

## Chapter 17 - Correlation and Regression

### Correlation - Scatter Diagram

#### Past Year Questions

PYQ May 18

- (1) If the plotted points in a scatter diagram are evenly distributed, then the correlation is
- Zero
  - Negative
  - Positive
  - (a) or (b)

PYQ May 18

- (2) Speed of an automobile and the distance required to stop the car after applying brakes correlation is
- Positive
  - Negative
  - Zero
  - None of these

Note: Confusing question but ans is taken as per ICAI Study Material

PYQ May 18

- (3) A relationship  $r^2 = 1 - \frac{500}{300}$  is not possible
- True
  - False
  - Both (a) & (b)
  - None of these

PYQ Nov. 19

- (4) If the plotted points in a scatter diagram lie from upper left to lower right, then correlation is
- Positive
  - Negative
  - Zero
  - None of these

PYQ Nov. 20

- (5) Scatter diagram does not help us to?
- Find the type of correlation
  - Identify whether variables correlated or not
  - Determine the linear or non-linear correlation
  - Find the numerical value of correlation coefficient

PYQ July 21

- (6) If the data points of (X, Y) series on a scatter diagram lie along a straight line that goes downwards as X-values move from left to right, then the data exhibit ----- correlation.
- Direct
  - Imperfect indirect
  - Indirect
  - Imperfect direct

PYQ June 22

- (7) If the plotted point in a scatter diagram lie from lower left to upper right then correction is:
- Positive
  - Negative
  - Perfectly negative
  - Zero

PYQ June 22

- (8) Scattered diagram is used to plot
- Quantitative data
  - Qualitative data
  - Discrete data
  - Continuous data

#### Answer Key

1	a	2	b	3	a
4	b	5	d	6	c
7	a	8	a		

### Correlation - Scatter Diagram

#### Mock Test Paper Questions

MTP May 19

- (1) The covariance between two variables is
- Strictly positive
  - Strictly negative
  - Always 0
  - Either positive or negative or zero.

MTP May 19 Series II

- (2) Correlation analysis aims a
- Predicting one variable for a given value of the other variable
  - Establishing relation between two variables
  - Measuring the extent of relation between two variables
  - Both (b) and (c).

MTP May 20

- (3) When  $r = 1$ , all the points in a scatter diagram would lie
- On a straight line directed from lower left to upper right
  - On a straight line directed from upper left to lower right
  - On a straight line
  - Both (a) and (b)



MTP Apr 21

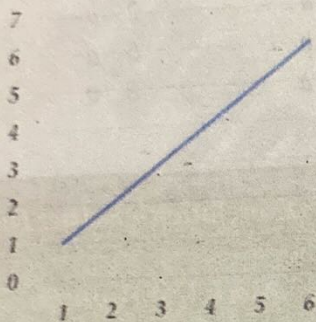
- (4) Price and Demand are the example of
- No correlation
  - Positive correlation
  - Negative correlation
  - None of these

MTP Nov 21

- (5) For a  $4 \times 7$  classification of bivariate data, the maximum no. of conditional distributions is:
- 11
  - 28
  - 35
  - None of these

MTP Nov 21

- (6) Below scatter diagram shows what type of correlation



- Perfect negative correlation
- Negative correlation
- Positive correlation
- Perfect positive correlation

MTP Oct 21

- (7) For a  $p \times q$  classification of bivariate data, the maximum no. of conditional distributions is
- $p$
  - $p+q$
  - $pq$
  - $P$  or  $q$

MTP Oct 21

- (8) For a  $p \times q$  bivariate frequency table, the maximum number of marginal distributions is
- $p$
  - $p+q$
  - 1
  - 2

MTP March 22

- (9) If the plotted points in a scatter diagram lie from upper left to lower right, then the correlation is
- Positive
  - Zero
  - Negative
  - none of these.

MTP June 22

- (10) For a  $m \times n$  two way or bivariate frequency table, the maximum number of marginal distributions is
- 1
  - 2
  - $m+n$
  - $mn$

MTP June 2023 Series II

- (11) A scatter diagram of two variables developing a pattern of multiple circular rings represents which kind of correlation?
- Positive
  - Negative
  - Curvilinear
  - No correlation

MTP June 24 Series II

- (12) For a  $(m \times n)$  classification of bivariate data, the maximum no. of conditional distributions is
- $p$
  - $p+q$
  - $Pq$
  - $p$

Answer Key

- |      |      |      |
|------|------|------|
| 1 d  | 2 d  | 3 a  |
| 4 c  | 5 a  | 6 d  |
| 7 b  | 8 d  | 9 c  |
| 10 b | 11 d | 12 b |

Karl Pearson Product Moment Correlation

Past Year Questions

PYQ May 18

- (1) The covariance between two variables is
- Strictly positive
  - Strictly negative
  - Always zero
  - Either positive or negative or zero

PYQ May 18

- (2) Correlation coefficient is \_\_\_\_\_ of the units of measurements.
- dependent
  - independent
  - both
  - none of these

PYQ Nov. 18

- (3) If the correlation coeff. between the variables X and Y is 0.5, then the correlation coefficient between the variables  $2x - 4$  and  $3 - 2y$  is
- 1
  - 0.5
  - 0.5
  - 0

PYQ June 19

- (4) Given that

X	Y
-3	9
-3/2	9/4
0	0
3/2	9/4
3	9



Then Karl Pearson's coefficient of correlation is

- a. Positive                      b. Zero  
c. Negative                      d. None of these

PYQ June 19

- (5) If the regression line of  $y$  on  $x$  is given by  $y = x + 2$  and Karl Pearson's coefficient of correlation is

0.5 then  $\frac{\sigma_y^2}{\sigma_x^2} =$  \_\_\_\_\_

- a. 3                                  b. 2  
c. 4                                  d. None of these

PYQ Nov. 19

- (6) What is the coefficient of correlation from the following data?

