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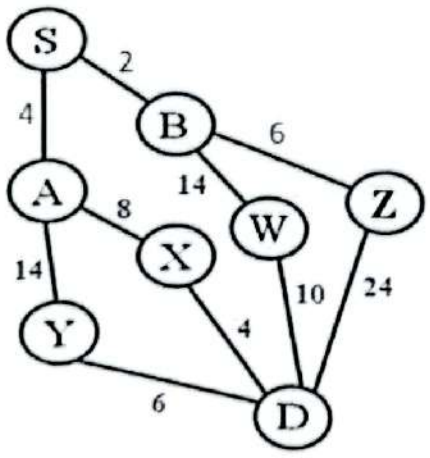
Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall-2023
Course Code: CSE315, Course Title: Artificial Intelligence
Level: L3 Term: T1/2 Batch: 60

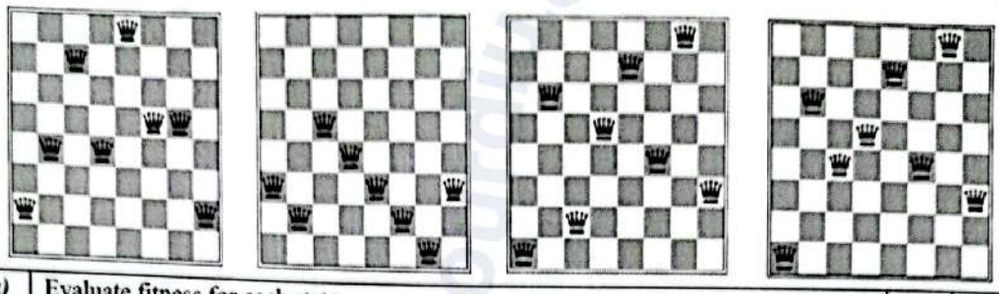
Time: 1 Hour and 30 Minutes **Marks: 25**

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.	Let us consider a closed room, where windows and doors are made with glasses. There is an AC (Air conditioner) placed in the top of the room, which works for '*Temperature Controlling System (TMP)*' for this room. If the desired temperature set for the room is more than the current temperature, TMP adjusts temperature by dissipating cool air. If the desired temperature set for the room is less than the current temperature, TMP adjusts temperature by dissipating hot air. If the desired temperature set for the room equals the current temperature, TMP performs no operation.			
	a)	**List** down the PEAS description and the task environments for this TMP.	**[2]**	**CO1**
	b)	**Explain** the type of agent that fits best for the above mentioned TMP.	**[3]**	**CO1**
2.	Consider the following scenario, where the start node is ***S*** and the goal node is ***D***.  ▪Values for h: A 5, B 6, D 0, S 20, W 4, X 5, Y 8, Z 15			
	a)	**Apply** uniform cost search to find the solution path from S to D.	**[2]**	**CO2**
	b)	**Construct** a search tree using A* algorithm to find the solution path from S to D.	**[3]**	
3.		Consider a state space where the start state is number 1 and each state k has two successors: numbers 2k and 2k + 1.		
3.	***a)***	**Construct** a tree for the portion of the state space for states 1 to 15.	**[2]**	**CO2**
	b)	**Calculate and Compare** the space complexity of BFS and IDS for the given problem if the goal is found at level 7.	**[3]**	

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4.	Consider the following four states (chess board combinations) given for 8-queens problem. 			
	a)	Evaluate fitness for each state.	[5]	CO2
	b)	Apply one iteration of the genetic algorithm on these states. (Assume that, *threshold* = *minimum fitness* + *1* and mutation occurred only on two bits randomly)	[5]	