B.Sc. (Part - I) (Semester - II) Examination, 2013

DESCRIPTIVE STATISTICS - II (Paper - III)

Sub. Code: 55749

Day and Date : Monday, 22-04-2013

Time : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

Instructions : 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q1) Choose correct alternative : [10]

1) The points of a scatter diagram are on a vertical line then the coefficient of correlation is ....
   A) +1
   B) –1
   C) 0
   D) less than 0

2) If the correlation coefficient between X and Y is 0.8, then the correlation coefficient between – X and – Y is ....
   A) –0.8
   B) 0.8
   C) 0.64
   D) 0.4

3) If one regression coefficient is greater than one, then other must be ....
   A) greater than one
   B) equal to one
   C) less than one
   D) equal to zero

4) If $r = \pm 1$, then the lines of regression are ....
   A) coincident
   B) parallel
   C) perpendicular
   D) asymptotic

5) In case of three attributes, total number of ultimate class frequencies are ....
   A) 8
   B) 27
   C) 16
   D) 64

6) If attributes A and B are completely associated then coefficient of association is ....
   A) 1
   B) 0
   C) –1
   D) None of these

7) The number of letters used to denote a class in the theory of attribute is called as ....
   A) manifold class
   B) dichotomous class
   C) order of a class
   D) frequency of the class

P.T.O.

8) The collection of information (data) about each and every individual of a country is known as ....
   A) vital statistics
   B) demography
   C) census
   D) sample survey

9) If NRR>1 then the population is ....
   A) increasing
   B) decreasing
   C) steady
   D) none of these

10) STDR for standard population is ....
    A) CDR
    B) TFR
    C) SDR
    D) NRR

Q2) Attempt any two of the following : [20]

a) Define the terms :
   i) Covariance between two variables X and Y.
   ii) Karl Pearson's correlation coefficient.
   Show that coefficient of correlation r is independent of change of origin and scale.

b) Define regression. Derive the line of regression of X and Y by the method of least square.

c) Define Youle's coefficient of association (Q) and coefficient of colligation (Y).
   Prove that $Q = \dfrac{2Y}{(1+Y^2)}$.

Q3) Attempt any Four of the following : [20]

a) Write short note on the scatter.

b) The values of two regression coefficients b_{XY} and b_{YX} are 4/5 and 9/20 respectively. Find correlation coefficient between X and Y.

c) Show that regression coefficients are independent of change of origin but not of change of scale.

d) Explain condition of consistency in case of two attributes.

e) Define the rates : TFR and GRR used in demography.

f) Define age SDR and infant mortality rate.

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B.Sc. (Part-I) (Semester - II) Examination – 2013
STATISTICS (Paper -III)
(Descriptive Statistics -II)
Sub. Code : 47847

Day and Date : Monday 15-4-2013   Total Marks : 40
Time : 11.00 a.m. to 1.00 p.m.
Instructions :   i)   All questions are compulsory.
                          ii)   Figures to the right indicate full marks.

Q1) Choose the **most correct** alternative: [8]

i)   The range of Karl Pearson's coefficients of correlation is ....
      a) $-\infty$ to ∞ b) 0 to ∞ c) -1 to 1 d) 0 to 1.

ii)   If the correlation coefficient between X and Y is - 0.02 then correlation
      coefficient between (X,2Y+3) is........
      a) 0.02   b) 0.04   c) -0.04   d) -0.02

iii)   If there are n dichotomous attributes then the number of ultimate classes is
      equal to ....
      a) 2^n b) 2^n-1 c) 3^n d) 2^n+1

iv)   If NRR< 1 then we say that there is .... in total population
      a) decrease   b) increase
      c) no decrease or increase   d) all of these.

v)   If the correlation coefficient, $r = \pm 1$ then the two regression lines are ....
      a) Perpendicular to each other   b) Parallel to each other
      c) Coincide   d) Do not exist.

vi)   In vital statistics the rates of vital events are measured in ....
      a) Per million   b) Per thousand
      c) Percentages   d) Fraction.

vii) 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.

viii) If A and B are completely disassociated then Q is equal to ....
   a) 1   b) 0   c) -1   d) -1 to 0.