X	1	2	3	4	5
Y	5	4	3	2	6

- a. 0                                  b. -0.75  
c. -0.85                          d. 0.82

PYQ Nov. 20

- (7) The covariance between two variables is

- a. Strictly positive  
b. Strictly negative  
c. Always zero  
d. Either positive or negative or zero

PYQ Jan. 21

- (8) For the set of observations  $\{(1,2), (2,5), (3,7), (4,8), (5,10)\}$  the value of Karl-person's coefficient of correlation is approximately given by

- a. 0.755                          b. 0.655  
c. 0.525                          d. 0.985

PYQ Jan. 21

- (9) The coefficient of correlation between  $x$  and  $y$  is 0.5 the covariance is 16, variance of  $x$  is 16 then standard deviation of  $y$  is

- a. 4                                  b. 8  
c. 16                                d. 64

PYQ July 21

- (10) If the sum of the product of the deviations of  $X$  and  $Y$  from their means is zero the correlation coefficient between  $X$  and  $Y$  is:

- a. Zero                              b. Positive  
c. Negative                        d. 10

PYQ July 21

- (11) The sum of square of any real positive quantities and its reciprocal is never less than:

- a. 4                                  b. 2  
c. 3                                  d. 4

Note: Remember this as a property

PYQ June 22

- (12) Karl Pearson Correlation Coefficient method is used for -

- a. Any data  
b. Scattered data  
c. Grouped data  
d. Ungrouped data

PYQ June 22

- (13) Which of the following is used to find correlation between two qualitative characteristics

- a. Karl Pearson  
b. Spearman rank correlation  
c. Concurrent deviation  
d. Scatter diagram

PYQ Dec 22

- (14) Pearson's Correlation coefficient between  $x$  and  $y$  is :-

- a.  $\frac{\text{cov}(x,y)}{S_x S_y}$                       b.  $\frac{\text{cov}^2(x,y)}{S_x S_y}$   
c.  $\frac{(S_x S_y)^2}{\text{cov}(x,y)}$                       d.  $\frac{S_x S_y}{\text{cov}(x,y)}$

PYQ Dec 23

- (15) ---- may be defined as the ratio of covariance between the two variables to the product of the standard deviation of the two variables

- a. Scatter diagram  
b. Karl Pearson's correlation coefficient  
c. Spearman's correlation coefficient  
d. Coefficient of concurrent deviations

PYQ June 24

- (16) If  $\text{cov}(x,y) = -2.15$ ,  $S_x = 1.30$ ,  $S_y = 2.50$ , then correlation coefficient  $r$  is

- a. -0.66  
b. 0.66  
c. 0.76  
d. 0.99

PYQ June 24

- (17) The range of the coefficient of correlation is

- a. between -1 and 1  
b. between -1 and 1 including 1  
c. between -1 and 1 including -1  
d. between -1 and 1 including -1, 1



PYQ Sep 24

(18) The variance of two variables 'x' and 'y' are 16 and 25 and covariance between 'x' and 'y' is 18.5. Another two variables 'u' and 'v' are defined as  $u = (x-3)/2$  and  $v = (y-2)/3$ , then coefficient of correlation between 'u' and 'v' is:

- a. 0.875                      b. 0.85  
c. 0.90                         d. 0.925

Answer Key

- |      |      |      |
|------|------|------|
| 1 d  | 2 b  | 3 c  |
| 4 b  | 5 c  | 6 a  |
| 7 d  | 8 d  | 9 b  |
| 10 a | 11 b | 12 a |
| 13 b | 14 a | 15 b |
| 16 a | 17 d | 18 d |

Karl Pearson Product Moment Correlation

Mock Test Paper Questions

MTP May 18

(1) Correlation Co-efficient is \_\_\_\_\_ of the units of measurements

- a. Independent              b. Dependent  
c. Both                         d. none of these

MTP May 18

(2) If for two variable x and y, the covariance, variance of x and variance of y are 40, 16 and 256 respectively, what is the value of the correlation coefficient?

- a. 0.01                         b. 0.625  
c. 0.4                         d. 0.5

MTP Nov 18

(3) The correlation coefficient between x and y is 0.8, the correlation coefficient between u and v are  $2u + x + 4 = 0$  and  $4v + 16y + 11 = 0$

- a.  $r = 0.8$                       b.  $r = -0.8$   
c.  $r = 0$                          d.  $r = \pm 1$

MTP Nov 18

(4) If the relation between two variables x and y in given by  $2x+3y+4=0$ , then the Value of the correlation coefficient between x and y is

- a. 0                                b. 1  
c. -1                              d. Negative

MTP May 20

(5) If for two variable x and y, the covariance, variance of x and variance of y are 40, 16 and 256 respectively, what is the value of the correlation coefficient?

- a. 0.01                         b. 0.625  
c. 0.4                         d. 0.5

MTP May 20

(6) If the relation between x and u is  $3x + 4u + 7 = 0$  and the correlation coefficient between x and y is -0.6, then what is the correlation coefficient between u and y?

- a. -0.6                         b. 0.8  
c. 0.6                         d. -0.8

MTP Nov 20

(7) When  $r = 0$  then  $cov(x,y)$  is equal to

- ☆ a. +1  
b. -1  
c. 0  
d. None

MTP March 2021

(8) Correlation coefficient r,  $b_{xy}$  and  $b_{yx}$  are all have \_\_\_\_\_ signs

- a. Different                      b. Same  
c. Both                         d. None

MTP March 2021

(9) The covariance between two variables is

- a. Strictly positive  
b. Strictly negative  
c. Always zero  
d. Either positive or negative or zero

MTP Apr 21

(10) The correlation coefficient (r) is the \_\_\_\_\_ of the two regression coefficients

- a. AM                              b. GM  
c. HM                              d. Median

MTP Apr 21

(11) The coefficient of correlation between x and y is 0.6. If x and y values are multiplied by -1, then coefficient of correlation will be

- a. -0.6                         b. 1/0.6  
c. 0.6                         d. 0.4

MTP Nov 21

(12) There are two equations:  $m + 3p = 2$  and  $6n + 2q = 1$ . Correlation coefficients for p and q is 0.5. Find the correlation coefficients of m and n

- a. 0.6                              b. 0.5  
c. -0.5                         d. None of these

MTP Oct 21

(13) If the covariance between two variables is 20 and the variance of one of the variables is 16, what would be the variance of the other variable?



- a.  $s_y^2 \geq 25$       b. More than 10  
c. Less than 10      d. More than 1.25

MTP March 22

- (14) The covariance between two variables is  
a. Strictly positive  
b. Strictly negative  
c. Always 0  
d. Either positive or negative or zero.

