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ICHALKARANJI
DEPARTMENT OF STATISTICS
Class:-B.Sc-I
Paper-III (Descriptive Statistics-II)
Question Bank

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Q. 1) Choose a correct alternative for each of following.

- 1) The range of Karl Pearson's correlation coefficient is.....
(A) $-\infty$ to ∞ (B) -1 to 1 (C) 0 to 1 (D) 0 to ∞
- 2) If X and Y are independent variables then.....
(A) $r = 0$ (B) $\text{Cov}(X, Y) = 0$
(C) Both (A) and (B) (D) either (A) or (B)
- 3) The Spearman's Rank correlation coefficients lie between.....
(A) -1 and 0 (B) 0 and ∞ (C) -1 and +1 (D) $-\infty$ to ∞
- 4) If X and Y are uncorrelated variables, then $V(X - Y)$ is.....
(A) $V(X) + V(Y)$ (B) $V(X) - V(Y)$
(C) $V(X) + V(Y) - 2\text{Cov}(X, Y)$ (D) $V(X) + V(Y) + 2\text{Cov}(X, Y)$
- 5) If coefficient of correlation between x and y is 0.8 and then coefficient of correlation between $2x+3$ and $4y+1$ is.....
(A) 0.16 (B) 0.32 (C) 0.8 (D) None of these
- 6) Spearman's rank correlation coefficient is equal to one if.....
(A) $\sum d_i^2 = 0$ (B) $\sum d_i^2 > 0$
(C) $\sum d_i^2 < 0$ (D) None of these
- 7) If the correlation coefficient is +1, then the scatter diagram is.....
(A) A rising straight line (B) A falling straight line
(C) A horizontal straight line (D) None of these
- 8) If coefficient of correlation between x and y is 0.8, then the coefficient of correlation between -x and -y is.....
(A) - 0.8 (B) 0.64 (C) 0.8 (D) None of these
- 9) If $\text{cov}(x,y) = 50$, then $\text{cov}(10x+10, 5y+5)$ is.....
(A) 200 (B) 50 (C) 65 (D) 2500

- 10) The Points of Scatter diagram are on a vertical line, then the Coefficient of correlation is.....
 (A) +1 (B) -1 (C) 0 (D) None of these
- 11) If the correlation coefficient is very close to zero, then the scatter diagram is.....
 (A) A rising straight line (B) A falling straight line
 (C) A horizontal straight line (D) None of these
- 12) $\sigma_x = 3$ and $\sigma_y = 4$ and x, y are uncorrelated, then σ_{x+y} is.....
 (A) 3 (B) 4 (C) 5 (D) 1
- 13) Karl Pearson's correlation coefficient between X and Y is.....
 (A) Independent of change of origin (B) Independent of change of Scale
 (C) Both (A) & (B) (D) None of these
- 14) The value of $\text{Cov}(ax+b, cy+d)$ is equal to.....
 (A) $ac \text{Cov}(x, y) + bd$ (B) $bd \text{Cov}(x, y)$
 (C) $ac \text{Cov}(x, y)$ (D) $2ac \text{Cov}(x, y)$
- 15) If $r(x, y) = 1$, then we says that x, y are.....
 (A) Negatively correlated (B) Positively correlated
 (C) Perfectly negatively correlated (D) Perfectly positively correlated
- 16) $\sigma_x = 2, \sigma_y = 3$ and $r = 0.8$ then $\text{cov}(x, y)$ is.....
 (A) 2.8 (B) 3.8 (C) 4.8 (D) 5.8
- 17) Given that $r_{xy} = 0.9$ and if $u = 2x + 1, v = y + 3$, then $r_{uv} =$
 (A) 0.9 (B) -0.9 (C) 1.9 (D) -1.9
- 18) The two lines of regression intersect at.....
 (A) (Median, $n/2$) (B) (\bar{x}, \bar{y}) (C) $(-\bar{x}, \bar{y})$ (D) $(-\bar{x}, -\bar{y})$
- 19) If two coefficients of regression are 0.9 and 0.4 then the coefficient of correlation is.....
 (A) 0.9 (B) 0.4 (C) 0.6 (D) 0.8
- 20) If $r = 0$, the angle between the two lines of regression is.....
 (A) 90° (B) 45° (C) 0° (D) 180°
- 21) If one of the regression coefficient is greater than one then other must be.....
 (A) Equal to one (B) Less than one
 (C) Greater than one (D) None of these
- 22) If $b_{yx} = \frac{-1}{4}$ and $b_{xy} = -1$ then correlation coefficient 'r' is.....

