Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Midterm Examination, Summer 2025

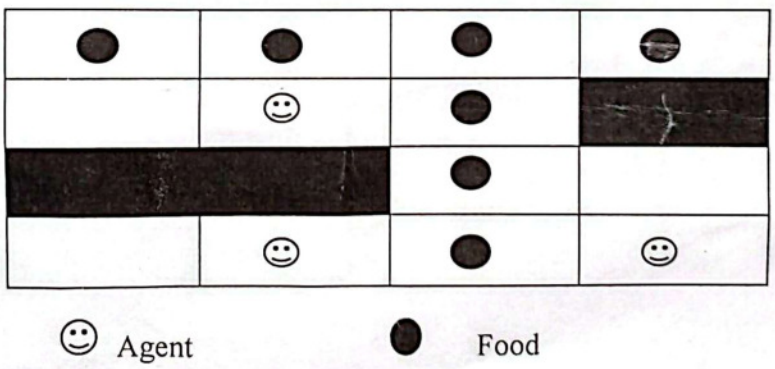
Course Code: CSE411, Course Title: Artificial Intelligence

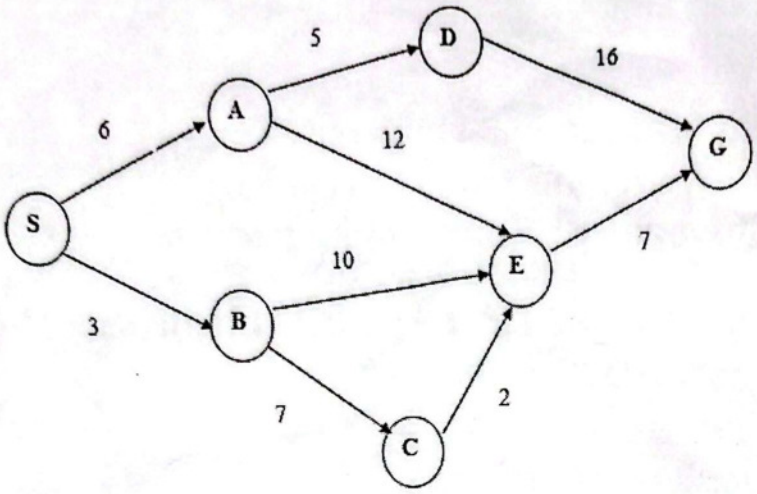
Level: 4 Term: 1 Batch: 63

Time: 01:30 Minutes **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	Imagine a scenario where an agent is trying to eat all the food in a maze that contains obstacles, but he has the help of his friends now! An agent cannot occupy a square that has an obstacle. There are initially k pieces of food (represented by dots), at positions (f1, ..., fk). There are also n agents at positions (p1 ,..., pn). Initially, all agents start at random locations in the maze. consider a search problem in which all agents move simultaneously; that is, in each step each agent moves into some adjacent position (Direction: N, S, E, or W, or STOP). Note that any number of agents may occupy the same position. Figure 1 represents the problem space overall.			**CO1**
	 **Figure: 1**			
	a)	**Explain** the problem for Figure 1.	**5**	
2.	Consider a state space where the start state is number 1 and each state k has two successors: numbers 2k and 2k + 1.			
	a)	**Construct** the portion of the state space for states 1 to 15.	**1**	
	b)	Suppose the goal state is 11. Now **Develop** the List the order in which nodes will be visited for breadth first search, depth-limited search with limit 3, and iterative deepening search.	**3**	**CO3**
	c)	**Illustrate** how to eliminate Local Optima in Hill Climbing Algorithm.	**2**	
	d)	Consider the following graph. **Develop** solution the optimum path from source node to goal node using A* algorithm for this graph. Is it possible to apply uniform cost search (UCS) on it? Compare the results.	**4**	



n	h(n)
S	14
A	12
B	11
C	6
D	11
E	4
G	0

Figure: 2

3.	***a)***	**Construct** solution for the following initial population, perform the three major operations of the genetic algorithm and maximize the output. 01100 10101 00111 11100 10010 00011	**5**	**CO2**
4.		A modern e-commerce company is developing an automated warehouse management system using intelligent agents. The system aims to efficiently sort, store, and retrieve packages within a large warehouse. Each package needs to be placed in an optimal storage location, and retrieved promptly when an order comes in. The warehouse environment includes conveyor belts, robotic arms, and a network of sensors providing real-time data on package location, available storage space, and order status. **Illustrate** an expert system where package-sorting robot tools can provide better service.	**5**	**CO3**