MTP March 22

- (15) The covariance between two variables X and Y is 8.4 and their variances are 25 and 36 resp. Calculate Karl Pearson's coefficient of correlation  
a. 0.82      b. 0.28  
c. 0.01      d. 0.09

MTP Dec 22 - Series I

- (16) If correlation co-efficient  $r$  between  $x$  and  $y$  is 0.5  
★ then  $r$  between  $x$  and  $-y$  is  
a. 1      b. 0.5  
c. -0.5      d. 0

MTP Dec 22 Series II

- (17) The covariance between two variables is  
a. Strictly positive  
b. Strictly negative  
c. Always 0  
d. Either positive or negative or zero.

MTP Dec 23 Series I

- (18) If the coefficient of correlation between  $x$  and  $y$  is 0.5, the covariance is 16 and the Standard Deviation of  $y$  is  
a. 4  
b. 8  
c. 16  
d. 64

MTP June 24 Series I

- (19) The covariance between two variables X and Y is 8.4 and their variances are 25 and 36 respectively. Calculate Karl Pearson's coefficient of correlation between them.  
a. 0.82      b. 0.28  
c. 0.01      d. 0.09

MTP June 24 Series I

- (20) If  $r$  is the Karl Pearson's coefficient of correlation in a bivariate distribution the two regression lines are at right angles when \_\_\_\_  
a.  $r = \pm 1$       b.  $r = 0$   
c.  $r = \pm \infty$       d. None

MTP June 24 Series I

- (21) If  $r = 0.6$  then coefficient of non-determination is  
a. 0.4      b. -0.6  
c. 0.36      d. 0.64

MTP June 24 Series II

- (22) The correlation between two variables  $x$  and  $y$  is found to be 0.4. What is the correlation between  $2x$  and  $(-y)$ ?  
a. 0.4      b. -0.4  
c. 0.6      d. None of these

MTP June 24 Series II

- (23) Correlation Co-efficient is \_\_\_\_\_ of the units of measurements  
a. Dependent      b. Independent  
c. Both      d. None of these

MTP June 24 Series II

- (24) If for two variable  $x$  and  $y$ , the covariance, variance of  $x$  and variance of  $y$  are 40, 16 and 256 respectively, what is the value of the correlation coefficient?  
a. 0.01      b. 0.625  
c. 0.4      d. 0.5

MTP June 24 Series II

- (25) If  $r = 0.5$ ,  $\sum xy = 120$ ,  $\sigma_y = 8$ ,  $\sum x^2 = 90$ , then value of  $n$  is equal to \_\_\_\_  
where  $\sum xy = \sum (x - \bar{x})(y - \bar{y})$ ,  $\sum x^2 = \sum (x - \bar{x})^2$   
a. 5      b. 10  
c. 15      d. 20

MTP June 24 Series III

- (26) The maximum value of correlation coefficient is  
a. 0      b. 1  
c. -1      d. None of these

MTP June 24 Series III

- (27) Correlation Co-efficient is \_\_\_\_\_ of the units of measurements  
a. Independent      b. Dependent  
c. Both      d. None of these

MTP June 24 Series III

- (28) If for two variable  $x$  and  $y$ , the covariance, variance of  $x$  and variance of  $y$  are 40, 16 and 256 respectively, what is the value of the correlation coefficient?  
a. 0.01      b. 0.625  
c. 0.4      d. 0.5

MTP Sep 24 Series I

- (29) if the coefficient of correlation between  $x$  and  $y$  is 0.5, the covariance is 16 and if the standard deviation of  $x$  is 4 then Standard deviation of  $y$  is:



- a. 4                      b. 8  
c. 16                     d. 64

**Answer Key**

- |      |      |      |
|------|------|------|
| 1 a  | 2 b  | 3 a  |
| 4 c  | 5 b  | 6 c  |
| 7 c  | 8 b  | 9 d  |
| 10 b | 11 c | 12 b |
| 13 a | 14 d | 15 b |
| 16 c | 17 d | 18 b |
| 19 b | 20 b | 21 d |
| 22 b | 23 b | 24 b |
| 25 b | 26 b | 27 a |
| 28 b | 29 b |      |

**Spearman Rank Correlation**

**Past Exam Paper Questions**

**PYQ May 18**

- (1) Rank correlation coefficient lies between
- 0 to 1
  - 1 to +1 inclusive of these value
  - 1 to 0
  - Both

**PYQ June 19**

- (2) Given the following series:

X	10	13	12	15	8	15
Y	12	16	18	16	7	18

The rank correlation coefficient  $r =$

- $1 - \frac{6 \sum d^2 + \sum_{i=1}^2 \frac{m_i(m_i^2 - 1)}{12}}{n(n^2 - 1)}$
- $1 - \frac{6 \left[ \sum d^2 + \sum_{i=1}^2 \frac{m_i(m_i^2 - 1)}{12} \right]}{n(n^2 - 1)}$
- $1 - 6 \sum d^2 + \sum_{i=1}^2 \frac{m_i(m_i^2 - 1)}{12 n(n^2 - 1)}$
- $1 - 6 \sum d^2 + \sum_{i=1}^3 \frac{m_i(m_i^2 - 1)}{12 n(n^2 - 1)}$

**PYQ June 19**

- (3) Determine Spearman's rank correlation coefficient from the given data  $\sum d^2 = 30, n = 10$ :
- $r = 0.82$
  - $r = 0.32$

- $r = 0.40$
- None of these

**PYQ Dec 22**

- (4) The coefficient of rank correlation between the ranking of following 6 students in two subjects Mathematics and Statistics is:

Mathematics	Statistics
3	6
5	4
8	9
4	8
7	1
10	2

- 0.25
- 0.35
- 0.38
- 0.20

**PYQ Jun 23**

- (5) Spearman's rank correlation coefficient  $r_R$  is given by

- $1 - \frac{6 \sum d_i^2}{n(n^2 + 1)}$
- $1 + \frac{6 \sum d_i^2}{n(n^2 - 1)}$
- $1 + \frac{6 \sum d_i^2}{n(n^2 + 1)}$
- $1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$

**PYQ June 24**

- (6) For a group of 10 students the sum of squares of difference in ranks for physics and chemistry marks was 60, what is the value of rank correlation coefficient (Choose the nearest value)
- 0.636
  - 0.725
  - 0.698
  - 0.842

**PYQ June 24**

- (7) Spearman's correlation Coefficient is used to check
- The scattering of the data
  - The relationship in variables
  - The median of a data
  - The range of a data

**Answer Key**

- |     |     |     |
|-----|-----|-----|
| 1 b | 2 b | 3 a |
| 4 a | 5 d | 6 a |
| 7 b |     |     |



