Second Year B. Sc. (Sem. III) Examination
March / April - 2015
Statistics : Paper - 301
(Correlation & Regression & Association of Attributes)

Time : 2 Hours] [Total Marks : 50

Instructions:

(1) Fill up strictly the details of signs on your answer book.

SECOND YEAR B. SC. (SEM. III)
Name of the Subject:

STATISTICS : PAPER - 301

Subject Code No.: 3029

(2) There are 25 questions and all are compulsory.

(3) Read the question carefully before selecting the correct option.

(4) Statistical and logarithmic tables will be supplied on request.

(5) Use of non-programmable scientific calculator is allowed.

SECTION - A : Q. 1 to 10 Multiple choice questions : (1 mark)
SECTION - B : Q. 11 to 20 Multiple Choice Questions : (2 marks)
SECTION - C : Q. 21 to 25 Multiple choice questions : (4 mark)

OMR Sheet अंकन करणार्यांना अत्यंतीत ओळखावासो आवश्यक
OMR Sheet-नं पाचण्याचे स्थान आहे.

Important instructions to fill up OMR Sheet are given on back side of the provided OMR Sheet.
1. If the correlation coefficient between $x$ and $y$ is $r = 0.5$, then find the correlation coefficient between $4x$ and $y$.
   (A) $-0.4$
   (B) $0.5$
   (C) $0.4$
   (D) $-0.5$

2. If $8x - 10y + 66 = 0$ is the regression line of $x$ on $y$. If $\bar{y} = 10$ and $\bar{x} = \_\_\_\_\_$.
   (A) $10$
   (B) $13$
   (C) $66$
   (D) $8$

3. If $b_{yx} = 2.5$ and $b_{xy} = 0.4$, then what is the value of $r$?
   (A) $1$
   (B) $-1$
   (C) $\frac{1}{2}$
   (D) $0$

4. If $(AB) < \frac{(A)(B)}{N}$ then what type of association between two attributes?
   (A) Negative
   (B) Independent
   (C) None of these
   (D) Positive
5 The value of Yule's coefficient of association is between _______ and _______.
(A) 0
(B) \(\frac{1}{2}\)
(C) None of these
(D) -1 and 1

6 If \(\frac{AB}{B} > \frac{(AB)}{B}\) then what type of association between A and B is?
(A) Positive
(B) Non associated
(C) None of these
(D) Negative

7 What is the value of r when the two variables are perfectly negatively correlated?
(A) 0
(B) +1
(C) \(\frac{1}{2}\)
(D) -1
8. Sum of square of difference is zero in rank correlation coefficient, then what is the value of correlation coefficient?

(A) 0  
(B) +1  
(C) $\frac{1}{2}$  
(D) −1

9. All the points of the scatter diagram are on one line then what kind of correlation?

(A) Perfect  
(B) Not associated  
(C) None of these  
(D) Not perfect

10. \[ r_{xy} = \frac{1}{2}, \quad v(x) = 2, \quad v(y) = 9 \]  
\[ \text{then, } \text{cov}(x,y) = \ldots \ldots \]  
\[ r_{xy} = \frac{1}{2}, \quad v(x) = 2, \quad v(y) = 9 \]  
\[ \text{then, } \text{cov}(x,y) = \ldots \ldots \]  

(A) −3  
(B) −2  
(C) 2  
(D) 3
11 \[ \sum d_i^2 = 330 \] and rank correlation coefficient \( r = -0.5 \), then find the number of pairs \( n = \) \[ \begin{align*}
& (A) \ 9 \\
& (B) \ 11 \\
& (C) \ 12 \\
& (D) \ 10
\end{align*} \]

12 \[ \rho_{xy} = 0.25, \ \nu(x) = 4, \ \nu(y) = 9 \] hence, \( \nu(x - 2y) = \) \[ \begin{align*}
& (A) \ 43 \\
& (B) \ 24 \\
& (C) \ 42 \\
& (D) \ 34
\end{align*} \]

13 \[ \text{If covariance of two variables} = 25, \ r = 0.6, \ \mu(x) = 36 \] hence, \( y \) has \( \mu \) value. \( \text{If } cov(x, y) = 25, \ r = 0.6, \ \nu(x) = 36, \text{ then find s.d. of } y. \) \[ \begin{align*}
& (A) \ 5.94 \\
& (B) \ 6.94 \\
& (C) \ 7.94 \\
& (D) \ 4.94
\end{align*} \]

14 \[ \bar{x} = 25, \ \bar{y} = 20, \ \sigma_x = 4, \ \sigma_y = 5 \] and \( r = 0.8 \) hence \( \text{If } \bar{x} = 30, \ \text{find } \bar{y}. \) \[ \begin{align*}
& (A) \ 20 \\
& (B) \ 25 \\
& (C) \ 30 \\
& (D) \ 15
\end{align*} \]

