

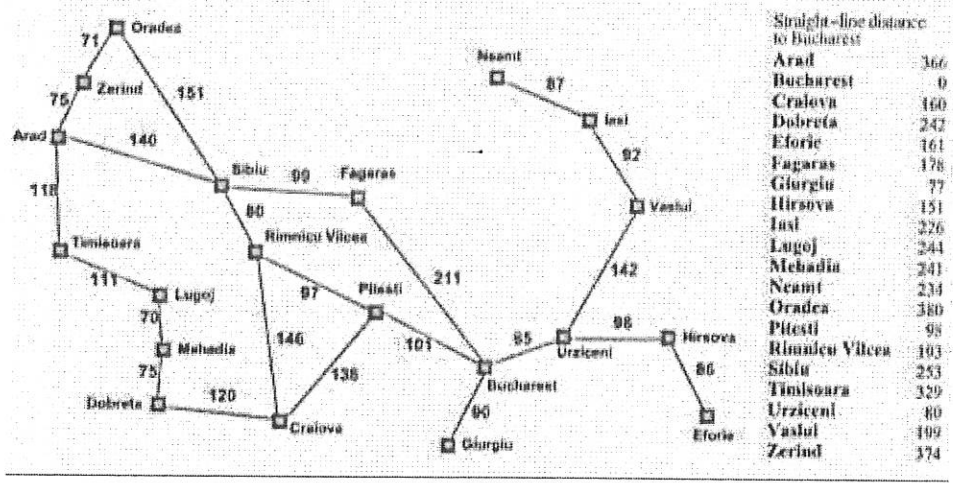
B.E. Sem-III C-scheme Summer 2025 ELEC
 10/6/25
 Marks: 80

Time: 3 hrs

- 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) Compare structured and unstructured forms of data. 05
 (c) Discuss the bias and variance in machine learning. 05
 (d) Illustrate the impact of outliers in a data set. 05
 (e) Describe the challenges in static security assessment 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) 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 classifies the substation working pattern for unseen circumstances {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.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) A impulse test was conducted on different insulators employed from a few months and the status of insulating property was found out where 0 indicates healthy and 1 indicates unhealthy. Use k-nearest neighbor algorithm to find the status of insulator for withstand voltage (kV)= 43.6, and installed duration (months)= 40 10

Insulator No	Withstand Voltage (kV)	Installed Duration (Months)	Status (Healthy - 0, Unhealthy -1)
1	33.6	50	1
2	26.6	30	0
3	23.4	40	0
4	43.1	67	0
5	35.3	23	1
6	35.9	67	1
7	36.7	45	1
8	25.7	46	0
9	23.3	29	0

- Q.5 (a) Explain voltage control expert system (VCES) along with its advantages over algorithmic approach. 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) Hill climbing search 05
- (b) Data mining 05
- (c) Activation function and its types 05
- (d) Deep Learning 05
- (e) Wind speed forecasting using machine learning 05