[16]

Q2) Attempt *any two* of the following:

a) Define Karl Pearson's coefficient of correlation. What is the effect of change of origin and scale on coefficient of correlation.

b) Define the consistency. Derive the conditions of consistency in case of three attributes A, B, C.

c) Derive the equation of the line of regression of X on Y by the least squares method.

[16]

Q3) Attempt *any four* of the following:

a) Explain how the types of correlation coefficient identified graphically.

b) Derive the expression for acute angle between the regression lines.

c) Define the rates: GFR and NRR used in demography.

d) Explain the following terms:
   i)   Ultimate class frequency and
   ii) Fundamental set of class frequency.

e) Define Spearman's rank correlation coefficient. Explain how Spearman's formula for rank correlation is modified in case of ties.

f) Write a note on Standardized Death Rate (STDR).

Seat No.

B.Sc. (Part - I) (Semester - II) Examination, October - 2017
STATISTICS
Descriptive Statistics - II (Paper - III)
Sub. Code: 59686

Day and Date : Tuesday, 10 - 10 - 2017
Time : 12.00 noon to 2.00 p.m.

Total Marks : 50

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q1) Choose the most correct alternative. **[10]**

a) If $\sigma_x = \sigma_y$ and $r = \sqrt{2}$, the value of b_{yx} is _____.

i) $\sqrt{2}$

ii) $1/\sqrt{2}$

iii) 0

iv) 1

b) The value of Cov $(aX+b, cY+d)$ is equal to _____.

i) ac Cov(X, Y)+bd

ii) bd Cov(X, Y)

iii) ac Cov(X,Y)

iv) 2ac Cov(X, Y)

c) If the rank correlation coefficient between X and Y for 6 pairs of observation is 0.6, then the sum of the squares of the difference between the ranks is _____.

i) 10

ii) 14

iii) 12

iv) 8

d) If $r(X,Y) = 1$ then we say that X and Y are _____.

i) negatively correlated

ii) positively correlated

iii) perfectly negatively correlated

iv) perfectly positively correlated

P.T.O.

e) The multiple correlation coefficient lies between _____.

    i)   −1 and 0   ii)   0 and 1

    iii)   −1 and 1   iv)   none of these

f) If three planes of regression coincide then we must have _____.

    i) $R_{1.23} = R_{2.13} = R_{3.12} = 1$

    ii) $r^2_{12.3} = r^2_{13.2} = r^2_{23.1} = 1$

    iii)   Determinant matrix of simple correlation coefficient is 0.

    iv)   All the above

g) Given $r_{12} = 0.6$, $r_{13} = 0.8$ and $r_{23} = 0.8$, then value of $r_{12.3}$ is _____.

    i)   −1/9   ii)   0.72

    iii)   1/9   iv)   none of these

h) If $e_{1.23}$ is the estimated value of X_1 from regression plane of X_1 on X_2 and X_3 then covariance between X_1 and $e_{1.23}$ is _____.

    i)   positive   ii)   negative

    iii)   non-negative   iv)   none of these

i) The square of simple correlation coefficient is known as _____.

    i)   coefficient of determination   ii)   coefficient of alienation

    iii)   coefficient of non-determination   iv)   none of the above

j) If $r_{xy} = -0.8$ and $b_{yx} = -0.4$ then the value of b_{xy} is _____.

    i)   1.6   ii)   −1.6

    iii)   0.16   iv)   0.4

Q2) Attempt <u>any two</u> of the following. [20]

a) Derive the equation of regression line of Y on X by the method of least square.

b) Define Product moment correlation coefficient. Discuss the effect of change of origin and scale on coefficient of correlation.

c) Define residual of X_1 on X_2 and X_3 and find it's mean and variance.

Q3) Attempt any four of the following. [20]

a) Write short note on scatter diagram.

b) State the properties of regression coefficients and prove any one of them.

c) Define

    i) Partial correlation coefficient

    ii) Multiple correlation coefficient.

d) With usual notation show that $b_{12.3} = (b_{12} - b_{13} b_{32})/(1 - b_{23} b_{32})$.

e) With usual notation show that $r^2_{23.1} = b_{23.1} b_{32.1}$.

f) Show that $1 - R^2_{1.23} = (1 - r^2_{12})(1 - r^2_{13.2})$.

