<u>UNIT 5: Unsupervised_Clustering_Reinforcement</u>

- **1.** "Reinforcement learning maps states or situations to actions in order to maximise some numerical reward". Justify this statement with appropriate examples of your choice.
- **2.** Explain Reinforcement Learning Cycle with suitable examples.
- **3.** What is reinforcement learning? Explain with suitable examples.
- **4.** Write and explain the k-means clustering algorithm. What are the four distance measures used by the classic k-means algorithm?
- **5.** Write a note on Markov Decision Process.
- **6.** Write and explain the SOM Algorithm. Explain with proper example why does it fall under the category of *'competitive learning'* algorithms?
- 7. Explain the Reinforcement Learning in Detail.
- **8.** Cluster the dataset = $\{2,3,4,10,11,12,20,25,30\}$ using k-means algorithm. We need to group into two clusters. Assume the initial centroids as 2 and 12.
- 9. Cluster the following eight data points A1(2,10), A2(2,5), A3(8,4), A4(5,8), A5(7,5), A6(6,4), A7(1,2), A8(4,9). Use k-means clustering with k = 3. Initial centroids are the data points A1, A4 and A7.
- **10.** Explain the following terms with appropriate examples:
 - (i) Hierarchical Clustering
 - (ii) Mixture Densities
- 11. Compare and Contrast K-Means and Hierarchical Clustering.
- **12.** State and explain the Self-Organizing Feature Map with necessary illustrations.
- **13.** Write '*O learning algorithm*' for deterministic rewards and functions.
- **14.** What is *Q learning*? Derive an equation for *Q function*.
- **15.** What is the criteria for choosing the number of clusters? Explain.
- **16.** Answer the following:
 - (i) How do you choose the value of 'k' in k-means algorithm?
 - (ii) What are the stopping criterion of k-means algorithm.
- 17. List and briefly explain a few applications of the Expectation Maximisation Algorithm.
- **18.** What are the two distinctive steps of the Expectation Maximisation Algorithm? Briefly explain how it this algorithm fits into the Gaussian Mixture Model.