O – 23642

Register No. | | | | | | | | |

BSc Degree Examination November 2023

Fifth Semester

Common to all branches

20BCT51 – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(Regulations 2020)

Time: Three hours | Maximum: 100 marks

Answer all Questions

Part – A (10 × 2 = 20 marks)

1. List any four AI applications. [CO1,K1]
2. Write an algorithm for "Generate-and-Test". [CO1,K2]
3. What is categorical data? Give an example. [CO2,K3]
4. Write a formula to calculate the performance metrics accuracy and precision. [CO2,K2]
5. Distinguish between supervised learning and unsupervised learning. [CO3,K2]
6. List any two characteristics of support vector machine. [CO3,K1]
7. Find the Euclidean distance between the data points (5, 7) and (13, 12). [CO4,K3]
8. Find the mean of given cluster {12, 13, 25, 34}. [CO4,K3]
9. Draw the structure of biological neuron and name its parts. [CO5,K2]
10. State the concept of regularization algorithm. [CO5,K1]

Part – B (5 × 16 = 80 marks)

11. a. Elaborate on depth-first search technique. Give an example of a problem for which depth-first search would work better than breadth-first search. (16) [CO1,K2]

(OR)

b. Write the working principle of Hill climbing technique. Illustrate the different types of Hill climbing with suitable example. (16) [CO1,K2]

12. a. i) Summarize the different types of data with suitable examples. (10) [CO2,K1]

ii) Enumerate the different types of machine learning tools and its purpose. (6) [CO2,K1]

(OR)

b. Demonstrate Hold – out method and k-fold cros validation method used to train a model for supervised learning. (16) [CO2,K1]

13. a. Apply K-NN learning algorithm to identify the class label for the test sample given below. (16) [CO3,K3]

Training Data

| GiveBirth | CanFly | Live in Water | Class |
|---|---|---|---|
| Yes | No | No | Mammals |
| No | No | No | Non-mammals |
| No | No | Yes | Non-mammals |
| Yes | No | Yes | Mammals |
| No | No | No | Non-mammals |
| Yes | Yes | No | Mammals |
| No | Yes | No | Non-mammals |
| Yes | No | No | Mammals |
| Yes | No | Yes | Non-mammals |
| Yes | No | No | Mammals |

Test Data:

| Give Birth | CanFly | Live in water | Class |
|---|---|---|---|
| Yes | No | Yes | ? |

(OR)

b. Compute the entropy and information gain to construct to decision tree for the given dataset. (16) [CO3,K3]

| Color | Type | Doors | Tyres | Class |
|---|---|---|---|---|
| Red | SUV | 2 | Whitewall | + |
| Blue | Minivan | 4 | Whitewall | – |
| Green | Car | 4 | Whitewall | – |
| Red | Minivan | 4 | Blackwall | – |
| Green | Car | 2 | Blackwall | + |
| Green | SUV | 4 | Blackwall | – |
| Blue | SUV | 2 | Blackwall | – |
| Blue | Car | 2 | Whitewall | + |
| Red | SUV | 2 | Blackwall | – |
| Blue | Car | 4 | Blackwall | – |
| Green | SUV | 4 | Whitewall | + |
| Red | Car | 2 | Blackwall | + |
| Green | SUV | 2 | Blackwall | – |
| Green | Minivan | 4 | Whitewall | – |

14. a. Apply the K-means clustering algorithm to the following dataset, group in to 3 clusters. Show the cluster centroids after second iteration. (16) [CO4,K3]

| Sepal Length | Sepal Width |
|---|---|
| 5.1 | 3.5 |
| 4.9 | 3.0 |
| 4.7 | 3.2 |
| 7.0 | 3.2 |
| 6.4 | 3.2 |
| 6.9 | 3.1 |
| 9.2 | 3.0 |
| 9.5 | 3.3 |
| 9.9 | 3.2 |

(OR)

b. Demonstrate Hierarchical clustering and DBSCAN clustering based techniques with suitable example. Compare the merits of these two techniques. (16) [CO4,K3]

15. a. Draw the structure of multilayer ANN. Illustrate the concept of back propagation algorithms to train the multilayer neural network. (16) [CO5,K2]

(OR)

b. Highlight the features of ensemble learning algorithms. Demonstrate the various ensemble leaning algorithms with suitable example. (16) [CO5,K2]

| Bloom's Taxonomy Level | Remembering (K1) | Understanding (K2) | Applying (K3) | Analysing (K4) | Evaluating (K5) | Creating (K6) |
|---|---|---|---|---|---|---|
| Percentage | 21 | 40 | 39 | – | – | – |