# Unit – VI ANALYSIS OF BIVARIATE DATA CORRELATION AND REGRESSION Section – A

## One mark questions

1.	Define correlation?	(U)
2.	Give an example for negative correlation between two variables.	(K)
3.	Give an example for positive correlation between two variables.	(K)
4.	Give an example where correlation does not exist.	(K)
5.	What is simple correlation?	(U)
6.	Give an example for simple correlation.	(K)
7.	What is multiple correlation?	(U)
8.	What is causation?	(S)
9.	What do you mean by spurious correlation?	(U)
10.	. What is 'perfect' correlation?	(U)
11.	. What is the nature of correlation between the variables 'expenditure on advertisement	,
	and ' likely' sales'?	(K)
12.	. What is the nature of correlation between the variables 'number of employees'	
	and 'expenditure on salary'?	(K)
13.	. What is the nature of correlation between the variables 'investment' and ' sales'?	(K)
14.	. What is the nature of correlation between the variables: salary and income tax?	(K)
15.	. Give an example of spurious correlation	(K)
16.	. What is scatter diagram?	(K)
17.	Mention a merit of scatter diagram.	(K)
18.	. Mention one demerit of scatter diagram.	(K)
19.	Define Karl Pearson's coefficient of correlation.	(K)
20.	. What is the value of 'r' when two variables are independent?	(S)
21.	Name the type of correlation when $r = -1$ ?	(K)
22.	. If r = 1, what is your conclusion?	(S)
23.	. What is the range for Karl Pearson's coefficient of correlation?	(K)
24.	Which method is used to calculate correlation coefficient when the data is qualitative	
	in nature?	(K)
25.	Mention one limitation of Spearman's coefficient of rank correlation.	(K)
26.	. Mention the limits of Spearman's coefficient of rank correlation.	(K)
27.	If $\sum d^2 = 0$ what is the value of spearman's rank correlation coefficient?	(S)
28.	. What is meant by regression?	(K)
29.	. Write the regression equation of x on y.	(K)
30.	. Write the regression equation of y on x.	(K)
31.	. Write the relationship between correlation coefficient and regression coefficients.	(K)
32.	. What is your conclusion when the regression lines are perpendicular?	(S)
33.	Write the co-ordinates of the point of intersection of the two regression equation.	(K)
34.	. What is your conclusion when the regression lines coincide?	(K)

## Section – B

#### Two marks questions

35. Mention two types of correlation.	(K)
36. Mention various methods of computing correlation.	(K)
37. Draw a scatter diagram to show positive correlation between two variables.	(K)
38. Draw a scatter diagram to show that there exists perfect negative correlation between	
two variables.	(S)
39. Define the term 'correlation'. Give an example.	(K)
40. What is 'positive correlation'? Give an example.	(K)
41. Mention which type of correlation is associated with	
a) Production and price of vegetable.	
b) Production of pigs and the production of the pig-iron.	(S)
42. Mention two uses of the study of correlation.	(U)
43. Mention two merits of scatter diagrams.	(U)
44. Mention two properties of γ.	(K)
45. In a bi-variate data $Cov(x,y)=V(x)=V(y)$ . Find $r_{xy}$ and conclude	(K)
46. Write the formula for Spearman's coefficient of rank correlation when one rank	
repeats 'm' times.	(S)
47. Mention two merits of Spearman's coefficient of rank correlation.	(K)
48. In a bi-variate data on x and y, $Var(x) = 9$ , $Var(y) = 49$ and $Cov(x, y) = 20$ . Find r.	(A)
49. Given, Cov (X , Y) = -100 , V(x) = 400 and S.D(y) = 5 . Find r.	(A)
50. In a bivariate data covariance is 20, variances are 25 and 36 respectively. Find r	(A)
51. If $\sum (x - \bar{x})^2 = 6000$ , $\sum (y - \bar{y})^2 = 920$ and $\sum (x - \bar{x})(y - \bar{y}) = 240$ , Find r.	(A)
52. Coefficient of correlation between two variables 'x' and 'y' is 0.32. Their covariance	
is 10.56. The variance of x is 9. Find Standard deviation of r.	(S)
53. If n=9 and $\Sigma d^2 = 24$ , find the coefficient of rank correlation.	(S)
54. Mention two properties of regression coefficients.	(K)
55. Mention two properties of regression lines.	(K)
56. Prove that $r = \pm \sqrt{b_{xy} b_{yx}}$ .	(S)
57. Mention two uses of regression analysis.	(K)
58. Mention the properties of the regression lines.	(K)
59. If r = 0.4, $\sigma_x$ = 12, $\sigma_y$ = 15, find the value of $b_{xy}$ .	(A)
60. If r = 0.5, $\sigma_x$ = 10, $\sigma_y$ = 15, find the value of $b_{yx}$	(A)
61. If bxy =0.5 S.d (x) =4 S.D(Y)=5, find r.	(A)
62. If bxy =0.6, r =0.75, S.D(X)= 3 find S.D(Y).	(S)

# Section – C

### Five marks questions

х	15	18	20	19	14	12	22	11
У	14	16	13	15	18	18	11	20

(S)

