

## CHAPTER 8 – Measures of Correlation

**Q1**

**Solution:**

Name of the artisan	Position given by judge (A) (Rank 1)	Position given judge (B) (Rank 2)	D = (A-B) (Difference of two ranks)	D <sup>2</sup>
P	2	3	-1	1
Q	9	8	1	1
R	5	5	0	0
S	5	7	-2	4
T	2	2	0	0
U	2	3	-1	1
V	4	2	2	4
W	7	5	2	4
X	8	10	-2	4
Y	10	9	1	1
				$\sum D^2 = 20$

Number of Artisans (N) = 10

$$\text{Coefficient of rank correlation} = 1 - \frac{6 \sum D^2}{N(N^2-1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{6 \times 20}{10(100-1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{120}{990}$$

⇒ Coefficient of rank correlation =  $1 - 0.121$

⇒ Coefficient of rank correlation =  $0.8787 \dots$

⇒ Coefficient of rank correlation =  $0.88$

## Q2

### Solution:

Marks scored in Mathematics (M)	(Rank 1)	Marks scored in Accountancy (A)	(Rank 2)	D = (M-A) (Difference of two ranks)	D <sup>2</sup>
50	2	80	6	-4	16
60	3	71	4	-1	1
65	4	60	2	2	4
70	5	75	5	0	0
75	6	90	8	-2	4
40	1	82	7	-6	36
80	7	70	3	4	16
85	8	50	1	7	49
					$\sum D^2 = 126$

Number of Students (N) = 8

Coefficient of rank correlation =  $1 - \frac{6 \sum D^2}{N(N^2 - 1)}$

⇒ Coefficient of rank correlation =  $1 - \frac{6 \times 126}{8(64 - 1)}$

⇒ Coefficient of rank correlation =  $1 - \frac{756}{504}$

⇒ Coefficient of rank correlation =  $1 - 1.5$

⇒ Coefficient of rank correlation =  $-0.5$

**Q3****Solution:**

Subject A (Rank 1)	Subject B (Rank 2)	D (Rank 1 – Rank 2)	D <sub>2</sub>
3	6	-3	9
5	4	1	1
8	9	-1	1
4	8	-4	16
7	1	6	36
10	2	8	64
2	3	-1	1
1	10	-9	81
6	5	1	1
9	7	2	4
			$\sum D^2 = 214$

Number of Students (N) = 10

$$\text{Coefficient of rank correlation} = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{6 \times 214}{10(100 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{1284}{990}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - 1.296$$

$$\Rightarrow \text{Coefficient of rank correlation} = -0.296$$

**Q4****Solution:**

Cost	Rank 1	Sales	Rank 2	D (rank 1 – rank 2)	D <sub>2</sub>
78	7	84	8	-1	1
36	2	51	2	0	0

98	10	91	10	0	0
25	1	60	5	-4	16
75	6	68	7	-1	1
82	8	62	6	2	4
90	9	86	9	0	0
62	4	58	4	0	0
65	5	53	3	2	4
39	3	47	1	2	4
					$\sum D^2 = 30$

Number of Students (N) = 10

$$\text{Coefficient of rank correlation} = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{6 \times 30}{10(100 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{180}{990}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - 0.181$$

$$\Rightarrow \text{Coefficient of rank correlation} = 0.818$$

## Q 5

**Solution:**

X	Y	D	D <sub>2</sub>
Rank 1	Rank 2	(Rank 1 - Rank 2)	
1	12	-11	121
2	9	-7	49
3	6	-3	9
4	10	-6	36
5	3	2	4
6	5	1	1
7	4	3	9
8	7	1	1

9	8	1	1
10	2	8	64
11	11	0	0
12	1	11	121
			$\sum D^2 = 416$

Number of Students (N) = 12

$$\text{Coefficient of rank correlation} = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{6 \times 416}{12(144 - 1)}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - \frac{2496}{1716}$$

$$\Rightarrow \text{Coefficient of rank correlation} = 1 - 1.454$$

$$\Rightarrow \text{Coefficient of rank correlation} = -0.454$$