## **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] \text{ for } i \text{ in data}]
y = [i[1] \text{ for } i \text{ 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 \text{ for } z, \text{ val in enumerate}(\text{distances}) \text{ if } \text{val} == \min(\text{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[i]:
           x += dataset[j][0]
           y += dataset[i][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[i]:
        print(data[i], 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()
```

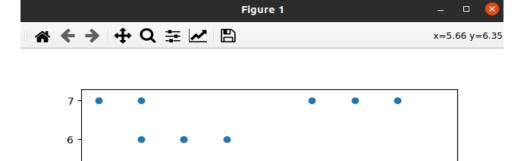
5

4

3

2

## **Output:-**



6