examples of real-life applications that use NLP. 1+2+2=5

(b) What are the major ethical concerns surrounding the development and deployment of artificial intelligence? How can AI systems become biased and what are the consequences of such bias? 2+3=5

(c) Prolog is often used for AI applications. Which of its characteristics make it especially suitable for expert systems and reasoning-based tasks? 4

10. (a) Write a brief note on important characteristics of prolog. How does Prolog differ from procedural programming languages like Python? 5+3=8

(b) What is the significance of the cut operator(!) in Prolog and how does it affect backtracking? 6

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UG/Integrated Even Semester Examination, 2025

COMPUTER SCIENCE

(2nd Semester)

Course No.: MCS-553

(Artificial Intelligence)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

The figures in the right margin indicate full marks for the question. Answer any five questions selecting one from each unit.

UNIT-I

1. (a) What is an intelligent agent in artificial intelligence (AI)? What are the characteristics of a rational agent? 2+2=4

(b) Explain how the state space tree is used in solving the Missisionaries and Cannibals problem. How does the concept of pruning apply to a state space tree? 8+2=10

2. (a) Write a brief note on the following use cases of AI: 3

(i) Expert System

(ii) Natural Language Processing

(b) What is the Turing Test, and why is it significant in AI? 4

(c) Do you think AI will ever surpass human intelligence? Why or why not? 4

UNIT-II

3. (a) With a suitable example describe the A* algorithm. Under what conditions does the A* algorithm guarantee an optimal solution? 8+2=10

(b) What are admissible and consistent heuristics? Explain with examples. 2+2=4

4. (a) What is Heuristic Function? 2

(b) Describe the different types of Informed Search Strategies. 4

(c) Explain the Minimax search algorithm used for decision-making in two-player games. Explain how Alpha-Beta pruning improves the efficiency of the Minimax algorithm. 4+4=8

UNIT-III

5. (a) Define First Order Logic (FOL). How is it different from Propositional Logic? 1+2=3

(b) List and explain the elements of FOL. 4

(c) Assume the following facts : 7

(i) Steve only likes easy courses

(ii) Science courses are hard.

(iii) All the course in the basket weaving department are easy.

(iv) BK301 is a basket weaving course

Convert the above facts into clause form and use resolution to answer the question, "What course would Steve like?"

6. (a) Explain the process of converting a propositional logic formula into clause form. 9

(b) What is automated planning in artificial intelligence? What are the main components of a planning problem? 2+3=5

UNIT-IV

7. (a) What is Machine Learning (ML), and how does it differ from traditional programming? 2+2=4

(b) Define bias and variance in the context of machine learning models. How do they relate to the model's performance? 2+2=4

(c) Explain the difference between supervised learning and unsupervised learning. 6

8. (a) Define the terms "model", "algorithm", and "hypothesis" in machine learning. 6

(b) What is overfitting in machine learning, and how can it be prevented? 4

(c) What is Reinforcement Learning? How does it compare with other Machine Learning techniques? 2+2=4

UNIT-V

9. (a) What is Natural Language Processing (NLP), and why is it important in AI? Give