



Dr. Vishwanath Karad

**MIT WORLD PEACE
UNIVERSITY** | PUNE

TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

SY B.Tech-CSE

Question Bank Unit III

1 REGRESSION:-

1. The ranks of 10 students in two subjects are given below.

A	3	5	8	4	7	10	2	1	6	9
B	6	4	9	8	1	2	3	10	5	7

What is the rank correlation coefficient?

Ans: $\rho = -0.3$

2. 10 students scored the following marks in two subjects A and B. Calculate the rank correlation coefficient.

A	78	36	98	25	75	82	90	62	65	39
B	84	51	91	60	68	62	86	58	63	47

Ans: 0.843

3. Find the lines of regression for the following data:

x	10	14	19	26	30	34	39
y	12	16	18	26	29	35	38

and estimate y for x = 14.5 and x for y = 29.5.

Ans:

(a) Regression line of y on x
 $y - 24.857 = 0.9194 (x - 24.571)$

(b) Regression line of x on y
 $x - 24.571 = 1.0749 (y - 24.857)$

(c) x = 14.5 then y = 15.5977

(d) y = 29.5 then x = 29.56176

4. Obtain regression lines for the following data:

X	2	3	5	7	9	10	12	15
Y	2	5	8	10	12	14	15	16

Find estimate of

(a) Y when X = 6

(b) X when Y = 20

Ans: (a) Y = 8.237 (b) X = 16.37505

5. The table below gives the respective heights x and y of a sample of 10 fathers and their sons (in inches):

Heights of father x	65	63	67	64	68	62	70	66	68	67
Heights of son y	68	66	68	65	69	66	68	65	71	67

(a) Find regression line of y on x.

(b) Find regression line of x on y.

(c) Estimate son's height if father's height is 65 inches.

- (d) Estimate father's height if son's height is 60 inches.
 (e) Compute correlation coefficient between x and y.
 (f) Find the angle between the regression lines.

Ans:

- (a) $y = 0.4821 x + 35.4814$
 (b) $x = 0.8411 y + 9.3940$
 (c) $y = 66.8179$
 (d) $x = 59.86$
 (e) $r = 0.63678$
 (f) $\theta = 24.19^\circ$

6. Calculate the correlation coefficient for the following weights (in kg) of husband (x) and wife (y).

x	65	66	67	67	68	69	70	72
y	55	58	72	55	66	71	70	50

Ans: $r = 0.022$

7. Obtain correlation coefficient between population density (per square miles) and death rate (per thousand persons) from data related to 5 cities.

Population density	200	500	400	700	800
Death rate	12	18	16	21	10

Ans: $r = 0.1082$

8. Calculate the coefficient of correlation from the following information.

$n = 10$, $\sum x = 40$, $\sum x^2 = 190$, $\sum y^2 = 200$, $\sum xy = 150$, $\sum y = 40$.

Ans: $r = -0.2886$

9. **Given:** $n = 6$, $\sum(x - 18.5) = -3$, $\sum(y - 50) = 20$, $\sum(x - 18.5)^2 = 19$, $\sum(y - 50)^2 = 850$, $\sum(x - 18.5)(y - 50) = -120$.

Calculate coefficient of correlation.

Ans: $r = -0.9395$

10. Obtain regression lines for the following data:

x	6	2	10	4	8
y	9	11	5	8	7

Ans:

- (a) Regression line of y on x is

$$y = -0.65x + 11.9$$

- (b) Regression line of x on y is

$$x = -1.3y + 16.4$$

11. Find the coefficient of correlation for distribution in which S.D. of $x = 4$ and S.D. of $y = 1.8$. Coefficient of regression of y on x is 0.32.

Ans: $r = 0.711$

12. Given the following information

	Variable x	Variable y
Arithmetic mean	8.2	12.4
Standard deviation	6.2	20

Coefficient of correlation between x and y is 0.9. Find the linear regression estimate of x, given $y = 10$.

Ans: $x = 7.5304$

13. The following are marks obtained by 10 students in

Statistics and Economics.

No.	1	2	3	4	5	6	7	8	9	10
Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

Marks are out of 50. Obtain regression equation to estimate marks in Statistics if marks in Economics are 30.