## Spearman Rank Correlation

## Mock Test Paper Questions

MTP May 19

- (1) If the sum of squares of difference of ranks, given by two judges A and B of 8 students in 21, what is the value of rank correlation coefficient?

a. 0.7                      b. 0.65  
c. 0.75                     d. 0.8

MTP Nov 18

- (2) If three Judges appointed for a beauty competition, then how many different rank correlation coefficients are required to analyse the judge competition.

a. 3                            b. 1  
c. 2                            d. 6

MTP March 21

- (3) If the sum of squares in difference of ranks, given by two judges A and B of 8 students is 21, What is the value of rank correlation coefficient?

a. 0.7                        b. 0.65  
c. 0.75                      d. 0.8

MTP June 22

- (4) In a bivariate distribution if the rank correlation coefficient  $r = 0.12$ ;  $\Sigma d^2 = 146$ ; Then the no. of observed pairs (N) is

a. 9                            b. 8  
c. 7                            d. 10

MTP June 2023 Series I

- (5) The coefficient of rank correlation between the ranking of following 6 students in two subjects Mathematics and Statistics is:

Mathematics	Statistics
3	6
5	4
8	9
4	8
7	1
10	2

a. -0.26                      b. 0.35  
c. 0.38                        d. 0.20

MTP Dec 23 Series I

- (6) The sum of the squares of differences in ranks of marks obtained in Physics and Chemistry by 10 students in a test is 150, then the coefficient of rank correlation by:

a. 0.849                      b. 0.091  
c. 0.909                      d. None of these

MTP Dec 23 Series II

- (7) If the sum of squares of the rank difference in mathematics and physics marks of 10 students is 22, then the coefficient of rank correlation is:

a. 0.267                      b. 0.897  
c. 0.92                        d. None of these

MTP June 24 Series II

- (8) The coefficient of rank correlation of marks obtained by 10 students in English and Economics was found to be 0.5, it was later discovered that the difference in ranks in the two subjects obtained by one student was wrongly taken as 3 instead of 7. Find correct coefficient of rank correlation.

a. 0.514                      b. 0.364  
c. 0.15                        d. 0.260

MTP Sep 24 Series I

- (9) The sum of the squares of differences in ranks of marks obtained in Physics and Chemistry by 10 students in a test is 150, then the coefficient of rank correlation by:

a. 0.849                      b. 0.091  
c. 0.909                      d. None of these

## Answer Key

1 c	2 a	3 c
4 d	5 a	6 b
7 b	8 d	9 b

## Correlation: Concurrent Deviation

## Past Exam Paper Questions

PYQ May 18

- (1) In the method of Concurrent Deviations, only the directions of change (Positive direction/Negative direction) in the variables are taken into account for calculation of

a. Coefficient of SD  
b. Coefficient of regression  
c. Coefficient of correlation  
d. None of these

PYQ June 22

- (2) If concurrent coefficient is  $1/\sqrt{3}$  and number of concurrent deviation is 6 for n pairs of data. Find total number of pairs?

a. 9                            b. 8  
c. 10                         d. 11



## Answer Key

1 c                      2 c

## Correlation: Concurrent Deviation

## Mock Test Paper Questions

MTP May 18

(1) Standard Error of Correlation coefficient

- ☆ a.  $\frac{1-r^2}{\sqrt{N}}$   
 b.  $\frac{1+r^2}{\sqrt{N}}$   
 c.  $\frac{1+r^2}{N}$   
 d.  $\frac{1-r}{N}$

MTP May 18

(2) Probable Error can be obtained using Correlation coefficient as

- a.  $0.675 \times \frac{1-r^2}{\sqrt{N}}$   
 b.  $\frac{2}{3} \times \frac{1+r^2}{\sqrt{N}}$   
 c.  $\frac{1+r^2}{N}$   
 d.  $\frac{1-r^2}{N}$

MTP May 19

(3) What is spurious correlation?

- a. It is a bad relation between two variables.  
 b. It is very low correlation between two variables.  
 c. It is the correlation between two variables having no causal relation.  
 d. It is a negative correlation

MTP Oct 21

(4) If the coefficient of correlation between two variables is 0.7 then the percentage of variation unaccounted for is

- a. 70%                      b. 30%  
 c. 51%                      d. 49%

MTP March 22

(5) If the coefficient of correlation between two variables is  $-0.9$ , then the coefficient of determination is

- a. 0.9                      b. 0.81  
 c. 0.1                      d. 0.19.

MTP June 22

(6) For 10 pairs of observations, number of concurrent deviations was found to be 4. What is the value of the coefficient of concurrent deviation?

- a.  $\sqrt{0.2}$                       b.  $1/3$   
 c.  $-1/3$                       d.  $-\sqrt{0.2}$

MTP Dec 22 - Series I

(7) For  $n$  pairs of observations, the coefficient of concurrent deviation is calculated as  $1/\sqrt{3}$ . If there are six concurrent deviations,  $n =$ 

- a. 11                      b. 10  
 c. 9                      d. 8

## Answer Key

- |     |     |     |
|-----|-----|-----|
| 1 a | 2 a | 3 c |
| 4 c | 5 b | 6 c |
| 7 b |     |     |

## Regression

## Past Exam Paper Questions

PYQ Nov. 18

(1) The two line of regression intersect at the point

- a. Mean                      b. Mode  
 c. Median                      d. None of these

PYQ Nov. 18

(2) If two lines of regression are  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$ , then the regression line of  $y$  on  $x$  is:

- a.  $x + 2y - 5 = 0$   
 b.  $2x + 3y - 8 = 0$   
 c.  $x + 2y = 0$   
 d.  $2x + 3y = 0$

PYQ Nov. 18

(3) If the two regression lines are  $3X = Y$  and  $8Y = 6X$ , then the value of correlation coefficient is

- a. 0.5                      b.  $-0.5$   
 c. 0.75                      d.  $-0.80$

PYQ Nov. 18

(4) The regression coefficient is independent of the change of:

- a. Scale                      b. Origin  
 c. Both (a) & (b)                      d. None of these



PYQ June 19

- (5) A.M. of regression coefficient is
- ★ a. Equal to  $r$   
 b. Greater than or equal to  $r$   
 c. Half of  $r$   
 d. None of these

PYQ Nov. 19

- (6) If two line of regression are  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$ . So  $x + 2y - 5 = 0$  is
- a.  $y$  on  $x$                       b.  $x$  on  $y$   
 c. Both (a) & (b)                d. None of these

PYQ Nov. 19

- (7) Find the coefficient of correlation.

