

8/11/30

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech-VII Semester (CSE/IT)

COURSE CODE (CREDITS): 18B1WCI742(2)

MAX. MARKS: 15

COURSE NAME: Artificial Intelligence

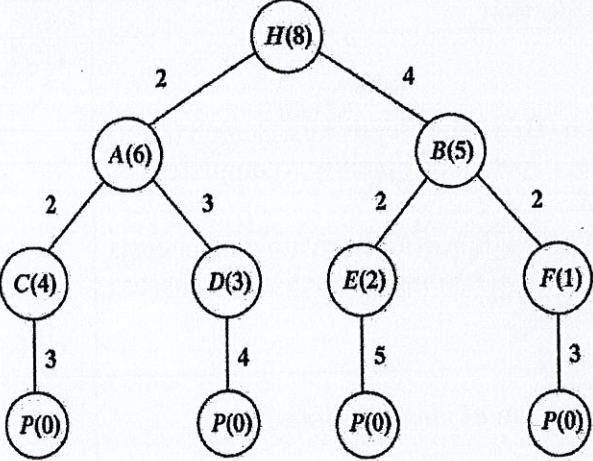
COURSE INSTRUCTOR: SMA*, RIV, MSI, DSA

MAX. TIME: 1 Hour

*Note: (a) All questions are compulsory.**(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems**(c) Use of calculator is not allowed*

Q.No	Question	CO	Marks
Q1	Answer the following: (a) Compare Breadth-First Search (BFS) and Depth-First Search (DFS) in terms of time complexity, space complexity, completeness, optimality, and traversal strategy. (b) A robot has to reach a goal location in a grid. Each movement costs 1. Which uninformed search would you recommend and why? Discuss trade-offs in memory and optimality.	CO1	3
Q2	Q. Consider the following population of chromosomes: $P_0 = \{110000, 101000, 100010, 111000\}$ The fitness function for the maximization problem is: $f(X) = \text{Number of 1s} + \text{Number of occurrences of substring '01'}$ Apply one generation of Genetic Algorithm using the following steps: (a) Calculate the fitness of each chromosome and select the two fittest chromosomes. [1] (b) Perform single-point crossover after the 3rd bit. [1] (c) In the first offspring, mutate the 2nd bit. [1] (d) Form the new population using the two selected parents and two offspring. The algorithm terminates if any chromosome has fitness = 5. State whether the algorithm terminates. [1] Show all intermediate steps.	CO2	4

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Q3	A university deploys an AI-based placement assistant that understands student queries, recommends suitable jobs, and adapts its recommendations based on student preferences and previous interactions. (a) The assistant maintains information from previous interactions to make decisions. Identify the type of intelligent agent. [1] (b) Identify the agent, its environment, and one action performed by the agent. [1] (c) The assistant searches through possible student-job assignments to find a suitable placement. Identify components of the search problem represented in this case. [1]	CO1	3
Q4	An AI-based Placement Assistant must find a route from Hostel (H) to Placement Cell (P) using the following search tree. Edge values represent travel cost and values in parentheses represent estimated remaining distance  <pre> graph TD H((H(8))) -- 2 --> A((A(6))) H -- 4 --> B((B(5))) A -- 2 --> C((C(4))) A -- 3 --> D((D(3))) B -- 2 --> E((E(2))) B -- 2 --> F((F(1))) C -- 3 --> P1((P(0))) D -- 4 --> P2((P(0))) E -- 5 --> P3((P(0))) F -- 3 --> P4((P(0))) </pre> (a) A search strategy increases its depth limit successively from 0 until P is found. Determine the depth at which P is first reached. [1] (b) A second strategy always selects the location with the smallest estimated remaining distance. Determine the path selected and its total cost. [1.5] (c) An improved strategy considers both the distance already travelled and the estimated distance still required before selecting the next location. Determine the path selected and its total cost. [1.5] (d) The system reaches a solution with score 91, while all its immediate neighbors have lower scores, although a solution with score 98 exists elsewhere. Identify the situation and state one method that can help the search escape from it. [1]	CO2	5