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

- 23) If $r_{xy} = 0.8$, $b_{yx} = 0.4$, $\sigma_x = 2$ then $\sigma_y = \dots\dots\dots$
 (A) 0.25 (B) 0.5 (C) 1 (D) None of these
- 24) If the two coefficients of regression are equal to 0.8 then the coefficient of correlation is equal to.....
 (A) 0.4 (B) 0.6 (C) 0.8 (D) 1
- 25) Coefficient of correlation is.....between the coefficients of regression.
 (A) Arithmetic mean (B) Harmonic mean
 (C) Geometric mean (D) Half way
- 26) If the two coefficients of regression are 0.6 and 0.8 then $r \leq \dots\dots\dots$
 (A) 0.4 (B) 0.5 (C) 0.6 (D) 0.7
- 27) If the coefficient of regression between y and x is 0.8, then the coefficient of regression between 2x and 3y is.....
 (A) 0.16 (B) 0.27 (C) 0.8 (D) 1
- 28) If $r = 0$, the lines of regression are.....
 (A) Coincident (B) Parallel (C) Perpendicular (D) Asymptotic
- 29) If $r = \pm 1$, the lines of regression are.....
 (A) Coincident (B) Parallel (C) Perpendicular (D) Asymptotic
- 30) If two variables are uncorrelated then the angle between the two lines of regression is.....
 (A) 0 (B) π (C) $\pi/2$ (D) $-\pi$
- 31) If $r_{xy} = -0.8$, $b_{yx} = -0.4$ then $b_{xy} = \dots\dots\dots$
 (A) 1.6 (B) -1.6 (C) -0.4 (D) 0.4
- 32) If two variables are perfectly correlated then the angle between the two lines of regression is.....
 (A) 0 (B) $\pi/2$ (C) $-\pi/2$ (D) $\pi/4$
- 33) If $\sigma_x = \sigma_y$ and $r = \sqrt{2}$ then the value of b_{yx} is.....
 (A) $\sqrt{2}$ (B) $1/\sqrt{2}$ (C) 0 (D) 1
- 34) Base year of index number is.....
 (A) Any convenient year (B) Preceding year
 (C) Year of stability (D) Succeeding year

- 35) Index number is called as.....
 (A) Economic Thermometer (B) Economic Barometer
 (C) Social Barometer (D) Social Thermometer
- 36) The index number for base year is.....
 (A) 0 (B) 100 (C) 1 (D) Cannot be determined
- 37) Laspeyre's index number is given by.....
 (A) $\frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$ (B) $\frac{\sum p_0 q_0}{\sum p_1 q_0} \times 100$
 (C) $\frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$ (D) $\frac{\sum p_0 q_1}{\sum p_1 q_1} \times 100$
- 38) In Paasche's quantity index number.....are used as weights.
 (A) Current year quantities (B) Base year quantities
 (C) Base year prices (D) Current year prices
- 39) Fisher's ideal index number is.....of Laspeyre's index number and Paasche's index number.
 (A) Product (B) Sum
 (C) Quotient (D) Square root of the product
- 40) An index number is said to satisfy time reversal test if.....
 (A) $P_{01} \times P_{10} = P_{10}^2$ (B) $P_{01} = P_{10}$
 (C) $P_{01} \times P_{10} = 1$ (D) $P_{01} \times Q_{10} = 1$
- 41) Methods to obtain cost of living index number are.....
 (A) Family budget method (B) Aggregate expenditure method
 (C) Both (A) and (B) (D) None of these
- 42) If the consumer price index for 2000 is 800 then the purchasing power of a rupee is....
 (A) 0.125 (B) 12.5 (C) 8 (D) None of these
- 43) For constructing consumer price index number.....is used.
 (A) Marshall-Edgeworth index number
 (B) Paasche's index number
 (C) Fishers's index number
 (D) Laspeyre's index number
- 44) If the old series is connected with the new series of index numbers, it is known as.....
 (A) Base shifting (B) Backward splicing
 (C) Forward splicing (D) None of these
- 45) Index number is a.....