- ★  $2x + 3y = 2$   
 $4x + 3y = 4$
- a.  $-0.71$                               b.  $0.71$   
 c.  $-0.5$                                 d.  $0.5$

PYQ Jan. 21

- (8) The interesting point of the two regression lines:  $y$  on  $x$  and  $x$  on  $y$  is
- a.  $(0, 0)$                               b.  $(\bar{x}, \bar{y})$   
 c.  $(b_{yx}, b_{xy})$                       d.  $(1, 1)$

PYQ Jan. 21

- (9) Given that the variance of  $x$  is equal to the twice of square of standard deviation of  $y$  and the regression line of  $y$  on  $x$  is  $y = 40 + 0.5(x - 30)$ . Then regression line of  $x$  on  $y$  is
- a.  $y = 40 + 4(x - 30)$   
 b.  $y = 40 + (x - 30)$   
 c.  $y = 40 + 2(x - 30)$   
 d.  $x = 30 + 2(x - 40)$

Note: Inadequate data to complete problem but by observing option only option d is of the format of X on Y

PYQ Jan. 21

- (10) Regression coefficients remain unchanged due to
- a. A shift to scale  
 b. A shift to origin  
 c. Replacing  $x$  - values by  $\frac{1}{x}$   
 d. Replacing  $y$  values by  $\frac{1}{y}$

PYQ July 21

- (11) If  $\bar{y} = 9x$  and  $x = 0.01y$  then  $r$  is equal to:
- ★ a.  $+0.1$                                 b.  $0.1$   
 c.  $+0.3$                                 d.  $-0.3$

PYQ July 21

- (12) The straight - line graph of the linear equation  $y = a + bx$ , slope is horizontal if:
- a.  $b = 1$                                 b.  $b \neq 0$   
 c.  $b = 0$                                 d.  $a = b \neq 0$

PYQ July 21

- (13) If  $b_{yx} = -1.6, b_{xy} = -0.4$  then  $r_{xy}$  will be:
- a.  $0.4$                                     b.  $-0.8$   
 c.  $0.64$                                 d.  $0.8$

PYQ July 21

- (14) If the slope of the regression line is calculated to be 5.5 and the intercept 15 then the value of Y if X is 6 is:
- a.  $88$                                     b.  $48$   
 c.  $18$                                     d.  $78$

PYQ July 21

- (15) For any two variables  $x$  and  $y$  the regression equations are given as  $2x + 5y - 9 = 0$  and  $3x - y - 5 = 0$ . What are the A.M. of  $x$  and  $y$ ?
- a.  $2, 1$                                     b.  $1, 2$   
 c.  $4, 2$                                     d.  $2, 4$

PYQ July 21

- (16) The intersecting point of two regression lines falls at X-axis. If the mean of X-values is 16, the standard deviations of X and Y are respectively, 3 and 4, then the mean of Y-value is
- a.  $16/3$                                     b.  $4$   
 c.  $0$                                         d.  $1$

PYQ July 21

- (17) The regression coefficients remain unchanged due
- a. Shift to origin                      b. Shift to scale  
 c. Always                                d. Never

PYQ Dec 22

- (18) The equations of the two lines of regression are  $4x + 3y + 7 = 0$  and  $3x + 4y + 8 = 0$ . Find the correlation coefficient between  $x$  and  $y$ ?
- a.  $-0.75$                                     b.  $0.25$   
 c.  $-0.92$                                     d.  $1.25$

PYQ Dec 22

- (19) The regression equations are  $2x + 3y + 1 = 0$  and  $5x + 6y + 1 = 0$ , then Mean of  $x$  and  $y$  are:
- a.  $-1, -1$                                 b.  $-1, 1$   
 c.  $1, -1$                                 d.  $2, 3$

PYQ Dec 22

- (20) If  $b_{yx} = 0.5, b_{xy} = 0.46$  then the value of correlation coefficient  $r$  is:
- a.  $0.23$                                     b.  $0.25$   
 c.  $0.39$                                     d.  $0.48$



PYQ Jun 23

- (21) For variables X and Y, we collect the four observations with  $\Sigma x = 10$ ;  $\Sigma y = 14$ ;  $\Sigma x^2 = 65$ ;  $\Sigma y^2 = 5$  and  $\Sigma xy = 3$ . What is the regression line of Y on X?
- $y = -0.8x - 5.5$
  - $y = 0.8x - 5.5$
  - $y = -0.8x + 5.5$
  - $y = 0.8x + 5.5$

PYQ Jun 23

- (22) The regression lines will be perpendicular to each other when the value of  $r$  is
- 1
  - 1
  - 1/2
  - 0

PYQ Jun 23

- (23) If the regression equations are  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$ , then the mean of x and the mean of y are \_\_\_\_\_ respectively.
- 3 and 4
  - 2 and 4
  - 1 and 2
  - 2 and 1

PYQ Dec 23

- (24) If the regression line of y on x and of x on y are given by  $10x - 290 = -20y$  and  $7y - 104 = -4x$ . Then the arithmetic means of x and y are
- 5, 12
  - 7, 12
  - 12, 5
  - 5, 7

PYQ Dec 23

- (25) If the coefficient of correlation is 0.8 and regression coefficient  $b_{xy} = 0.32$  then what is the value of regression coefficient  $b_{yx}$ ?
- 2
  - 1
  - 0.52
  - 0.48

PYQ Dec 23

- (26) If the Regression coefficient ( $r_{yx}$ ) of y on x is greater than unity, then other Regression coefficient ( $r_{xy}$ ) of x on y is:
- Less than one
  - Greater than one
  - Equal to one
  - Equal to zero

PYQ Dec 23

- (27) If  $4y - 6x = 18$  is regression line of y on x and coefficient of correlation between x and y is 0.8, then value of regression coefficient of x on y is?
- 0.2448
  - 0.4267
  - 0.5733
  - 0.7441

PYQ Jun 24

- (28) If the regression lines are  $3x - 4y + 8 = 0$  and  $4x - 3y = 1$ , then the correlation coefficient between x and y is \_\_\_\_\_
- 3/4
  - 3/8
  - 4/8
  - 1/4

PYQ Sep 24

- (29) Which of the following statement is correct?
- Regression Coefficients are independent of origin and scale
  - Both regression coefficients must be less than unity
  - The regression lines of two independent variables are parallel to each other
  - If two regression lines coincide with each other, there is no correlation between the variables

