Shahjalal University of Science and Technology
Institute of Information and Communication Technology
Software Engineering
3rd Year 1st Semester Term Test 02 (Session: 2019-20)
Course Code: SWE ~~433~~ 323 Credits: 3 Course Title: Artificial Intelligence
Time: 40 minutes Total Marks: 30

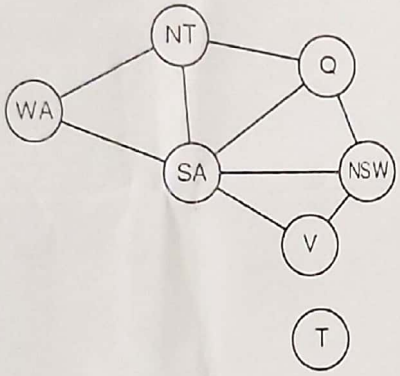
1 **Answer all the following questions**

Suppose Genetic algorithm is used to find the solution of the equality a + 2b + 3c + 4d = 30. The objective here is to minimize f(x) where f(x) = abs((a + 2b + 3c + 4d) – 30). The chromosome is defined as [a, b, c, d] where a, b, c, d are integers between 0 and 30. Initially there are 6 chromosomes in the population: 10

Chromosome1 = [12, 5, 23, 8] Chromosome2 = [2, 21, 18, 3]
Chromosome3 = [10, 4, 13, 14] Chromosome4 = [20, 1, 10, 6]
Chromosome5 = [1, 4, 13, 19] Chromosome6 = [20, 5, 17, 1]

a) Calculate the fitness of all individuals with f(x).
b) Select candidate parents using truncation selection with f = 50%.
c) Generate new offspring with one-point crossover in the middle, randomly do mutation (change value) in two offspring.
d) Compute the fitness of the new generation. Use elitism to select 50% 1st generation chromosomes to replace 50%
chromosomes of 2nd generation to make the new population.
e) Make a verdict to the overall fitness of the new population.

2 Color the following map with forward checking algorithm. Show the steps. 10



Do you think there is any other algorithm faster than forward checking? If yes, show how the algorithm works?

3 10

max

min

max

min

3 1 1 5 1 1 0 2 7 3 2 4

Perform Minimax algorithm on the figure with alpha-beta pruning.

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3rd Year 1st Semester Term Test 01 (Session: 2019-20)
Course Title: Artificial Intelligence
Time: 40 minutes **Total Marks: 35**

1. **Answer all the following questions**

a) What is artificial intelligence? **2**
b) Explain the following agent type: Goal-based, Utility-based **2**
c) Write down the properties of Environments. **2**
d) Define the Characteristics of the environments in POKER and Image analysis. **2**
e) Write the difference between UCS and DLS. **2**

2. What is PEAS(Performance, Environment, Actuators, Sensors)? Explain with examples for the TESLA Autopilot car. **5**

3. What is a heuristic? Design and heuristic function and solve the given 8-puzzle. **10**

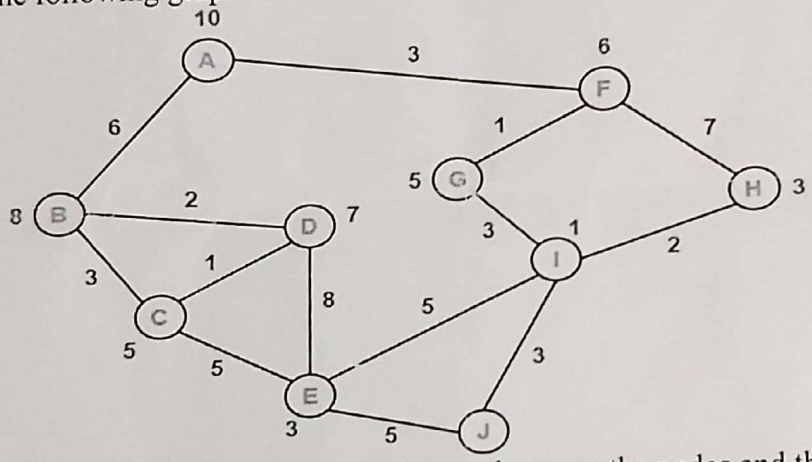
1	2	3
8	5	6
4	7	

Initial State

1	2	3
4	5	6
7	8	

Goal State

4. Consider the following graph: **10**



The numbers on the edges represent the distance between the nodes and the numbers on the nodes represent the heuristic value. Find the most cost-effective path to reach from start state A to final state J using A* algorithm.