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Fifth Semester B.E. Degree Examination, June/July 2024 Principles of Artificial Intelligence

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define following terms :
 - i) Total Turing Test
 - ii) Logical positivism
 - iii) Tractable problems
 - iv) Decision Theory
 - v) Neurons. (05 Marks)
- b. For an automotive taxi driver example, write working of goal agents and utility agents with necessary diagrams. [No explanations]. (10 Marks)
- c. Write PEAS specification of a biometric authentication system. (05 Marks)

OR

- 2 a. Explain Any two milestones in the history of AI :
 - i) Neural networks failure to generalize
 - ii) Advent of DENDRAL
 - iii) Emergence of Intelligent Agents. (05 Marks)
- b. Differentiate following types of agents :
 - i) Semi – dynamic V/s dynamic
 - ii) Episodic V/s sequential
 - iii) Deterministic V/s Stochastic (05 Marks)
- c. Write PEAS specification for Tomato Classification System. (10 Marks)

Module-2

- 3 a. Write and explain five components of a problem with example. (05 Marks)
- b. Write the state space for a vacuum cleaner to clean 2 squares P and Q is to the bottom of P. [Hence actions are Top, Bottom, Clean, Suck]. (10 Marks)
- c. For the tree given below, using BES write the steps traversed from A to E. Build frontier and explored sets, (No explanation, steps should be shown clearly) (Breadth First Search).

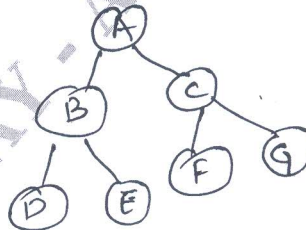


Fig Q3(c)

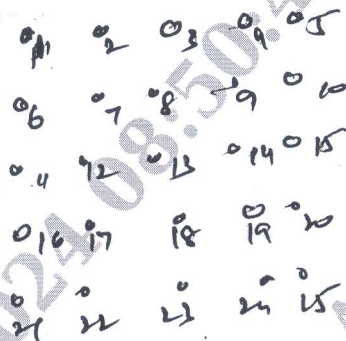
(05 Marks)

OR

- 4 a. Differentiate the following :
 - i) Goal formulation V/s Problem solution
 - ii) Toy problem V/s Real world problem. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

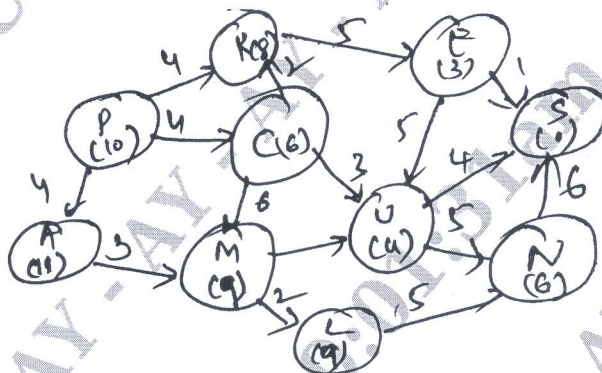
- b. Demonstrate Separation property of GRAPH SEARCH on the following rectangular grid [At least 3 sequences]



- c. For graph shown in Fig Q3(c) using DFS write steps to reach G from A, Also show frontier at each step [Depth First Search]. (05 Marks)
(10 Marks)

Module-3

- 5 a. For following graph, demonstrate the working of Greedy best first search. Heuristics Arch inside brackets of each node.



Source Node = P
Goal Node = S

Fig Q5(a)

- b. Explain the admissibility and consistency property of A* search. (10 Marks)
c. Explain relaxed problem and pattern databases. (05 Marks)
(05 Marks)

OR

- 6 a. For following graph and heuristic function table, explain the working of A* search.

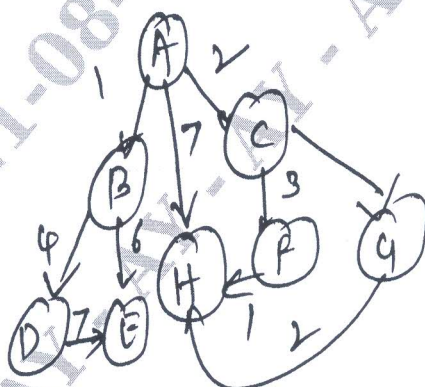


Fig Q6(a)
Source = A, Goal = H

Nodes	Heurists
A	5
B	3
C	4
D	2
E	6
F	3
G	1
H	0

(10 Marks)

- b. Define syntax, semantics, model, satisfaction and entailment of logic. (05 Marks)
 c. Explain the five commonly used logical connectivity in propositional logic. (05 Marks)

Module-4

- 7 a. Explain formal languages and their ontological and epistemological commitments. (05 Marks)
 b. Represent following English statements in following : (10 Marks)
 i) All birds fly ii) Every man respect his parent iii) Some boys play football iv) Only one student failed in maths.
 c. Define and write possible set of axioms on set theory. (05 Marks)

OR

- 8 a. Write and explain the unification algorithm. (05 Marks)
 b. Differentiate Forward chaining and Backward chaining for the example : "As per the law, it is crime for America to sell weapons to hostile nations. Country A, enemy of America, has some missiles, and all missiles were sold to Robert, Who is an American citizen". Prove that "Robert is criminal" using Forward chaining. (10 Marks)
 c. Write and explain procedure for conversion to conjunctive normal form for first order logic. (05 Marks)

Module-5

- 9 a. Explain the summarizing of uncertainty through laziness and Ignorance. Define sample space, unconditional probability and Random variables. (10 Marks)
 b. Explain the method for probabilistic inference using various concepts of probability distribution. (10 Marks)

OR

- 10 a. Explain the following with examples :
 i) Absolute independence ii) Bayes Rules iii) Probability density function. (10 Marks)
 b. Using axioms of probability. Prove that any probability distribution of discrete random variable must sum to 1. Further, prove $P(A/B \cap A) = 1$. (10 Marks)