PYQ Sep 24

- (30) Which of the following statement is correct regarding limit of the two regression coefficients?
- Must be positive
  - No limit
  - One positive and the other negative
  - Product of the regression coefficients must be numerically less than unity

Answer Key

1 a	2 a	3 a
4 b	5 b	6 a
7 a	8 b	9 d
10 b	11 c	12 c
13 b	14 b	15 a
16 c	17 a	18 a
19 c	20 d	21 c
22 d	23 c	24 a
25 a	26 a	27 b
28 a	29 b	30 d

Regression

Mock Test Paper Questions

MTP May 18

- (1) Equations of two lines of regression are  $4x + 3y + 7 = 0$  and  $3x + 4y + 8 = 0$ , the mean of x and y are
- 5/7 & 6/7
  - 4/7 & -11/7
  - 2 & 4
  - none



MTP May 18

- (2) If two variables are uncorrelated then regression lines are
- a. Parallel                      b. Perpendicular  
c. Coincident                  d. Inclined at 450

MTP Nov 18

- (3) If the two regression co-efficient are 4 and 0.16 the percentage of unexplained variation is:
- a. 64                              b. 36  
c. 54                              d. 46

MTP Nov 18

- (4) For two variables  $x$  and  $y$  with the same mean the regression equation are  $y = 2x - \alpha$  and  $x = 2y - \beta$ ; what is the value of common mean
- a.  $-\alpha$                         b.  $\beta$   
c. 0                                d.  $-\beta$

MTP Nov 18

- (5) In a bivariate population, the linear regression lines  $3x + y - 2 = 0$  and  $y + x = 0$  then the coefficient of correlation is
- a. 0                                b.  $1/3$   
c.  $-1/3$                         d.  $-1/\sqrt{3}$

MTP May 19

- (6) If  $r = 0.6$  then the coefficient of non-determination
- a. 0.4                              b. -0.6  
c. 0.36                          d. 0.64

MTP May 19 Series II / MTP Sep 24 II

- (7) The two lines of regression become identical when
- a.  $r = 1$                         b.  $r = -1$   
c.  $r = 0$                         d. (a) or (b).

MTP May 19 Series II

- (8) If the regression coefficient of  $y$  on  $x$  is 2.5, the correlation coefficient 0.6 and the SD of  $y$  is 4, the SD of  $x$  is
- a. 0.64                          b. 0.24  
c. 0.96                          d. 1.44

MTP May 19 Series II

- (9) If the regression coefficient of  $y$  on  $x$  is 1.5 and the variances of  $x$  and  $y$  is 4 and 9 respectively then the correlation coefficient is
- a. 1                                b. -1  
c. 2.25                          d. 1

MTP May 19 Series II

- (10) If the coefficient of determination is 0.64 and the regression coefficient of  $x$  on  $y$  is 4 then the regression coefficient of  $y$  on  $x$  is
- a. 0.32                          b. 0.16  
c. 0.48                          d. 0.96

MTP Nov 19

- (11) If two regression coefficients are 4 and 0.16, the percentage of unexplained variation is.
- a. 64                              b. 36  
c. 54                              d. 46

MTP Nov 19

- (12) If the coefficient of determination is 0.64 and the regression coefficient of  $x$  on  $y$  is 4 then the regression coefficient  $y$  on  $x$  is.
- a. 0.32                          b. 0.16  
c. 0.48                          d. 0.96

MTP Nov 19

- (13) If two variables are independent their covariance is
- a. 1                                b. -1  
c. 0                                d. None of these

MTP Nov 19

- (14) The covariance between two variables  $x$  and  $y$  is 72. The variances of  $x$  and  $y$  are 144 and 81. The coefficient of correlation is
- a.  $1/3$                             b.  $4/5$   
c.  $2/3$                             d.  $3/5$

MTP Nov 20

- (15) The two lines of regression become identical when
- a.  $r = 1$                         b.  $r = -1$   
c.  $r = 0$                         d. Both (a) & (b)

MTP Nov 20

- (16) The regression coefficients remain unchanged due to a
- a. Shift of origin  
b. Shift of scale  
c. Both (a) and (b)  
d. (a) or (b)

MTP March 21

- (17) If  $u + 5x = 6$  and  $3y - 7v = 20$  and correlation coefficient between  $x$  and  $y$  is 0.58 then what be the correlation coefficient between  $U$  and  $V$  ?
- a. 0.58                          b. -0.58  
c. -0.84                        d. 0.84

MTP March 21

- (18) If  $y = 3x + 4$  is the regression line  $y$  on  $x$  and the arithmetic mean of  $x$  is -1, what is the arithmetic mean of  $y$
- a. 1                                b. -1  
c. 7                                d. None of these



MTP Apr 21

- (19) The regression equation  $x$  and  $y$  is  $3x + 2y = 100$ , the value of  $b_{xy}$
- a.  $-2/3$                       b.  $100/3$   
c.  $3/2$                          d.  $2/3$

MTP Nov 21

- (20) The coefficients of correlation between two variables  $x$  and  $y$  is the simple \_\_\_\_\_ of two regression coefficients.
- a. Harmonic Mean  
b. Arithmetic Mean  
c. Geometric Mean  
d. None of the above

MTP Nov 21

- (21) If  $r=0$ , regression lines are:
- a. Perpendicular  
b. Parallel  
c. They coincide  
d. Cannot be determined

MTP Oct 21

- (22) If the regression line of  $y$  on  $x$  and of  $x$  on  $y$  are given by  $2x + 3y = -1$  and  $5x + 6y = -1$  then the arithmetic means of  $x$  and  $y$  are given by
- a.  $(1, -1)$                       b.  $(-1, 1)$   
c.  $(-1, -1)$                       d.  $(2, 3)$

MTP March 22

- (23) The regression coefficients remain unchanged by
- a. Shift to origin                b. Shift to scale  
c. Always                         d. Never

MTP June 22

- (24) Consider the two regression lines  $3x + 2y = 26$  &  $6x + y = 31$ , Find the mean values of  $x$  and  $y$ .
- a.  $\bar{x} = 4$  and  $\bar{y} = 7$   
b.  $\bar{x} = 7$  and  $\bar{y} = 4$   
c.  $\bar{x} = 5$  and  $\bar{y} = 6$   
d. None of these

MTP June 22

- (25) If the regression line of  $Y$  on  $X$  is given by  $Y = X + 2$  and Karl Pearson's coefficient of correlation is 0.5 then  $\frac{\sigma_y^2}{\sigma_x^2} =$  \_\_\_\_\_.
- a. 3                                 b. 2  
c. 4                                 d. None of these

MTP Dec 22 - Series I

- (26) If  $4y - 5x = 15$  is the regression line of  $y$  on  $x$  and the coefficient of correlation between  $x$  and  $y$  is 0.75, what is the value of the regression coefficient of  $x$  on  $y$ ?