64. Draw a scatter diagram for the data given below and interpret. (S) х y 65. Calculate Pearson's coefficient of correlation from the following data. (A) х y 66. Calculate Pearson's coefficient of correlation from the following data. (A) х V 67. Calculate Karl Pearson's coefficient of correlation from the following data. (A) х y 68. Calculate the coefficient of correlation by Karl Pearson's method from the following data relating to overhead expenses and cost of production. (A) Overheads('000Rs) Cost('000Rs) 69. Following are the marks of 8 students in Statistics and Mathematics. Find coefficient (A) of rank correlation. Marks in Statistics Marks in Mathematics 70. Following are the ranks given by two Judges regarding exhibits of paintings. Find the Spearman's coefficient of rank correlation. (A) Paintings I judge II Judge 71. Calculate the coefficient of rank correlation from the following data. (A) Х v 72. The following data relate marks in Accountancy and Statistics. Marks in Accountancy Marks in Statistics Calculate Spearman's coefficient of correlation and interpret its value. (A) 73. Mention two differences between correlation and regression analysis. (K) 74. The following figures relate to years of service and income (in thousands of rupees) of the employees of an organization. Considering the preferential ranks, compute the

Length of service (years)	3	7	9	1	8	6	10	4	5	2
Income (000' of Rs.)	7	5	3	2	6	4	8	10	9	1

(A)

75. Find the regression equation of y on x and predict the average value of y when x is 9. (U)

х	3	6	5	4	4	6	7	5
У	3	2	3	5	3	6	6	4
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76. From the following data regarding the age of husband and the age of wife, estimate the age of husband when the age of wife is 16 years.

Husband's age (Yrs.)	36	23	27	28	28	29	30	31	33	35
Wife's age (Yrs.)	29	18	20	22	27	21	29	27	29	28

77. You are given with the following information about the expenditure on advertisement and sales :

	Advertisement	Salas (Crora Bs.)
	Expenditure (Crore Rs.)	Sales (CIDIE RS.)
Mean	20	120
S.D	5	2

Correlation coefficient = 0.8

- I. Obtain the two regression equations.
- II. Find the likely sales when the expenditure on advertisement is Rs. 25 crores.
- 78. Following are the details of the marks scored by students in kannada and

	kannada	English
Mean	40	50
S.D	10	16

Estimate the marks in Kannada when the scores in English is 30.

79. The regression equations of a bi-variate distribution are: Regression equation of y on x is 4y = 9x+15

Regression equation of x on y is 25x = 6y+7, Find  $\overline{x}$ ,  $\overline{y}$  and Y.

80. In a laboratory experiment on correlation research study, the equation to the two regression lines was found to be 2x-y+1=0 and 3x-2y+7=0. Find the means of x and y. Also, workout the values of regression coefficients and the coefficient of correlation between the two variables x and y.

#### Section – D

#### Ten marks questions

81. Calculate the coefficient of correlation between the number of male children and the number of female children from the following data .

No. of male	No. of female children					
children	0	1	2	3	4	
0	3	4	2	-	-	
1	4	8	8	2	-	
2	-	7	12	8	4	
3	-	3	8	8	5	
4	-	-	3	5	6	

(A)

(A)

(A)

(A)

(A)

82. Calculate Karl Pearson's coefficient of correlation.

x	20 – 29	30 – 39	40 – 49	50 – 59
10 - 14	10	10	-	-
14 - 18	-	20	8	-
18 – 22	-	10	25	6
22 – 26	_	-	7	4

83. Calculate Karl Pearson's coefficient of correlation from the data given below : (A)

Marks	Age in years						
	18	19	20	21	22		
20 – 25	3	2	-	-	-		
15 – 20	-	5	4	-	-		
10 – 15	-	-	7	10	-		
5 – 10	-	-	-	3	2		
0 – 5	-	-	-	3	1		

84. Following are the marks of 8 students in Statistics and Mathematics s and. Estimate the marks of a student in statistics who has scored 50 marks in Mathematic and estimate the marks of a student in mathematics who has scored 60 in statistics

Marks in Statistics	25	43	27	35	54	61	37	45
Marks in Mathematics	35	47	20	37	63	54	28	40

85. Find the two regression equations from the following data.

х	3	6	5	4	4	6	7	5
У	3	2	3	5	3	6	6	4

Also find correlation coefficient  $r_{xy}\!.$ 

86. Given the following information about expenditure on advertisement (crores) and sales (crores)

	Advertisement expenditure	Sales
Mean	20	120
S.D	5	2

Correlation coefficient = 0.3

- (a) Obtain the two regression equations
- (b) Estimate the sales when the expenditure on advertisement is Rs.25 crores.
- (c) Estimate the budget on advertisement if the sales are Rs. 150 crores.

# 87. Calculate the two regression co-efficients from the following bi-variate table and determine the value of r.

X X	0 - 10	10 – 20	20 – 30	30 – 40
10 - 20	5	4	3	-
20 – 30	7	6	7	6
30 - 40	-	5	-	7

(A)

(A)

88. Obtain the regression line of x on y for the following bi-variate frequency distribution. (A)

Sales revenue	Advertisement expenditure (in '000 Rs)					
(in '000 Rs)	5 – 15	15 – 25	25 – 35	35 – 45		
75 – 125	4	1	-	-		
125 – 175	7	6	2	1		
175 – 225	1	3	4	2		
225 – 275	1	1	3	4		

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