



## End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: M.Tech & I

Name of the Paper: Artificial Intelligence

Paper Code: MCS-143

Time: 3 hour

Maximum Marks: 100

**Note:**

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks)

- a. Explain the difference between Uninformed Search and Informed Search. Describe the properties of a heuristic function  $h(n)$ . CO-1
- b. Define the PEAS (Performance measure, Environment, Actuators, Sensors) framework for describing an intelligent agent. Apply the PEAS framework to model an Autonomous Taxi Driver. CO-1
- c. Formulate the classic N-Queens Problem as a Constraint Satisfaction Problem (CSP), clearly defining the variables, domains, and constraints. CO-1

Q2.

(2X10=20 Marks)

- a. Explain the concepts of soundness and completeness in logical reasoning systems. Translate the following English statements into First-Order Logic (FOL) sentences:
  - 1) "All students who study pass."
  - 2) "Some dogs do not like cats."CO-2
- b. Describe the role of Bayesian Networks in reasoning under uncertainty. Explain the key difference between Propositional Logic and reasoning systems that handle uncertainty. CO-2
- c. Distinguish between Induction and Deduction as methods of inference used in AI systems. Briefly describe the goal of Explanation-Based Learning (EBL). CO-2

Q3.

(2X10=20 Marks)

- a. Compare and contrast Procedural Knowledge (e.g., skill-based rules) with Declarative Knowledge (e.g., facts and axioms). CO-3
- b. Describe the core mechanism of Forward Chaining and Backward Chaining reasoning strategies. Give a simple example scenario (e.g., a medical diagnosis) where Backward Chaining would be the more efficient and preferred strategy, justifying your choice. CO-3
- c. Explain the difference between monotonic and non-monotonic reasoning with the help of proper example. CO-3

Q4.

(2X10=20 Marks)

- a. Define and differentiate between Supervised Learning and Unsupervised Learning. Provide a typical real-world application and a relevant algorithm for each category. CO-4
- b. Describe the mechanism by which a Decision Tree algorithm performs classification. Explain the concept of overfitting in the context of decision trees. CO-4
- c. Briefly describe the key structural difference between a Convolutional Neural Network (CNN) and a Recurrent Neural Network (RNN). CO-4

Q5.

(2X10=20 Marks)

- a. Identify and briefly explain the three main components of an Expert System. Focus on the function of the Inference Engine and how it interacts with the Knowledge Base to provide solutions. CO-5
- b. Explain the major limitation of the single-layer Perceptron model, specifically its inability to solve problems that are not linearly separable. CO-5
- c. Explain the distinction between Syntax and Semantics in the context of Natural Language Processing. Briefly describe the role of Speech Recognition and Machine Translation. CO-5