



# CBCS SCHEME

21AI71

## Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Advanced AI and ML

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define AI. Explain the foundation of AI in detail. (10 Marks)
- b. Explain history of AI in detail. (10 Marks)

OR

- 2 a. Briefly explain the properties of task environment. (10 Marks)
- b. Explain the following with respect to structure of agents:
  - i) Simple reflex agents
  - ii) Model based reflex agents
  - iii) Utility based agents(10 Marks)

### Module-2

- 3 a. What is decision theory? Describe the decision theoretic agent that selects rational actions. (10 Marks)
- b. What is Baye's rule? Explain with a relevant example. (10 Marks)

OR

- 4 a. Explain the following with examples:
  - i) Kolmogorov's axioms
  - ii) Inclusion – Exclusion principle
  - iii) Probability density function
  - iv) Joint Probability distribution
  - v) Independence(10 Marks)
- b. Prove that probabilistic agent can perform better than logical agent by concept of wumpus world. (10 Marks)

### Module-3

- 5 a. Define perceptrons. How the perceptrons are represented? Explain perceptron training rule. (08 Marks)
- b. Derive the gradient descent rule. (08 Marks)
- c. Write the stochastic gradient descent version of the BACKPROPAGATION algorithm for feedforward network containing 2 layers of sigmoid units. (04 Marks)

OR

- 6 a. Write the prototypical genetic algorithm. (05 Marks)
- b. Explain the different operators with relevant bit strings. (06 Marks)
- c. Illustrate program tree representation in genetic programming. Explain block stacking problem. (09 Marks)

**Module-4**

- 7 a. What is association rule mining? Explain support, confidence and lift. (10 Marks)  
b. What is collaborative filtering? Explain the types. (10 Marks)

**OR**

- 8 a. What is BOW model? What are the 3 ways to identify the importance of words in BOW model? (08 Marks)  
b. Explain Naïve – Baye's model for sentiment classification. (08 Marks)  
c. Brief stemming and lemmatization process. (04 Marks)

**Module-5**

- 9 a. Define Clustering. What are the different types of clustering? (06 Marks)  
b. Explain k-medoids clustering with relevant example. (08 Marks)  
c. Write the k-nearest neighbor algorithm using voronoi diagram. (06 Marks)

**OR**

- 10 a. Explain distance weighted Nearest neighbor algorithm. (05 Marks)  
b. Derive and explain locally weighted Linear Regression. (10 Marks)  
c. Briefly explain radial basis function. (05 Marks)

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