Numerical on Agglomerative Hierarchical Clustering using single link technique

Sample No.	X	Y
P1	0.40	0.53
P2	0.22	0.38
P3	0.35	0.32
P4	0.26	0.19
P5	0.08	0.41
P6	0.45	0.30

For the given dataset, find the clusters using a single link technique. Use Euclidean distance and draw the Dendrogram.

Soln:

Step-1: Compute the distance matrix

$$d(P_1, P_2) = \sqrt{(0.22-0.40)^2 + (0.38-0.53)^2}$$
$$= 0.23$$

$$d(P_1, P_3) = \sqrt{(0.35-0.40)^2 + (0.32-0.53)^2}$$
$$= 0.22$$

So, the matrix formed from the distance between the particular points is

	P1	P2	P3	P4	P5	P6
P1	0					
P2	0.23	0				
P3	0.22	0.14	0			
P4	0.37	0.19	0.13	0		
P5	0.34	0.14	0.28	0.23	0	
P6	0.24	0.24	0.10	0.22	0.39	0

Step 2: Merging the two closest members

⇒ Here the minimum value is 0.10 and hence we combine P3 and P6 (as 0.10 came in the P6 row and P3 column)

⇒ Now, we form clusters of elements corresponding to the minimum value and updat the distance matrix

Updated distance matrix:

	P1	P2	P3, P6	P4	P5
P1	0				
P2	0.23	0			
P3, P6	0.22	0.14	0		
P4	0.37	0.19	0.13	0	
P5	0.34	0.14	0.28	0.23	0

(P3, P6)

Again,

	P1	P2	P3, P6, P4	P5
P1	0			
P2	0.23	0		
P3, P6, P4	0.22	0.14	0	
P5	0.34	0.14	0.28	0

(P3, P6), P4

Again,

	P1	P2, P5	P3, P6, P4
P1	0		
P2, P5	0.23	0	
P3, P6, P4	0.22	0.14	0

{(P3, P6), P4} and (P2, P5)

Again,

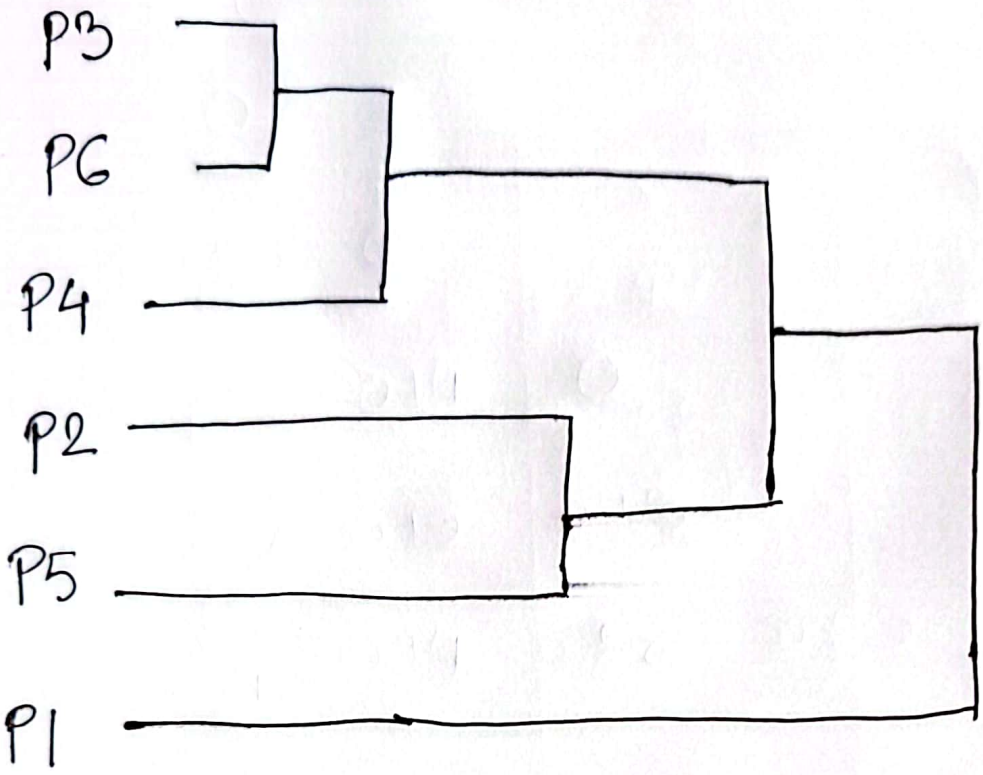
	P1	P2, P5, P3, P6, P4
P1	0	
P2, P5, P3, P6, P4	0.22	0

[{(P3, P6), P4}, (P2, P5)]

Final resulting cluster is:

[{(P3, P6), P4}, (P2, P5)], P1

The dendogram will be as follows:



Dendgram of the cluster formed