Fisher's ideal index No. (B) Paasche's index No. (C) Laspeyere's index No.
(D) Chain index No.
- 12 Probability of drawing red card of spade from a pack of playing cards is
(A) 0 (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$
- 13 For mutually exclusive events A and B $P(A \cap B)$ is
(A) $P(A)P(B|A)$ (B) $P(A)P(B)$ (C) $P(B)P(A|B)$ (D) 0
- 14 For a random variable X, $\sum P(x) = \dots\dots\dots$
(A) 0 (B) 1 (C) < 1 (D) > 1
- 15 $Y = 2x - 8$ and $Var(x) = 3$ then $Var(y) = \dots\dots\dots$
(A) 3 (B) 6 (C) 12 (D) 20
- 16 Variance of binomial distribution is
(A) npq (B) np (C) n^2p (D) $(npq)^2$
- 17 A hyper geometric distribution has parameters 15, 5 and 3, its mean is
(A) 15 (B) 5 (C) 3 (D) 1

QUESTION NO. 2 Write short answers any Eight (8) parts of the following

16

- (i) Differentiate between population and sample (ii) Define variable (iii) Find median of 0, -1, -3, 3, 2
 (iv) Define mode and give an empirical relationship between mean, median and mode
 (v) Define Harmonic Mean with its formula (vi) Write down the advantages of A.M
 (vii) If the mean and G.M of two numbers are 20 and 16 respectively, then find the value of H.M
 (viii) For a frequency distribution of a variable X, it is given $X = 10 - 5u$, $\Sigma f = 125$, $\Sigma fu = -45$. Find the value of mean
 (ix) Define Index Number (x) Write down the uses of Index Number
 (xi) If Laspayer's Index No. = 105.4, Paache's Index No. = 103.2, find Fisher's I.No. = ?
 (xii) Given $\Sigma p_1q_0 = 900$ and $\Sigma p_0q_0 = 897$. Find cost of Living Index Number

QUESTION NO. 3 Write short answers any Eight (8) parts of the following

16

- (i) Distinguish between one-way and two-way classification (ii) Write a short note on pie-chart
 (iii) Explain the absolute measure of dispersion
 (iv) Given median = 8, $n = 4$ and $\Sigma |X - \text{median}| = 48$. Compute median coefficient of dispersion
 (v) Given mean = 50, median = 47 and coefficient of skewness = 1, find the value of variance
 (vi) Explain positively skewed distribution in your own words (vii) Describe variance with formula
 (viii) Explain quartile deviation with formula
 (ix) If $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{10}$. Find $P(B)$ and $P(\bar{A})$ (x) Explain sample space with example
 (xi) Describe the term compound event (xii) What do you understand by dependent events?

QUESTION NO. 4 Write short answers any Six (6) parts of the following

12

- (i) How can random number be generated? (ii) State any two properties of expectation
 (iii) Find the probability distribution of number of heads when two coins are tossed
 (iv) Given $x : 0, 1, 2$ $P(x) = 9/16, 6/16, 1/16$ Find $E(x)$
 (v) If $\text{Var}(x) = 2$ and $\text{Var}(y) = 5$, where 'x' and 'y' are independent variables then find $\text{Var}(2x - y)$
 (vi) State any two properties of hypergeometric experiment
 (vii) Find the number of trials if mean is 20 and probability of success in binomial distribution is 0.20
 (viii) If $p = q$ and $n = 10$. Find out mean and variance of binomial distribution
 (ix) Write the p.d.f. of Hypergeometric distribution

SECTION-II

Note: Attempt any Three (3) questions from this section

8 x 3 = 24

Q.5. (a) A bus travelling 200 miles has 5 stages at equal intervals. The speed of bus in various stages was observed to be : 10, 15, 20, 25 and 20. Find average speed at which the bus travels

(b) Find lower quartile for the given distribution

Classes	2 - 4	4 - 8	8 - 12	12 - 16	16 - 22
Frequency	5	10	12	6	4

Q.6. (a) Find the coefficient of S.D from the following data

x	5	10	15	20	25	30
f	3	7	20	10	6	4

(b) If $\Sigma f = 200$, $\Sigma fx^2 = 12080$, $\Sigma fx = 1520$, $\Sigma fx^3 = 16070$ then find first three moments about the mean

Q.7 (a) Compute index number of prices from the following data taking 1981 as base and using median as an average

Year	A	B	C
1981	18	85	52
1982	22	76	60
1983	28	80	66
1984	31	95	80

(b) A digit is selected at random from the first 10 natural numbers. Find the probability that the selected digit is (i) Greater than 6 (ii) A complete square (iii) Multiple of 3

Q.8. (a) Given the following probability distribution

x	-1	0	1	2	3
p(x)	0.125	0.500	0.200	0.050	0.125

Verify $E(2x + 3) = 2E(x) + 3$

(b) A continuous random variable x has a probability density function $f(x) = cx$ for $0 < x < 2$. Find (i) C (ii) $P(1 < x < 1.5)$

Q.9. (a) In a binomial distribution $n = 20$ and $p = 3/5$. Find Mean, Variance and Standard deviation. Also find $P(x = 3)$

(b) Five balls are drawn without replacement from a bag containing 4 white and 7 black balls. Find probability distribution for number of white balls