Ans: $y = -0.664x + 59.248$, $y = 39.328$

14. If the two lines of regression are $9x + y - \lambda = 0$ and $4x + y = \mu$ and the means of x and y are 2 and -3 respectively. Find the values of λ, μ and the coefficient of correlation between x and y .

Ans: $\lambda = 15, \mu = 5, r = -0.663$

15. The regression equations are $8x - 10y + 66 = 0$ and $40x - 18y = 214$. The value of variance of x is 9. Find

- (a) The mean values of x and y
- (b) The correlation x and y
- (c) The standard deviation of y .

Ans: (a) $\bar{x} = 13, \bar{y} = 17$, (b) $r = 0.6$ (c) $\sigma_y = 4$

16. Two examiners A and B independently award marks to seven students.

Roll No.	1	2	3	4	5	6	7
Marks by A	40	44	28	30	44	38	31
Marks by B	32	39	26	30	38	34	28

Obtain the equations of regression lines. If examiner A awards 36 marks to Roll No. 8, what would be the marks expected to be awarded by examiner B to the same candidate?

Ans:

(a) Regression line of y on x is

$$y = 0.6874 x + 7.3874$$

(b) Regression line of x on y is

$$x = 1.2987 y - 5.6862$$

(c) $y = 32.133$

17. Determine the equations of regression lines for the following data:

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

and obtain an estimate of y for $x = 4.5$.

18. The following marks have been obtained by a group of students in Engineering Mathematics.

Paper I	80	45	55	56	58	60	65	68	70	75	85
Paper II	82	56	50	48	60	62	64	65	70	74	90

Calculate the coefficient of correlation.

Ans: $r = 9277$

19. Coefficient of correlation between two variables X and Y is 0.8. Their covariance is 20. The variance of X is 16. Find the standard deviation of Y series.

Ans: $\sigma_y = 6.25$

20. Find the coefficient of correlation for the following table:

x	10	14	18	22	26	30
y	18	12	24	6	30	36

Ans: $r = 0.6013$

21. The two regression equations of the variables x and y are

$$x = 19.13 - 0.87y \quad y = 11.64 - 0.50x$$

Find:

- (a) $\bar{x}$ and $\bar{y}$
(b) The correlation coefficient between x and y.

Ans: (a) $\bar{x} = 15.935$, $\bar{y} = 3.673$ (b) $r = -0.6595$

2 LEAST SQUARE METHOD:-

1. Find the best values of a and b so that $y = a + bx$ fits the data given in the table.

x	0	1	2	3	4
y	1.0	2.9	4.8	6.7	8.6

Ans: $a = 1$, $b = 1.9$

2. Fit a straight line to the following data.

x	71	68	73	69	67	65	66	67
y	69	72	70	70	68	67	68	64

Ans: $y = 39.5455 + 0.4242 x$

3. Find the linear least square polynomials based on data

x	-2	-1	0	1
y	6	3	2	2

is given. Find the least square straight line approximation to the data.

Ans: $10y = 26 - 13x$

4. The following table shows the number of salesmen working for a certain concern:

Year	1998	1999	2000	2001	2002	2003
Number	28	38	46	40	56	60

Use the method of least squares to fit a straight line trend.

Ans: $y = 5.9428x - 11843.9047$

5. If F is pull required to lift a load W by means of a pulley, fit a linear law $F = a + bW$ connecting F and W against the following data:

W	50	70	100	120
F	12	15	21	25

Ans: $F = 2.2785 + 0.1879W$

6. Employ the method of least squares to fit a parabola $y = a + bx + cx^2$ in the following data:

$(x, y) : (-1, 2), (0, 0), (0, 1), (1, 2)$

Ans: $y = 0.5 + 1.5x^2$

7. Fit a parabola $y = ax^2 + bx + c$ to the following data

taking x as independent variable.

x	1	2	3	5	7	11	13	17	19	23
y	2	3	5	7	11	13	17	19	23	29

Ans: $y = 1.4125x^2 + 1.0890x + 0.00313$

8. Fit a second degree parabola to the following:

x	1	2	3	4	5
y	1090	1220	1390	1625	1915

Ans: $2y = 2048 + 81x + 55x^2$

9. Fit a second degree parabola to the following data:

x	10	15	20	25	30	35	40
y	11	13	16	20	27	34	41

Ans: $700y = 7250 - 135x + 17x^2$