CBCS SCHEME

USN | | | | | | | | | | |

21AI54

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 miles tones 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).

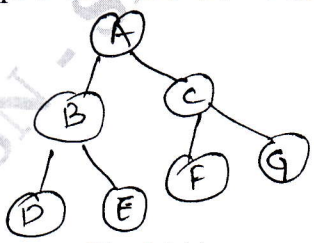
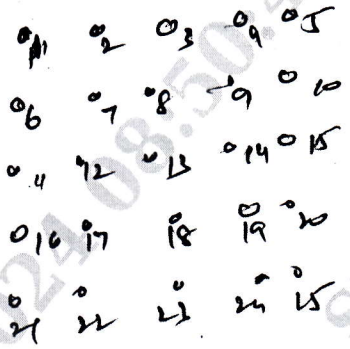


Fig Q3(c) **(05 Marks)**

OR

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

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

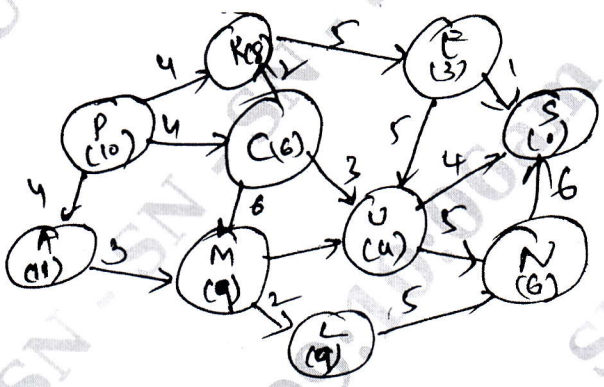


(05 Marks)

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]. **(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

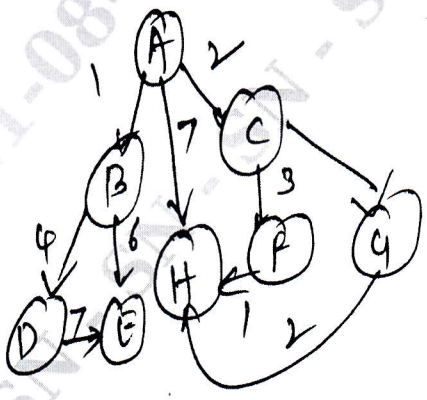
Fig Q5(a) **(10 Marks)**

b. Explain the admissibility and consistency property of A* search. **(05 Marks)**

c. Explain relaxed problem and pattern databases. **(05 Marks)**

OR

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



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

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

(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 uncertainity 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)**

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