- a. 0.45  
c. 0.6

- b. 0.9375  
d. None of these

MTP Dec 22 - Series I / MTP Sep 24 II

- (27) If the regression line of  $y$  on  $x$  and of  $x$  on  $y$  are given by  $2x + 3y = -1$  and  $5x + 6y = -1$  then the arithmetic means of  $x$  and  $y$  are given by.
- a.  $(1, -1)$                         b.  $(-1, 1)$   
c.  $(-1, -1)$                       d.  $(2, 3)$

MTP Dec 22 - Series I

- (28) For a positive and perfectly correlated random variables, regression coefficient of  $x$  on  $y$  is 1.4 and the SD of  $X$  is 2, the variance of  $Y$  is
- a. 2.37                              b. 6.76  
c. 6.56                              d. 3.16

MTP Dec 22 Series II

- (29) If the two lines of regression are  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$ , then regression line of  $y$  on  $x$  is:
- a.  $x + 2y - 5 = 0$                 b.  $x + 2y = 0$   
c.  $2x + 3y - 8 = 0$                 d.  $2x + 3y = 0$

MTP Dec 22 Series II

- (30) If the two regression lines are  $3X = Y$  and  $8Y = 6X$  then the value of correlation coefficient is:
- a. -0.5                                b. 0.5  
c. 0.75                                d. -0.80

MTP Dec 22 Series II

- (31) AM of regression coefficient is:
- a. Equal to  $r$   
b. Greater than or equal to  $r$   
c. half of  $r$   
d. None of these

MTP Dec 22 Series II

- (32) If the regression line of  $y$  on  $x$  is given by  $y = x + 2$  and Karl Pearson's coefficient of correlation is 0.5 then  $\frac{\sigma_y^2}{\sigma_x^2} =$
- a. 3                                      b. 2  
c. 4                                      d. None of these

MTP Dec 22 Series II

- (33) When two lines of regression become identical if
- a.  $R = 1$                               b.  $R = -1$   
c.  $R = 0$                               d.  $a$  or  $b$

MTP June 2023 Series I

- (34) The equations of the two lines of regression are  $4x + 3y + 7 = 0$  and  $3x + 4y + 8 = 0$ . Find the correlation coefficient between  $x$  and  $y$ .
- a. -0.75                                b. 0.25  
c. -0.92                                d. 1.25



## MTP June 2023 Series I

- (35) The regression equation are  $2x + 3y + 1 = 0$  and  $5x + 6y + 1 = 0$ , then Mean of  $x$  and  $y$  respectively are
- |           |          |
|-----------|----------|
| a. -1, -1 | b. -1, 1 |
| c. 1, -1  | d. 2, 3  |

## MTP June 2023 Series I

- (36) If  $b_{yx} = 0.5$ ,  $b_{xy} = 0.45$  then the value of correlation coefficient is:
- |         |         |
|---------|---------|
| a. 0.23 | b. 0.25 |
| c. 0.39 | d. 0.47 |

## MTP June 2023 Series I

- (37) If  $Y$  is dependent variable and  $X$  is independent variable and the S.D. of  $X$  and  $Y$  are 5 and 8 respectively and co-efficient of co-relation between  $X$  and  $Y$  is 0.8. Find the Regression coefficient of  $Y$  on  $X$ :
- |         |         |
|---------|---------|
| a. 0.78 | b. 1.28 |
| c. 6.8  | d. 0.32 |

## MTP Dec 22 Series II

- (38) In regression analysis, which of the following can be in the form of an index number?
- Only dependent variable
  - Only independent variable
  - Both A and B
  - Need more information

## MTP Dec 22 Series II

- (39) If both the regression coefficients are negative, what will be coefficient of correlation?
- Negative
  - Positive
  - Can be either positive or negative
  - Cannot be determined

## MTP Dec 22 Series II

- (40) If the regression equation of two variables are  $5x - y = 4$  and  $3x - 2y = 1$ . Find the arithmetic means of  $x$  and  $y$
- 2, 1
  - 2, 2
  - 1, 1
  - Cannot be determined

## MTP Dec 23 Series I

- (41) Two regression lines are perpendicular each other of  $r =$
- |       |            |
|-------|------------|
| a. 0  | b. +1      |
| c. -1 | d. $\pm 1$ |

## MTP Dec 23 Series I

- (42) If one regression coefficient is \_\_\_ unity, the other must be \_\_\_ unity

- more than, more than
- less than, less than
- more than, less than
- positive, negative

## MTP Dec 23 Series I

- (43) Find the coefficient of correlation  $2x + 3y = 2$  and  $4x + 3y = 4$
- |          |         |
|----------|---------|
| a. -0.71 | b. 0.71 |
| c. -0.5  | d. 0.5  |

## MTP Dec 23 Series II

- (44) If one regression coefficient is greater than one, then other will be:
- More than one
  - Equal to one
  - Less than one
  - Equal to minus one

## MTP Dec 23 Series II

- (45) In a bivariate data  $\sum X = 30, \sum Y = 40$   
 $\sum X^2 = 196, \sum XY = 850$  and  $N = 10$ . The regression coefficient of  $Y$  on  $X$  is:
- |          |                  |
|----------|------------------|
| a. -5.31 | b. -8.23         |
| c. 6.89  | d. None Of these |

## MTP Dec 23 Series II

- (46) For a bivariate data, the two lines of regression are  $4x + 5y - 137 = 0$  and  $2x + 9y - 179 = 0$ , the values of  $\bar{X}$  and  $\bar{Y}$  are:
- |           |                  |
|-----------|------------------|
| a. 13, 17 | b. 16, 13        |
| c. 15, 11 | d. None Of these |

## MTP June 24 Series I

- (47) The correlation coefficient between  $x$  and  $y$  is  $-1/2$ . The value of  $b_{xy} = -1/8$ . Find  $b_{yx}$ .
- |       |       |
|-------|-------|
| a. -2 | b. -4 |
| c. 0  | d. 2  |

