Solution: Computation of Rank Correlation Coefficient

Let $R_1 \rightarrow$ Rank by I Judge, $R_2 \rightarrow$ Rank by II Judge

R_1	R_2	$D = R_1 - R_2$	D^2
1	6	$1-6 = -5$	25
6	4	$6-4 = 2$	4
5	9	$5-9 = -4$	16
10	8	$10-8 = 2$	4
3	1	$3-1 = 2$	4
2	2	$2-2 = 0$	0
4	3	$4-3 = 1$	1
9	10	$9-10 = -1$	1
7	5	$7-5 = 2$	4
8	7	$8-7 = 1$	1
			$\Sigma D^2 = 60$

Rank correlation coefficient of two judes is given by

$$\rho = 1 - \frac{6\Sigma D^2}{n(n^2-1)} = 1 - \frac{6 \times 60}{10(10^2-1)}$$

$$= 1 - \frac{4}{11} = \frac{7}{11}$$

$$\rho = 0.636$$

$$\rho = 0.64 \text{ Ans}$$

The answer suggest that there is some degree of association between the ranking given by two judges.

Ques: Ranking of 10 trainees at the beginning and at the end of a certain course is given below

Trainees :	A	B	C	D	E	F	G	H	I	J
Rank at beginning :	1	6	3	9	5	2	7	10	8	4
Rank at end :	6	8	3	7	2	1	5	9	4	10

Calculate Spearman's rank correlation coefficient.

Ques: If the sum of the rank differences of 9 pairs of values is 80, find the rank correlation coefficient between them.

Solution: Here, we have $\Sigma D^2 = 80$ and $n = 9$

$$\rho = 1 - \frac{6\Sigma D^2}{n(n^2-1)}$$

$$= 1 - \frac{6 \times 80}{9(9^2-1)} = 1 - \frac{480}{720} = 1 - \frac{2}{3} = \frac{1}{3}$$

$$= 0.33 \text{ Ans}$$

Ques: In a bivariate data of n pairs of coservations, the sum of square of differences between the ranks of observed values of two variables is 231 and the rank correlation coefficient is -0.4. Find value of n.

Solution: Here, we have $\sum D^2 = 231$ and $\rho = -0.4$

$$\rho = 1 - \frac{6\sum D^2}{n(n^2-1)}$$

$$-0.4 = 1 - \frac{6 \times 231}{n(n^2-1)}$$

$$\frac{6 \times 231}{n(n^2-1)} = 1 + 0.4$$

$$\frac{6 \times 231}{n(n^2-1)} = 1.4 \Rightarrow 1.4\, n(n^2-1) = 1386$$

$$n(n^2-1) = \frac{1386}{1.4}$$

$$n^3 - n = 990 \Rightarrow n = 10$$ Ans

Ques: The coefficient of rank correlation between loan price and share prices of a company is found to be 0.143. If the sum of squares of differences in ranks is 48, find the value of n.