



BRAINWARE UNIVERSITY

Course –MCA

Artificial Intelligence (MCA304)

(Semester – 3)

Time allotted: 3 Hours

Full Marks: 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Questions)

10 x 1 = 10

1. *Choose the correct alternative from the following:*

- (i) The truth values of traditional set theory is _____ and that of fuzzy set is _____
- | | |
|---------------------------------|---------------------------------|
| a. Either 0 or 1, between 0 & 1 | b. Between 0 & 1, either 0 or 1 |
| c. Between 0 & 1, between 0 & 1 | d. Either 0 or 1, either 0 or 1 |
- (ii) Best-First search can be implemented using _____ data structure.
- | | |
|-------------------|-------------------|
| a. Queue | b. Stack |
| c. Priority Queue | d. Circular Queue |
- (iii) Which search strategy is also called as blind search?
- | | |
|-----------------------|--------------------|
| a. Uninformed search | b. Informed search |
| c. Adversarial search | d. All of these |
- (iv) Backward reasoning is _____ .
- | | |
|---------------------|----------------------|
| a. Data driven | b. Goal driven |
| c. Knowledge driven | d. Resolution driven |
- (v) What is the heuristic function of greedy best-first search?
- | | |
|---------------------|------------------|
| a. $f(n) \neq h(n)$ | b. $f(n) < h(n)$ |
| c. $f(n) = h(n)$ | d. $f(n) > h(n)$ |

- (vi) Where does the value of alpha-beta search get updated?
- Along the path of search
 - Initial state itself
 - At the end
 - None of the mentioned
- (vii) What is the rule of simple reflex agent?
- Simple-action rule
 - Condition-action rule
 - Both a & b
 - None of the mentioned
- (viii) Which search is implemented with an empty first-in- first-out queue?
- Depth-first search
 - Breadth-first search
 - Bidirectional search
 - None of the mentioned
- (ix) Adversarial search problems uses _____ .
- Competitive Environment
 - Cooperative Environment
 - Neither a nor b
 - All of these
- (x) In A* algorithm, heuristic evaluation function is _____
- $f(x)=h(x)$
 - $f(x)=h(x) + g(x)$
 - $f(x)=g(x)$
 - none of the above

Group – B

(Short Answer Type Questions)

(Answer any *three* from the following)

3 x 5 = 15

- Justify “Uniform cost search is a special case of A* search.” [5]
- Compare between inductive learning and deductive learning. [5]
- Write the difference between Procedural and declarative knowledge. [5]
- Explain different types of agent. [5]
- Define production system with suitable example. [5]

Group – C

(Long Answer Type Questions)

(Answer any *three* from the following)

3 x 15 = 45

- Compare between propositional logic and predicate logic. [5]
 - Consider the following knowledge base using predicate logic.

1. The-humidity-is-high or the-sky-is-cloudy.
2. If the-sky-is-cloudy then it-will-rain
3. If the-humidity-is-high then it-is-hot.
4. it-is-not-hot

Goal: it-will-rain.

Prove the goal using resolution.

[10]

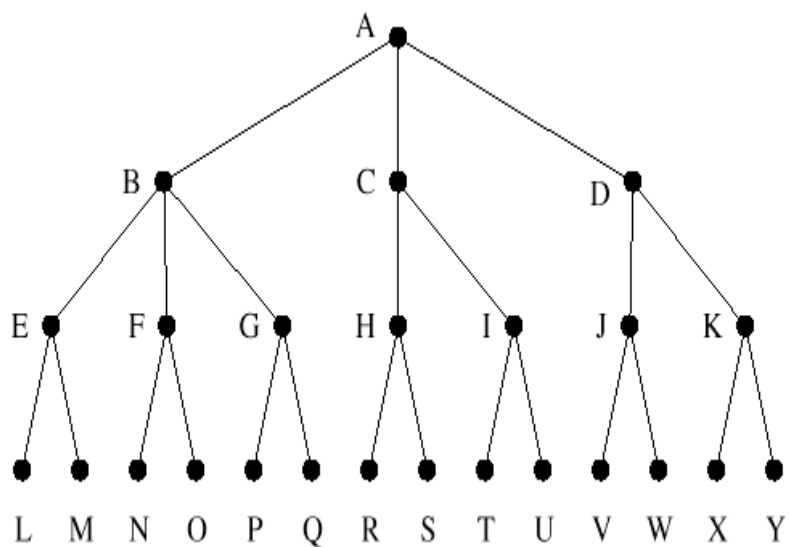
8. You are given two jugs, a 4-gallon and a 3-gallon and a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug?

i) Write the list of operators used.

ii) With the help of state representation, find a solution for the problem.

[8+7]

9. (a)



(-1) (2) (3) (6) (-2) (4) (7) (9) (10) (5) (8) (-3) (-1) (2)

Consider the game tree in which the static scores (in parentheses at the tip nodes) are all from the first player's point of view.

(i) Assuming that the first player is the maximizing player, what move should the first player choose (Use alpha-beta pruning)?

(ii) Assuming that the first player is the minimizing player, what move should the first player choose (Use alpha-beta pruning)?

[8]

- (b) Mention the difference between breadth first search and best first search using suitable example. [7]

10. (a) What is defuzzification? Give an example. [2+1]
 (b) Given two fuzzy set A and B with its membership value.

	1	1.5	2	2.5
$\mu_A(X)$	1	0.75	0.3	0.4
$\mu_B(X)$	0.4	0.2	0.7	0.1

Perform union, intersection and complement on fuzzy set A and B. [4]

- (c) Compute max-min composition for R.S

R :

	Y1	Y2	Y3
X1	0.1	0.7	1
X2	0.3	0	0.8

S:

	Z1	Z2
Y1	0.4	0.6
Y1	0.5	0.1
Y1	0	0.9

[8]

11. (a) What is tautology? Explain with example. [3]
 (b) Write predicate logic representation for the following.
 i. If it is a bird, it can fly.
 ii. Every father is parent.
 iii. Some boys in the class are taller than all girls in class.
 iv. All basketball players are tall. [8]
 (c) What is horn clause? Prove that $p \supset q$ is horn clause. [4]