Kafrelsheikh University
Faculty of Engineering
Electrical Engineering Department
Final Exam, 2018 -2019
Subject :Artificial Intelligence

4th Year:(Computer Engineering & systems)
Academic Number : ECS4125
Date: 17 / 1 / 2019
Time: 3 Hours.
Mark: 90, 2 pages

This exam measures ILOs no: a1, a4, a5, a12, a13, a16, a17, b1, b2, b3, b7, b12, b17, c1, c2, c7, c14, c15, d1, d2, d3,d4

Question #1: True or False [10 Marks]

a) "Connect four" game is considered as fully observable and discrete in AI terminology. ( )
b) "Backgammon" game is considered as partially observable and stochastic in AI terminology. ( )
c) If variable B depends on variable A then $P(\neg A/B) = 1 - P(A/B)$ ( )
d) A* algorithm is based on Depth – First –Search. ( )
e) Robot car is considered as stochastic and discrete in AI terminology ( )

Question #2: Choose the correct answer [10 Marks]

1- The Task Environment of an agent consists of .....
a) Sensors b) Actuators
c) Performance Measures d) All of the mentioned

2- What is state space?
a) The whole problem b) Representing your problem with variable and parameter
c) Your Definition to a problem d) Problem you design

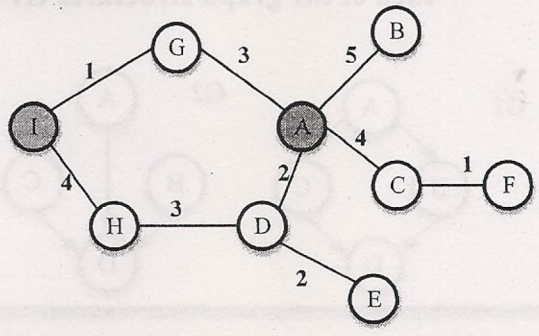
3- A problem in a search space is defined by one of these state.
a) Initial state b) Last state
c) Intermediate state d) All of the above

4- The major component/components for measuring the performance of problem solving
a) Completeness b) Optimality
c) Time and Space complexity d) All of the mentioned

5- Which is the best way to go for Game playing problem?
a) Linear approach b) Random approach
c) Heuristic approach d) Optimal approach

Question #3: Answer the following questions [25 Marks]

1. Assume the initial state (root) is A and the goal state is I. show how each of the search strategies would create a search tree to find a path from the initial state to the goal state using *Uniform cost search.*



2. Bowl B_1 contains two red and four white chips, bowl B_2 contains one red and two white chips, and bowl B_3 contains five red and four white chips. The probabilities for selecting the bowls are given by $P(B_1) = \frac{1}{3}, P(B_2) = \frac{1}{6}, P(B_3) = \frac{1}{2}$. Consider the experiment of selecting a bowl with these probabilities and then drawing a chip at random from that bowl.
(a) What is the probability of drawing a white chip?

(b) Suppose that the outcome of the experiment is a white chip. What is the conditional probability that the chip was drawn from bowl B_2? Also calculate $P(B_1/W)$ and $P(B_3/W)$.

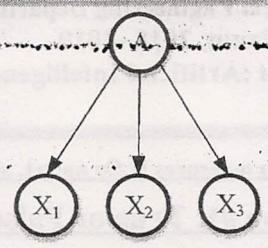
Question #4: Answer by explanations [30 Marks]

1. Consider the following network, where the P (A) =0.5,

$\forall i\ P(X_i/A) = 0.2, P(X_i/\neg A) = 0.6$

a) Calculate $P(A/X_1, X_2, \neg X_3)$

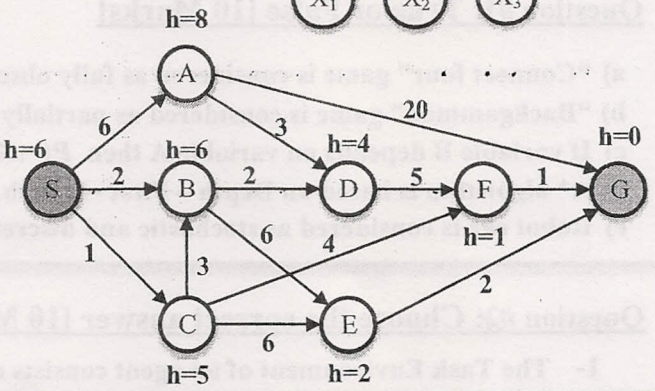
b) Calculate $P(X_3/X_1)$



2. Consider the search problem below with start state S and goal state G. The transition costs are next to the edges, and the heuristic values are next to the states.

(a)What is the final path for this DFS search?

(b) What is the final path for this A* search?



Question #5: Answer by explanations [15 Marks]

1. How can you design a simple *neural network* with two inputs perceptron that acts as an *AND* gate, using step operator with learning rate 0.1 and bias input is -0.2, the initial random weights are W_1=0.3 and W_2= -0.1.

2. Following is a list of conditional independence statements. For each statement.

(1) Name all of the graph structures, G1— G4, or "none" that imply it.

a. A is conditionally independent of B given C.

b. A is conditionally independent of B given D.

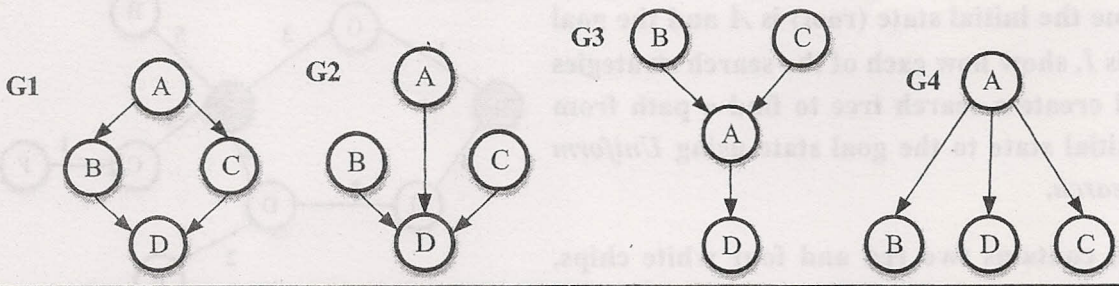
c. B is conditionally independent of D given A.

d. B is conditionally independent of D given C.

e. B is independent of C.

f. B is conditionally independent of C given A.

(2) How many independent parameters are required to specify a Bayesian network given each of the graph structures G1— G4?



With Best Wishes

Dr. Wessam Fikry, Committee of Correctors and Testers