

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

M.A./M.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2024

FIRST YEAR [BATCH 2024-26]

COMPUTER SCIENCE

Paper : CC 1

Date : 13/12/2024

Time : 11.00 am – 1.00 pm

Full Marks : 50

Answer any five questions:

[5×10]

1. a) What do you mean by ‘Rationality’ of an agent? Explain with example.
b) Suppose you design a machine to pass the Turing test. What are the capabilities such a machine must have?
c) What is the role of an initial state and a goal state in state space search? [4+4+2]
2. a) Why is the branching factor an important metric in state space search?
b) In a search space if the solution exists at the shallowest depth, which blind search strategy would you choose and why?
c) What do you mean by Iterative Deepening DFS? [3+4+3]
3. a) Explain Overestimation and Underestimation in context of A* search with the help of an example.
b) Consider a state space where the start state is number 1 and each state k has two successors: numbers $2k$ and $2k + 1$. Draw the portion of the state space for states 1 to 15. Suppose the goal state is 11. List the order in which nodes will be visited for i) breadth first search ii) depth-limited search with limit 3. [5+5]
4. a) Compare Iterative Hill Climb and Random Walk algorithms.
b) Explain the difference between unary and binary constraints in CSP.
c) Design and explain a CSP to schedule exams for three subjects AI, ML, IoT in two available time slots, ensuring:
No two subjects can occur at the same time.
ML must occur before IoT. [4+2+4]
5. a) Let $P(x)$ be the statement “x spends more than five hours every weekday in class,” where the domain for x consists of all students. Express the following quantifications in English:
i) $\exists x \neg P(x)$
ii) $\forall x P(x)$
b) Translate each of these statements into logical expressions using necessary predicates, quantifiers, and logical connectives
i) Something is not in the correct place.
ii) Everything is in the correct place and in excellent condition.
c) let $R(x, y, z)$ denote the statement “ $x + y = z$ ”. When values are assigned to the variables x, y, and z, this statement has a truth value. Write and explain the truth values of the propositions $R(1, 2, 3)$ and $R(0, 0, 1)$. [3+4+3]
6. a) Is the following argument valid?
“If you do every problem in this book, then you will learn AI. You learned AI. Therefore, you did every problem in this book.”
Explain using proposition.
b) What do you mean by ‘Resolution by refutation’?
c) Explain Skolemization. [4+3+3]

[P.T.O]

7. a) Represent the following sentence using Semantic Net: Team Falcon won a game 'F2' against team Panther with score 5-2.
- b) How to represent time intervals in Ontological Engineering? Explain with example.
- c) Compare ADL and STRIPS. [4+3+3]

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