Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination December 2024

Roll no.....

Name of the Course and semester: B Tech CSE Sem 7th
Name of the Paper: Artificial Intelligence
Paper Code: TCS 706
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 (10 marks) CO1

Define Artificial Intelligence (AI). Explain in detail how AI is applied to problem-solving in games, natural language processing, automated reasoning, and visual perception. Provide examples to illustrate your answer.

(b)
You are tasked with developing a heuristic algorithm for a simple game scenario where a player must reach the target score of 50 by selecting numbers from the set {1, 3, 5, 7}. The algorithm prioritizes larger numbers first. Simulate the algorithm's decision-making process to solve for the target score of 50.

(c)
AI often aims to simulate human-like intelligent behavior. Critically evaluate the challenges and limitations of replicating sophisticated tasks such as natural language understanding and visual perception. Provide examples to support your analysis.

Q2 (10 marks) CO2
(a)
Explain context-free grammar and transformational grammar. Construct a detailed parse tree for the sentence: "The cat sat on the mat." Specify the grammar rules used.

(b)
Given the transition net below, simulate the parsing process for the input sentence: "John runs quickly."
Transition Net:
S → NP VP
NP → {John, Mary} VP → V Adv
V → {runs, walks}
Adv → {quickly, slowly}
Show each transition step and the resulting structure.

(c)
Describe the concept of transformational grammar and its role in natural language processing. How does it differ from context-free grammar in handling complex sentence structures? Provide examples.

Q3 (10 marks) CO3
(a)Discuss the role of first-order predicate calculus in knowledge representation. Write expressions to represent the following facts and query their relationship:
- "All birds can fly."
- "Penguins are birds but cannot fly."
- "Tweety is a penguin." Query: Can Tweety fly?

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