- (A) Measure of relative change
(B) Special type of an average
(C) Both (A) and (B)
(D) None of these

46) The square root of the product of Laspeyre's index number and Paasche's index number is known as.....

- (A) Kelly's index number
(B) Fisher's ideal index number
(C) Bowley's index number
(D) None of these

47) Base year's quantities are used as weights in.....

- (A) Laspeyre's price index number
(B) Paasche's price index number
(C) Fisher's price index number
(D) None of these

48) In Laspeyre's quantity index number.....are used as weights.

- (A) Current year quantities
(B) Base year quantities
(C) Base year prices
(D) Current year prices

49) Paasche's index number is given by.....

- (A) $\frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$
(B) $\frac{\sum p_0 q_0}{\sum p_1 q_0} \times 100$
(C) $\frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$
(D) $\frac{\sum p_0 q_1}{\sum p_1 q_1} \times 100$

50) Laspeyre's and Paasche's index numbers will be equal if.....

- (A) $q_0 > q_1$
(B) $q_0 < q_1$
(C) $q_0 = q_1$
(D) None of these

Q. 2) Long answer questions.

Q.1) What is meant by correlation? Describe scatter diagram and interpret.

Q.2) Explain Karl Pearson's coefficient of correlation and show that it is always lies between -1 to 1.

Q.3) Prove that Spearman's rank correlation coefficient R is given by

$$R = 1 - \frac{6 \sum d_i^2}{n^3 - n}$$

Q.4) Obtain the equations of lines of regression by the method of least square.

Q.5) Define regression coefficient. State & prove any four properties of regression coefficient.

Q.6) Given $6Y=5X+90$, $15X=8Y+130$, $\sigma_x^2 = 16$. Find (i) \bar{x} and \bar{y} , (ii) r and (iii) σ_y^2

Q.7) What is an Index Number. State any four important points that should be considered in constructing Index Numbers.

Q.8) write a short notes on:-

- i) Factor reversal test
- ii) Time reversal test

Q.9) Explain Chain index Number in detail.

Q.10) write a short notes on:-

- i) Aggregative Expenditure Method
- ii) Family Budget Method

Q. 3) Short answer questions.

Q.1) Show that the coefficient of correlation r is independent of change of origin and scale.

Q.2) Write short notes on Scatter Diagram.

Q.3) Discuss on the types of correlation.

Q.4) Define the term 'correlation'. Define correlation coefficient and show that correlation coefficient is not affected by multiplying each term by 2.

Q.5) Define Spearman's rank correlation coefficient and discuss the method when ranks are equal.

Q.6) Show that the covariance is independent of change of origin but not of scale.

Q.7) Distinguish between correlation and regression.

Q.8) Explain the method of scatter diagram to obtain a line of regression.

Q.9) Obtain the expression for the acute angle between the two regression lines. Interpret the results $\theta = 0$, $\theta = \pi/2$.

Q.10) Explain the following terms:

- (i) Regression.
- (ii) Lines of regression.
- (iii) Coefficients of regression.

Q.11) The equations of two regression lines are $4x-5y+33=0$ and $20x-9y - 107=0$. Find (i) means of x and y (ii) Coefficient of correlation between x and y .

Q.12) Explain the term "Lines of regression".

- Q.13) Distinguish between Laspeyre's and Paasche's Index Numbers. When will they be equal? Why is it that Fisher's Index Number is called an Ideal Index Number?
- Q.14) Explain the following terms:
(i) Quantity Index
(ii) Value Index
- Q.15) Write a short note on shifting the base.
- Q.16) Write a short note on
(i) Splicing
(ii) Purchasing power of money
- Q.17) Define the term
(i) Laspeyre's index number
(ii) Paasche's index number
(iii) Fisher's ideal index number
- Q.18) Define Laspeyre's and Paasche's index numbers. Check whether time reversal test is satisfied by Paasche's Index Number.
- Q.19) Discuss the Weighted average of price relatives method.
- Q.20) Write a short note on Consumers price index number.