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Seat
No.

**B.Sc. (Computers Science) (Entire) (Part -I) (Semester - II)
Examination, April - 2018
STATISTICS
Descriptive Statistics - II (Paper - III)
Sub. Code: 59710**

Day and Date : Wednesday, 25 - 04 - 2018
Time :12.00 noon to 2.00 p.m.

Total Marks : 50

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator and statistical table is allowed.

Q1) Choose the correct alternative: [10]

a) The multiple correlation coefficient lies between _____.

   i)   0 to 1   ii)   -1 to 1

   iii) 0 to ∞ iv) $-\infty$ to ∞

b) The correlation coefficient between (X,X) is _____.

   i)   0   ii)   1

   iii) -1   iv)   Var(X)

c) Equations of two regression lines are X+Y=8 and X-Y=4 then mean of X and Y are _____.

   i)   (2, 6)   ii)   (8, 4)

   iii) (6, 2)   iv)   (0, 2)

P.T.O.

d) If $R_{1.23}=1$ then $R_{2.13}=$ _____.

    i)   0   ii)   -1

    iii) 1   iv) none of these

e) If there exists perfect correlation between X and Y then $r(X, Y)$ is _____.

    i)   1   ii)   0

    iii) -1   iv) -1 or +1

f) If $r(X, Y) = -0.8$ and $b_{yx} = -0.4$ then the value of b_{xy} is _____.

    i)   1.6   ii)   -1.6

    iii) -0.4   iv) 0.4

g) When correlation coefficient $r=0$ then the two regression lines are _____.

    i)   parallel to each other

    ii)   perpendicular to each other

    iii) Coincident

    iv) none of these

h) If three regression planes coincide then determinant of total correlation coefficient matrix $| R |$ or $| \Delta |$ is _____.

    i)   0   ii)   1

    iii) greater then zero   iv) greater than 1

i) One can estimate value of Y for a given value of X by using _____.

    i) line of regression X on Y

    ii) line of regression Y on X

    iii) graphical met.

    iv) none of these

j) The concept of rank correlation was given by _____.

    i) Spearman   ii) Galton

    iii) Mood   iv) none of these

Q2) Attempt any two of the following: [20]

a) What is correlation? Define Karl Pearson's correlation coefficient (r) and show that it lies between -1 to 1.

b) Derive the equation of regression line of Y on X by using least square method.

c) If $r_{12} = r_{13} = r_{23} = \rho$ then show that

    i) $\quad R_{1.23}^2 = \dfrac{2\rho^2}{1+\rho}$

    ii) $\quad r_{12.3} = \dfrac{\rho}{1+\rho}$

Q3) Attempt any four of the following: [20]

a) State and prove effect of change of origin and scale on Karl Pearson's correlation coefficient.

b) Are the following values consistent?

$r_{12}=0.6$, $r_{13}=-0.4$, $r_{23}=0.7$.

c) If rank correlation coefficient (R) = 2/3 and $\Sigma d^2 = 55$. Find number of pairs in the series (n).

d) Explain $r=0$, $r=-1$ and $r=+1$ using scatter diagram.

e) Show that if $R_{1.23}= 0$ it does not imply that $R_{3.12}=0$.

f) Find coefficient of correlation between X and Y for following data.

$n =7$, $\Sigma x=119$, $\Sigma x^2=2833$, $\Sigma y=87$, $\Sigma y^2=2385$, $\Sigma xy=521$.

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Seat
No.

Day and Date : Wednesday, 2- 5 - 2018   Total Marks : 50
Time : 12.00 noon. to 2.00 p.m.

Instructions :   1)   All questions are compulsory.
                   2)   Figures to the right indicate full marks.
                   3)   Use of scientific calculator is allowed.

