

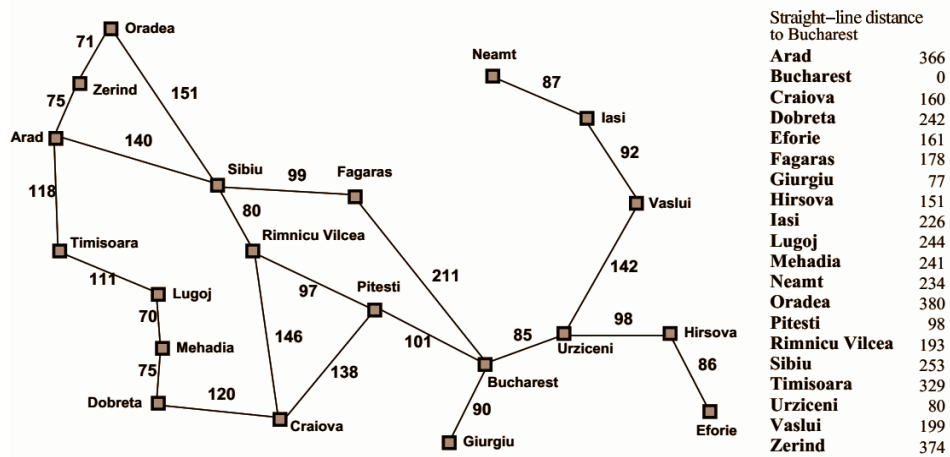
Time : 3 hrs

Marks : 80

- Note: 1. Question number 1 is compulsory.  
 2. Solve any three questions out of the remaining five questions  
 3. Assume suitable data if necessary.  
 4. Figure to the right indicates full marks.

Q.1 Solve any **Four** of the following.

- (a) Consider the graph shown in figure below. Assume that the initial state is Arad and the goal state is Bucharest. Create a search tree to find a path from the initial state to the goal state using Greedy Best First Search. Generate the solution cost using the straight line distance mentioned in figure below. Is it an optimal solution? If not please write the optimal solution. 05



- (b) State the reason for increase in the popularity of data mining in the field of machine learning. 05
- (c) Explain the term mean square error, root mean square error, and mean absolute error. 05
- (d) Demonstrate that data cleansing is an important aspect for unsupervised learning. 05
- (e) Illustrate how machine learning helps in enhancing operation of wind energy systems. 05

- Q.2 (a) Describe McCulloch-Pitts Neuron Model and discuss its performance for the implementation of NOT, OR, and AND operations. 10
- (b) Why is dimensionality reduction an important issue? Describe the steps to reduce dimensionality using the principal component analysis method by clearly stating mathematical formulas used. 10

- Q.3 (a)** List different types of activation function and describe any three in brief. **10**
- (b)** Consider the following 2-D dataset in Table. Construct a SVM classifier model. Given (2,1), (2, -1), and (4, 0) as support vectors, estimate the parameters of the model and classify (4, 2). **10**

(X1, X2)	(1, -1)	(2, -1)	(5, -1)	(4, 0)	(6, 0)	(1, 1)	(2, 1)	(5, 1)
Class	C1	C1	C2	C2	C2	C1	C1	C2

- Q.4 (a)** Following dataset represents a substation working pattern for different atmospheric conditions where YES represents smooth working and NO represents that there is some fault developed in the substation. Using Naive Bayes classifier classify the substation working pattern for unseen circumstance {Sunny, Cool, High, Strong} **10**

Outlook	Temperature	Humidity	Windy	Pattern
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

- (b)** Apply  $k$ -means algorithm in given data for  $k = 3$ . Use  $C_1 = 2$ ,  $C_2 = 16$ , and  $C_3 = 38$  as the initial cluster centers. Data {2, 4, 6, 3, 31, 12, 15, 16, 38, 35, 14, 21, 23, 25} **10**

- Q.5** (a) Discuss the challenges faced in demand side management and explain how machine learning enhances the demand side management process. **10**
- (b) Explain the decision tree? Comment on the selection of the best attribute for decision tree classifier along with examples. **10**
- Q.6** Write short notes on any **Four**
- (a) Compare informed and uninformed strategies **05**
- (b) Diversity of data: Structured and Unstructured data **05**
- (c) Perceptron training rule **05**
- (d) Deep Learning **05**
- (e) Electrical load pattern classification using machine learning **05**

\*\*\*\*\*