Graphic Era

End Term (Even) Semester Examination May-June 2025

Roll no.... ....

Name of the Program and semester: ~~MBA~~ BCA A I 05
Name of the Course: Foundations of Artificial Intelligence
Course Code: TBD203
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.   (2X10=20 Marks)
a. Define Artificial Intelligence (AI). Compare and contrast the four approaches to AI with real-world examples. (CO1)

b. Explain the structure of an intelligent agent. Differentiate between a model-based reflex agent and a utility-based agent. (CO2)

c. Convert the following statement into predicate logic and apply backward chaining: "If it is raining, then the ground is wet. The ground is wet. Prove it is raining." (CO3)
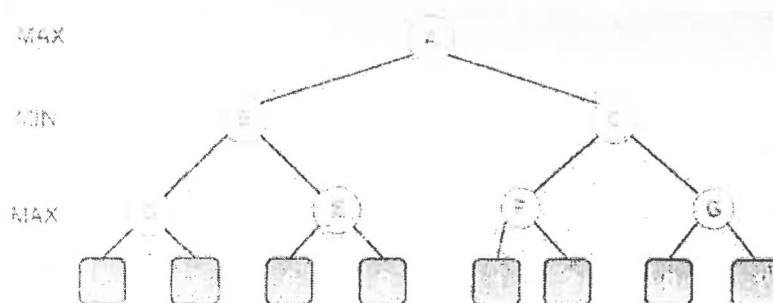
Q2   (2X10=20 Marks)
a. Convert the following statement into First-Order Logic (FOL):
"All humans are mortal. Socrates is a human. Therefore, Socrates is mortal."
Explain forward chaining and backward chaining in knowledge representation. (CO3)
b. Explain the hill-climbing algorithm with its advantages and limitations. Solve the 8-Queens problem using hill-climbing (show at least 2 iterations) (CO5)
c. Compare Breadth-First Search (BFS) and Depth-First Search (DFS) in terms of time complexity, space complexity, and completeness. (CO6)

Q3   (2X10=20 Marks)
a. Apply Min-Max algorithm with Alpha-Beta pruning on the following game tree. Which move should MAX choose? (CO6)

b. Explain the structure of an intelligent agent with a block diagram. Differentiate between goal-based and utility-based agents. (CO2)

c. Discuss the history of AI and its applications in e-commerce. How do learning agents improve performance? (CO3)

Q4.   (2X10=20 Marks)

a. Discuss the history of AI and its industrial applications. How do learning agents improve over time? (CO2)

b. Explain Particle Swarm Optimization (PSO). Minimize $f(x)=x^2$ using PSO (initial particles: $x1=2$, $x2=-1$; $w=0.5$, $c1=c2=1$). (CO5 + CO6)

c. Explain Genetic Algorithm (GA) with steps. (CO3)

Q5.   (2X10=20 Marks)

a. Define Artificial Intelligence (AI). Compare and contrast Strong AI and Weak AI with real-world examples. (CO1)

b. Apply *A search* to find the shortest path from A to Z in the following graph: (CO4)
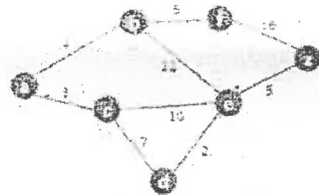
A* Search Algorithm

What is the shortest path to travel from A to Z?

c. Explain simulated annealing and how it avoids local optima. Compare it with hill-climbing. (CO5)