Q1) Choose the most correct alternative.   **[10]**

a)   The concept of covariance is related with how many variables?

   i)   exactly two   ii)   at least one

   iii)   at most two   iv)   at least two

b)   If $b_{yx} > 0$ then _____

   i) $b_{yx} > 0$

   ii)   X and Y are positively correlated

   iii)   X and Y takes only positive values

   iv)   only (i) and (ii) are true

c)   Regression plane of X_2 on X_1 and X_3 obtained by least square method is given by _____

   i) $X_2 = a + bX_1 + cX_3$

   ii) $X_2 = a + b_{2.1}X_1 + b_{2.3}X_3$

   iii) $X_2 - \bar{X}_2 = b_{21.3}(X_1 - \bar{X}_1) + b_{23.1}(X_3 - \bar{X}_3)$

   iv) $X_2 = b_{21.3}X_1 + b_{23.1}X_3$

P.T.O.

d) Mean of residual is always _____

i) non - zero

ii) positive

iii) negative

iv) zero

e) If all the observations on (X, Y) when plotted in a scatter diagram are on a straight line with positive slope then correlation between X and Y is

_____

i) positive

ii) zero

iii) perfect positive

iv) none of these

f) If sum of the ranks of each pair (X_i, Y_i) for N pairs of observations on (X,Y) is (N + 1) then identify the value of Spearman's correlation coefficient between X and Y?

i) N

ii) 1

iii) 0

iv) −1

g) If $r_{12} = -0.5$ and $r_{13} = 0.6$ then identify the minimum value of $R_{1.23}$?

i) −0.5

ii) −0.6

iii) 0.6

iv) 0.1

h) If regression equations between X and Y are perpendicular to each other then what will be the correlation coefficient between X and Y?

i) 0

ii) 1

iii) −1

iv) positive

i) If correlation coefficient between X and Y is 0.75 then correlation coefficient between U = X + 10 and V = 10 − Y is _____

i) 0

ii) 1

iii) 0.75

iv) −0.75

j) If $R_{2.13} = 0$ then _____

i) $r_{12} = 0$

ii) $r_{23} = 0$

iii) $r_{13} = 0$

iv) only (i) and (ii) are true

Q2) Attempt any two of the following. [20]

a) Define regression coefficients between two variables X and Y. State and prove effect of change of origin and scale transformation on regression coefficient.

b) Using least square method, derive formula for regression plane of X_1 on X_2 and X_3.

c) Define partial correlation coefficient $r_{12.3}$.

Derive formula for $r_{12.3}$ in terms of simple correlation coefficients.

Q3) Attempt any four of the following. [20]

a) Explain scatter diagram and its utility.

b) Let $r_{(X,Y)}$ be a Karl Pearson's correlation coefficient between X and Y. Define $U = (X - A)/h$ and $V = (Y-B)/k$, where A, B, $h \neq 0$ and $k \neq 0$ are any constants then prove that:

$$r_{(X,Y)} = \begin{cases} r_{(U,V)} & \text{if } hk > 0 \\ -r_{(U,V)} & \text{if } hk < 0 \end{cases}$$

c) Define Spearman's rank correlation coefficient. State its formulae explicitly when:

i) observations are not repeated and

ii) observations are repeated

d) Derive formula for an acute angle between two regression lines between X and Y.

e) Define a residual $X_{1.23}$ and obtain its mean.

f) With usual notations prove that $(1-R_{1.23}^2)=(1-r_{12}^2)(1-r_{13.2}^2)$.

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Seat No.

B.Sc.(Part-I) (Semester-II) Examination, April-2016

STATISTICS

Descriptive Statistics-II (Paper-III)

Sub. Code : 59686

Day and Date : Saturday, 16-04-2016

Time : 12.00 noon to 2.00 p.m.

Total Marks : 50

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q1) Choose the most correct alternative: [10]

a) The correlation coefficient between (X, X) is _____.

   i) 1   ii) 0

   iii) -1 iv) $V(X)$

b) If X and Y are independent then correlation coefficient between them is _____.

   i) maximum   ii) minimum

   iii) zero   iv) -1 or 1

c) Equations of two regression lines are: $X + Y = 8$ and $X - Y = 4$, then mean of X and Y are _____.

   i) (2, 6)   ii) (8, 4)

   iii) (6, 2)   iv) (0, 2)

P.T.O.

d) In case of rank correlation, if observation on X is repeated 3 times and observation on Y is repeated 2 times then correction factor is _____.

    i) 2

    ii) 2.5

    iii) 3

    iv) none of these

e) If b_{yx} and b_{xy} are two regression coefficients then which of the following is false?