15 \[ \text{If regression equations are} \ 4y - 5x = 0 \text{ and } 5y - x = 6 \text{ then the mean of } x \text{ and } y \text{ are } \] \[ \begin{align*}
& (A) \ 15, \ 12 \\
& (B) \ 15, \ 10 \\
& (C) \ 12, \ 10 \\
& (D) \ 12, \ 15
\end{align*} \]
16 \[ r_{xy} = 0.2 \] \text{ then find value of acute angle } \theta \text{ of two regression lines.}
(A) 66.15
(B) 66.70
(C) 66.60
(D) 66.85

17 \( (AB) = 200, (A \beta) = 40, (\alpha B) = 700, (\alpha \beta) = 160 \) \text{ then find } N = _______.
(A) 1000
(B) 1100
(C) 1200
(D) 900

18 \[
\begin{bmatrix}
5 & 6 \\
7 & 8
\end{bmatrix}
\] \text{ भाँकती माथे गुलनो गुणात्मक संबंधांक मेजयो.}
For data \[
\begin{bmatrix}
5 & 6 \\
7 & 8
\end{bmatrix}
\] \text{ what is the coefficient of Yule's attribute ?}
(A) 0.024
(B) -0.042
(C) 0.042
(D) -0.024

19 \( x \) \text{ अने } y \text{ प्रभावित निर्देश चयो घोष तथा } (3x + 4y) \text{ अने } (x + ky) \text{ पश्चयो संबंधांक शून्य घोष तो आंशिक } k \text{ नी उसमत्ते केटमी ?}
If \( x \) \text{ and } y \text{ are standard independent variables and if correlation between } (3x + 4y) \text{ and } (x + ky) \text{ is zero then what is the value of } k ?
(A) \frac{3}{4}
(B) \frac{4}{3}
(C) \frac{3}{4}
(D) \frac{4}{3}

20 \( x \) \text{ अने } y \text{ अने } Y \text{ नु सद्विभवक } = -60, X \text{ नु } \mu.X = 8 \text{ अने } Y \text{ नु } \mu.Y = 10 \text{ तो सद्विभवक } r = ________.
If covariance of random variable \( X \) and \( Y \) is -60, s.d. of \( X = 8 \) and s.d. of \( Y = 10 \), then \( r = \) ________.
(A) 0.75
(B) 0.60
(C) -0.60
(D) 0.80
21 Let \( X \) be a random variable with \( X \sim N(\mu, \sigma^2) \). Given \( Y = x \) and \( 4x - y = 3 \) are two lines, find the value of \( r \) and \( \sigma_y \).

If \( Y \) on \( X \) and \( X \) on \( Y \) are two lines \( y = x \) and \( 4x - y = 3 \) and \( \nu(x) = 4 \) then \( r = \) _______ and \( \sigma_y = \) _______.

(A) 4 and 0.25
(B) 0.5 and 4
(C) 0.5 and 3
(D) 3 and 0.25

22 In the following data find Yule's coefficient of association between two attributes.

(A) \( a = 800 \), \( b = 250 \), \( c = 500 \), \( d = 1200 \)

For the following data find Yule's coefficient of association between two attributes.

(A) \( a = 800 \), \( b = 250 \), \( c = 500 \), \( d = 1200 \)

(A) 0.75
(B) 0.57
(C) -0.57
(D) -0.75

23 Let \( x \) and \( y \) be random variables with \( \nu(x) = \nu(y) = \sigma^2 \) such that \( \text{cov}(x, y) = \frac{\sigma^2}{2} \) and \( (2x + 3) \) and \( (2y - 3) \) are two variables. Find the correlation \( r \) between \( 2x + 3 \) and \( 2y - 3 \).

For random variables \( x \) and \( y \) \( \nu(x) = \nu(y) = \sigma^2 \) and \( \text{cov}(x, y) = \frac{\sigma^2}{2} \) then find the correlation \( r \) between \( 2x + 3 \) and \( 2y - 3 \).

(A) \( -\frac{1}{3} \)
(B) \( \frac{1}{2} \)
(C) \( -\frac{1}{2} \)
(D) \( \frac{1}{3} \)
Three variables $x_1, x_2, x_3$ have same variance $\sigma^2$ and correlation coefficient between them is $r$, if $\bar{x} = \frac{x_1 + x_2 + x_3}{3}$ then $\nu(\bar{x}) =$ _______.

(A) $\frac{\sigma^2}{2}(1 + 3r)$

(B) $\frac{\sigma^2}{3}(1 + 3r)$

(C) None of these

(D) $\frac{\sigma^2}{3}(1 + 2r)$

If for two random variables regression equations are $3x + 2y = 26$ and $6x + y = 31$ then $\bar{x} =$ _______, $\bar{y} =$ _______ and $r =$ _______.

(A) 4, 7 and 0.5

(B) 5, 7 and 0.5

(C) None of these

(D) 7, 4 and 0.5