Experiment 9

Program:-

```
data = [
    [5, 2], [2, 4], [9, 5], [3, 6], [3, 1], [5, 5], [1, 5], [6, 7], [4, 2], [2, 7],
    [9, 2], [1, 5], [4, 6], [3, 6], [1, 7], [8, 4], [8, 7], [2, 2], [7, 2], [2, 1],
    [2, 4], [1, 2], [1, 4], [2, 6], [7, 7], [2, 4], [3, 4], [1, 4]
]

X = [i[0] for i in data]
y = [i[1] for i in data]

import matplotlib.pyplot as plt
plt.scatter(X, y)
plt.show()

import math
def dist(center, point):
    d = 0.0
    for i in range(0, len(point)):
        d += (center[i] - point[i]) ** 2
    return math.sqrt(d)

def assignCenters(centers, dataset):
    clusters = []
    for i in range(len(dataset)):
        distances = []
        for center in centers:
            distances.append(dist(center, dataset[i]))
        temp = [z for z, val in enumerate(distances) if val == min(distances)]
        clusters.append(temp[0])
    return clusters

def mean_center(k, dataset, clusters):
    nCenters = []
    for i in range(k):
        x = 0.0
        y = 0.0
        count = 0
        for j in range(len(clusters)):
            if i == clusters[j]:
                x += dataset[j][0]
                y += dataset[j][1]
                count += 1
        x = x / count
        y = y / count
        nCenters.append([x, y])
    return nCenters

print("Enter k")
k = int(input())
```

```
centers = []
for i in range(k):
    print("Enter center " + str(i))
    temp = [int(x) for x in input().split()]
    centers.append(temp)

print("Initial centers:")
print(centers)

print("Initial clusters:")
clusters = assignCenters(centers, data)
for i in range(k):
    print("Cluster " + str(i))
    for j in range(len(clusters)):
        if i == clusters[j]:
            print(data[j], end="")
    print()

for itr in range(10):
    print("Iteration " + str(itr))
    centers = mean_center(k, data, clusters)
    print("Updated centers:")
    print(centers)
    clusters = assignCenters(centers, data)
    print("Updated clusters:")
    for i in range(k):
        print("Cluster " + str(i))
        for j in range(len(clusters)):
            if i == clusters[j]:
                print(data[j], end="")
        print()
```

Output:-