    i) $b_{yx} = 0.5$ and $b_{xy} = 2$

    ii) $b_{yx} = 0.2$ and $b_{xy} = 0.4$

    iii) $b_{yx} = -0.3$ and $b_{xy} = -0.2$

    iv) $b_{yx} = 0.1$ and $b_{xy} = -0.6$

f) The partial correlation coefficient $r_{12.3}$ is _____.

    i) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1-r_{13}^2)(1-r_{23}^2)}}$

    ii) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1-r_{23}^2)}}$

    iii) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1-r_{13}^2)}}$

    iv) $\sqrt{\dfrac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1-r_{23}^2}}$

g) The order of residual $X_{1.23}$ is _____.

    i) 0

    ii) 1

    iii) 2

    iv) 23

h) If $R_{1.23} = 1$ then $R_{2.13}$ is equal to _____.

    i) 0

    ii) 1

    iii) −1

    iv) none of these

i) The multiple correlation coefficient lies between _____.

    i) 0 to 1

    ii) −1 to 1

    iii) 0 to ∞

    iv) −∞ to ∞

j) If $X_1 = a + b X_2 + c X_3$ is the best regression plane of X_1 on X_2 and X_3 under least square method then

    i) $b = b_{12.3}$ and $c = b_{13.2}$

    ii) $b = b_{1.23}$ and $c = b_{1.32}$

    iii) $b = b_{23.1}$ and $c = b_{32.1}$

    iv) $b = b_{12}$ and $c = b_{13}$

Q2) Attempt Any Two from the following: [20]

a) What is correlation? Define Karl Pearson's correlation coefficient (r) and show that it lies between -1 to 1.

b) Derive the equation of regression line of Y on X by using least square method.

c) Define multiple correlation coefficient ($R_{1.23}$). Obtain an expression for $R_{1.23}$ in terms of simple correlation coefficients.

[20]

Q3) Attempt Any Four from the following:

a) Explain the concept of positive and negative correlation.

b) State and prove any one property of residual.

c) Show that the Karl Pearson's coefficient of correlation is a geometric mean of regression coefficients.

d) Define:

i) Spearman's rank correlation coefficient.

ii) Partial Regression coefficients.

iii) Residual of variable X_1 w.r.t. X_2 and X_3.

e) The regression equations are $4X - 5Y + 33 = 0$ and $20X - 9Y - 107 = 0$.

Find:

i) Regression Coefficients.

ii) Corr. (X, Y).

f) With usual notations, show that $b_{12.3} = \dfrac{b_{12} - b_{13}b_{32}}{1 - b_{23}b_{32}}$.

Instructions : 1) *All questions are compulsory.*
                         2) *Figures to the right indicate full marks.*

1. Choose the correct alternative : 8

   i) If ranks in each pair are equal then Spearman's rank correlation coefficient is
   _____

      a) 0   b) 1   c) –1   d) $\frac{1}{2}$

   ii) If $b_{yx} = -\left(\frac{1}{4}\right)$ and $b_{xy} = -1$ then correlation coefficient (r) is

   _____

      a) $\frac{1}{4}$ b) $-\frac{1}{4}$ c) $\frac{1}{2}$ d) $-\frac{1}{2}$

   iii) In case of three attributes, total No. of class frequencies are _____
       a) 8   b) 27   c) 16   d) 64

   iv) The limit of the Spearman's rank correlation coefficient (R) is
   _____
       a) 0 to 1   b) –1 to 1   c) 0 to ∞   d) – ∞ to ∞

   v) If r = 0, the angle between the two regression lines is _____
      a) 90°   b) 45°   c) 0°   d) 180°

vi) Given two regression lines as $X + 4Y - 8 = 0$ and $X - 2Y + 4 = 0$, then Mean $(\overline{X}, \overline{Y})$ of X and Y are

    a) (4, 5)   b) (2, 1)   c) (4, 1)   d) (0, 2)

vii) Given $(AB) = a$, $(A\beta) = c$, $(\alpha B) = b$, $(\alpha\beta) = d$ then two attributes are said to be positively associated if _____

    a) $ad > bc$ b) $ac > bd$ c) $ab > ad$ d) $(a + d) > (b + c)$

viii) If NRR <1, then we say that _____

    a) Population will be decreasing

    b) Population will be increasing

    c) Population will remain same

    d) Can not say

2. Attempt **any two** of the following :   **16**

    i) Derive the Spearman's rank correlation coefficient formula in case of without ties.

    ii) Derive the equation of regression line Y on X by the method of least square.

    iii) Derive the conditions of consistency in case of 3 attributes A, B, C.

