

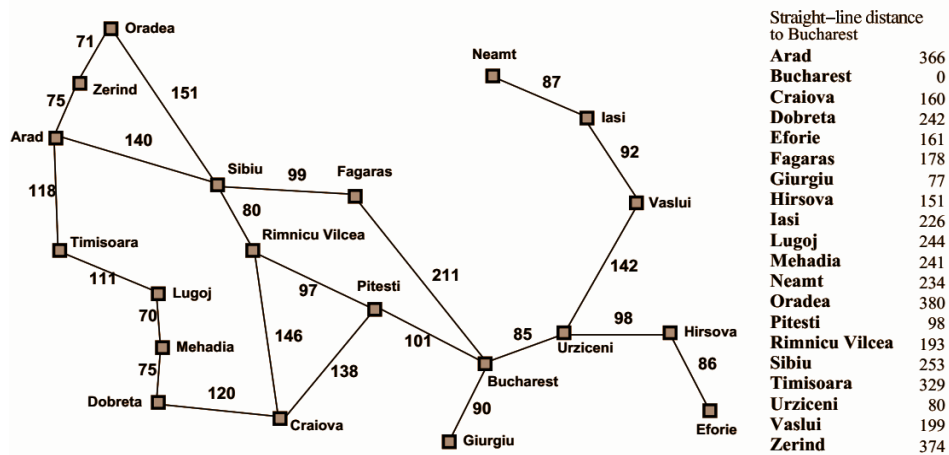
TIME : 3Hrs

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) For a machine learning learning model to work efficiently there is always a tradeoff between bias and variance. Justify **05**
- (c) Highlight the usefulness of the confusion matrix in machine learning, and also discuss various terms involved in it. **05**
- (d) Demonstrate that impact of outliers on data set. **05**
- (e) Illustrate how machine learning helps in enhancing operation of renewable 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) Explain reinforcement learning in detail along with the various elements involved in forming the concept. **10**
- Q.3** (a) State the problem with the perceptron training rule. How gradient descent and delta rule addresses the problem. Derive the gradient descent rule. **10**

- (b) The following data of current and voltage level for different electrical appliances was obtained by conducting a load test. Predict the likely value of voltage level for the appliance having current value of 27 A. **10**

| Current (A) | Voltage (V) |
|-------------|-------------|
| 17 | 140 |
| 21 | 189 |
| 24 | 210 |
| 28 | 240 |
| 14 | 130 |
| 16 | 100 |
| 19 | 135 |
| 22 | 166 |
| 15 | 130 |
| 18 | 170 |

- Q.4** (a) Use agglomerative clustering and draw single link dendrogram for following distance matrix **10**

| | 1 | 2 | 3 | 4 | 5 |
|---|----|---|---|---|---|
| 1 | 0 | | | | |
| 2 | 2 | 0 | | | |
| 3 | 6 | 3 | 0 | | |
| 4 | 10 | 9 | 7 | 0 | |
| 5 | 9 | 8 | 5 | 4 | 0 |

- (b) 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 |

Q.5 (a) With the help of a suitable constrained power system model, discuss the challenges in static security assessment.. **10**

(b) Define SVM? Explain the following terms: hyperplane, separating hyperplane, margin, and support vectors with suitable examples. **10**

Q.6 Write short notes on any **Four**

(a) Compare informed and uninformed strategies **05**

(b) Data mining **05**

(c) Activation function and its types. **05**

(d) Deep learning **05**

(e) Load forecasting using machine learning **05**
