REFNO077620

Roll No. 2341MCA05

# M.C.A./M.Sc. Semester II Examination 2023-24

## Computer Application/Computer Science

## CS-208: Artificial Intelligence

Time : Three hours | Max. Marks : 70

(Write your Roll No. at the top immediately on the receipt of this question paper)

Note: *Attempt the five questions including the Question No.1 which is compulsory.*

1. Consider the following problem:

**Missionaries and cannibals:** Three missionaries and three cannibals wish to cross a river using a two person boat. If at any time the cannibals outnumber the missionaries on either side of the river, they will eat the missionaries. How can a sequence of boat trips be performed that will get everyone to the other side of the river without any missionaries being eaten?

a) Design a suitable state space representation. **3**

b) Write down the all possible production rules. **2**

c) Generate the problem tree up to 5 levels and calculate the Average Branching Factors. **3**

d) Analyse the problem with respect to seven AI problem characteristics with proper justifications for your answer. **14**

2. a) Compare and contrast DFS and BFS with suitable example **6**

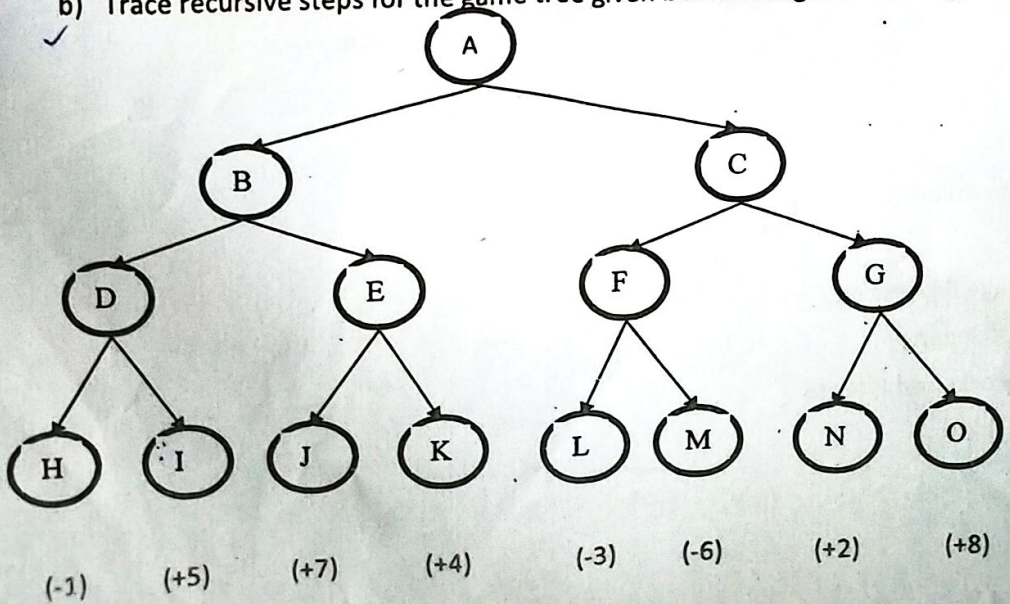
b) Discuss Hill climbing algorithm with its limitations. **6**

3. a) Provide definition of the word "heuristic" In what ways can heuristic be useful in search? **5**

b) Explain A* algorithm. **7.0**

4. a) Explain how the problem reduction approach can be used to find the winning strategy for two players' game. **4**

b) Trace recursive steps for the game tree given below using minimax algorithms **8**




P.T.O

5. a) Find whether the following pairs of expressions are unifiable or not, and the most general substitution for each unifiable pair: 4

   i. P(x,B,B) and P(A,y,z)

   ii. P(g(f(v)),g(u)) and P(x,x)

   iii. P(x,f(x)) and P(y,y)

   iv. P(y, y, B) and P(z, x, z)

   b) Consider the following statements 8

   1. John likes all kinds of food
   2. Apples are food
   3. Chicken is food
   4. Anything anyone eats and is not killed by is food
   5. Bill eats peanuts and still alive
   6. Sue eats everything bill eats

   i. Translate these sentences into formulas in predicate logic.

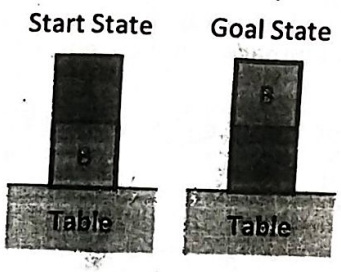
   ii. Convert the formulas into clause form.

   iii. Prove that John like peanuts using resolution.

   iv. Use resolution to answer the question. "What food does Sue eat?"

6. a) Encode the 4-queens problems as a Constraint Satisfaction Problems and draw constraint graph for the problem. 6.0

   b) What is operator subgoaling? And explain how the following blocks world planning problem can be solved using the Means Ends Analysis. 6.0




7. Explain any two of the following: 12

   i. Expert System

   ii. Natural Language Processing

   iii. Conceptual Dependency

   iv. Semantic Networks and Frames

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