3. Attempt **any four** of the following :   **16**

    i) Write short note on Scatter Diagram method.

    ii) State any two properties of regression coefficients and prove one of them.

    iii) Write short note on Age-SDR.

    iv) For three attributes A, B, C, express following class frequencies in terms of positive class frequencies

    $(A\beta)$, $(B\gamma)$, $(\alpha\beta)$, $(\alpha\beta\gamma)$.

    v) Prove the relation between Yule's coefficient of association and coefficient of colligation.

    vi) Define :

        i) C.D.R.   ii) T.F.R.

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Seat
No.

B.Sc. (Part - I) (Semester - II) Examination, May - 2015
STATISTICS (Paper - III) (New)
(Descriptive Statistics - II)
Sub. Code : 59686

Day and Date : Monday, 11 - 05 - 2015

Time : 12.00 noon to 02.00 p.m.

Total Marks : 50

Instructions : 1) All questions are Compulsory.

2) Figures to the right indicate full marks.

Q1) Choose the most correct alternative :   [10]

i)   The following scatter diagram shows :
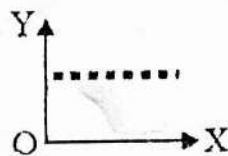
a) positive correlation

b) negative correlation

c) perfect correlation

d) no correlation

ii) If Cov(X, Y) = 2 then Cov(3X + 4, – 4Y + 3) = ...

a) – 24

b) – 5

c) 24

d) – 12

iii) The concept of rank correlation was given by :

a) Galton

b) Kendall

c) Spearman

d) Mood

iv) If rank correlation coefficient is equal to 1, it mean that :

a) all differences of ranks are nonzero

b) ranks in each pair are equal

c) ranks in each pair are not equal

d) none of these

P.T.O.

v) 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

vi) if $b_{yx} = -1/9$ and $b_{xy} = -1$ then correlation coefficient r is _____ .

    a) $-1/9$ b) $1/9$

    c) $-1/3$ d) $1/3$

vii) Which of the following coefficient have range 0 to 1

    a)   Simple correlation coefficient

    b)   Rank correlation coefficient

    c)   Multiple correlation coefficient

    d)   Partial correlation coefficient

viii) If $R_{1.23} = 0$ then $r_{12} = r_{13} =$ _____ .

    a)   0   b)   1

    c) -1 d)   0.5

ix) The partial correlation coefficient $r_{12.3} =$ _____ .

    a) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$ b) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{23}^2)}}$

    c) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)}}$ d) $\sqrt{\dfrac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}}$

x) If three regression planes coincide then determinant of total correlation coefficients matrix ($|R|$) is _____ .

    a) $|R| = 0$ b) $|R| = 1$

    c) $|R| > 0$ d) $|R| > 1$

Q2) Attempt any Two of the following : [20]

i) Define Spearman' s rank correlation coefficient. Derive the Spearman's rank correlation coefficient formula in case of without ties.

ii) Derive the equation of regression line of Y on X by the method of least square.

iii) Define multiple correlation coefficient. Obtain an expression for multiple correlation coefficient in terms of simple correlation coefficients.

Q3) Attempt any four from the following : [20]

i) Write Short note on Scatter diagram method.

ii) Derive the expression for acute angle between two regression lines.

iii) State and prove any one property of residuals.

iv) Show that multiple correlation coefficient lies between 0 to 1.

v) If $r_{12} = r_{13} = r_{23}$ $\rho (\rho \neq \pm 1)$ then show that $1 - R^2_{1.23} = \dfrac{(1-\rho)(1+2\rho)}{(1+\rho)}$

vi) Define :

a) Simple correlation coefficient

b) Residual of X_1 on X_2 and X_3

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