## MTP June 24 Series I

- (48) If  $Y$  is dependent variable and  $X$  is Independent variable and the S.D of  $X$  and  $Y$  are 5 and 8 respectively and co-efficient of co-relation between  $X$  and  $Y$  is 0.8. Find the Regression co-efficient of  $Y$  on  $X$ .
- |         |         |
|---------|---------|
| a. 0.78 | b. 1.28 |
| c. 6.8  | d. 0.32 |

## MTP June 24 Series I

- (49) Out of the following which one affects the regression co-efficient:
- Change of origin only
  - Change of scale only
  - Change of scale & origin both



- d. Neither change of origin nor change of scale

## MTP June 24 Series III

- (50) Equations of two lines of regression are  $4x + 3y + 7 = 0$  and  $3x + 4y + 8 = 0$ , the mean of  $x$  and  $y$  are
- $5/7$  and  $6/7$
  - $-4/7$  and  $-11/7$
  - $2$  and  $4$
  - none of these

## MTP June 24 Series III

- (51) If two variables are uncorrelated then regression lines are
- Parallel
  - Perpendicular
  - Coincident
  - Inclined at  $45^\circ$

## MTP June 24 Series III

- (52) If one regression coefficient is greater than one, then other will be:
- More than one
  - Equal to one
  - Less than one
  - Equal to minus one

## MTP Sep 24 Series I

- (53) Two regression lines are perpendicular each other  
A of  $r =$
- $0$
  - $+1$
  - $-1$
  - None of these

## MTP Sep 24 Series I

- (54) If one regression coefficient is \_\_\_\_\_ unity, the other must be \_\_\_\_\_ unity
- more than, more than
  - less than, less than
  - more than, less than
  - Positive, Negative

## MTP Sep 24 Series I

- (55) For regression lines  $4x - 2y = 3$  &  $2x - 3y = 5$ , find  $b_{xy}$
- $1/8$
  - $1/2$
  - $1/12$
  - None of these

## MTP Sep 24 Series II

- (56) The two lines of regression are given by  $8x + 10y = 25$  and  $16x + 5y = 12$  respectively. If the variance of  $x$  is  $25$ , what is the standard deviation of  $y$ ?
- $16$
  - $8$
  - $64$
  - $4$

## MTP Sep 24 Series II

- (57) If  $y = 3x + 4$  is the regression line of  $y$  on  $x$  and the arithmetic mean of  $x$  is  $-1$ , what is the arithmetic mean of  $y$ ?
- $1$
  - $-1$
  - $7$
  - None of these

## Answer Key

1 b	2 b	3 b
4 b	5 d	6 d
7 d	8 c	9 d
10 b	11 b	12 b
13 c	14 c	15 d
16 a	17 b	18 a
19 a	20 c	21 a
22 a	23 a	24 a
25 c	26 a	27 a
28 a	29 a	30 b
31 b	32 c	33 d
34 a	35 c	36 d
37 b	38 c	39 a
40 c	41 a	42 c
43 a	44 c	45 c
46 a	47 a	48 b
49 b	50 b	51 b
52 c	53 a	54 c
55 b	56 b	57 a

## Other Topics

## Past Exam Paper Questions

## PYQ May 18

- (1) The coefficient of determination is defined by the formula
- $r^2 = \frac{1 - \text{unexplained var iance}}{\text{total var iance}}$
  - $r^2 = \frac{\text{explained var iance}}{\text{total var iance}}$
  - both (a) and (b)
  - None of these

## PYQ June 19

- (2) Find the probable error if  $r = 2/\sqrt{10}$  and  $n = 36$
- $0.6745$
  - $0.067$
  - $0.5287$
  - None of these

## PYQ Nov. 20

- (3) Which of the following is spurious correlation?
- Correlation between two variables having no casual relationship



- b. Negative correlation  
 c. Bad relation between two variables  
 d. Very low correlation between two variables

PYQ Jun 23

- (4) Given that  $r = 0.4$  and  $n = 81$ , determine the limits for the population correlation coefficient.  
 a. (0.333, 0.466)    b. (0.367, 0.433)  
 c. (0.337, 0.463)    d. (0.373, 0.427)

PYQ Sep 24

- (5) In case of "Insurance companies' profit" and "The number of claims they have to pay", there exists a:  
 a. Negative correlation  
 b. Positive correlation  
 c. No correlation  
 d. It cannot be predicted

Answer Key

- |     |     |     |
|-----|-----|-----|
| 1 c | 2 b | 3 a |
| 4 c | 5 a |     |

## Other Topics

## Mock Test Paper Questions

MTP May 19 Series II

- (1) If the coefficient of correlation between two variables is 0.7 then the percentage of variation unaccounted for is  
 a. 70%    b. 30%  
 c. 51%    d. 49%

MTP May 20/ MTP Sep 24 II

- (2) What is spurious correlation?  
 a. It is a bad relation between two variables  
 b. It is very low correlation between two variables.  
 c. It is the correlation between two variables having no causal relation.  
 d. It is a negative correlation.

MTP May 20

- (3) If the coefficient of correlation between two variables is 0.8 then the percentage of variation unaccounted for is  
 a. 70%    b. 30%  
 c. 51%    d. 36%

MTP Nov 20/ RTP Sep 24

- (4) If the coefficient of correlation between two variables is  $-0.9$ , then the coefficient of determination is  
 a. 0.9  
 b. 0.81  
 c. 0.1  
 d. 0.19

MTP March 2021

- (5) The coefficient of two variables is 0.9, then coefficient of non-determination is  
 a. 0.9    b. 0.19  
 c. 0.81    d. 0.1

MTP Apr 21

- (6) If the coefficient of correlation between two variables is 0.8 then the percentage of variation unaccounted for is  
 a. 70%    b. 30%  
 c. 51%    d. 36%

MTP June 2023 Series II

- (7) Correlation between unrelated variables is not because of:  
 a. Coefficient of non-determination  
 b. Existence of third variable related to both the variables  
 c. Spurious correlation  
 d. None of the above

MTP Dec 2023 Series I/ MTP Sep 2024 I

- (8) If  $r = 0.6$ , then coefficient of non-determination is  
 a. 0.4    b.  $-0.6$   
 c. 0.36    d. 0.64

Answer Key

- |     |     |     |
|-----|-----|-----|
| 1 c | 2 c | 3 d |
| 4 b | 5 b | 6 d |
| 7 c | 8 d |     |