



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH(ECE)/SEM-7/EC-704E/2012-13

2012

**PATTERN RECOGNITION AND MACHINE
INTELLIGENCE**

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

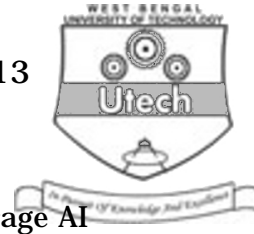
1. Choose the correct alternatives for any *ten* of the following :
 $10 \times 1 = 10$

- i) Problems dealt within Pattern Recognition and Machine Intelligence generally use a common term called

- | | |
|----------------|---------------|
| a) State | b) Space |
| c) State space | d) Knowledge. |

- ii) Depth first search problem can be easily solved using

- | | |
|--------------|--------------------|
| a) Queue | b) Stack |
| c) Link List | d) Circular Queue. |



iii) Simulation of intelligence is

- a) Weak AI b) Average AI
- c) Strong AI d) Very strong AI.

iv) MINIMAX algorithm performs

- a) In-order Traversal b) Infix-order Traversal
- c) Postorder Traversal d) Preorder Traversal.

v) "Since the neighbouring states of the goal node are known better than the neighbouring states of the starting node".

The above problem can be easily solved by employing

- a) Backward reasoning b) Forward reasoning
- c) Hill Climbing d) None of these.

vi) In the sense that each variable in the system has a finite valuation space and for each value of the variable, Probabilistic and Fuzzy techniques are

- a) Strength of happening
- b) Stochastic
- c) Inappropriate reporting
- d) Probabilistic techniques.



vii) For selection of least cost we use

- a) MINIMAX Algorithm b) α - β Search Algorithm
- c) A* Algorithm d) DFS Algorithm.

viii) Hill-Climbing can be used to solve problems that have

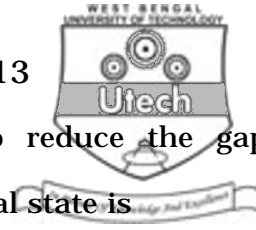
- a) One solution
- b) Two solutions
- c) More than two solutions
- d) Many solutions.

ix) When all the premises are true, check whether the conclusion is true. Under this circumstance, we say that

- a) forward chaining holds good
- b) backward chaining holds good
- c) both (a) & (b) holds good
- d) none of these.

x) A point is detected as an ordinary point, core point or delta point by computing the

- a) Modulation Index b) Poincare Index
- c) Pseudo Index d) All of these.



xi) The method of search attempts to reduce the gap between the current state and the goal state is

- a) Heuristic search
- b) Problem Decomposition
- c) Means and Ends analysis
- d) Constraint Satisfaction.

xii) Genetic Algorithm has major applications, namely

- a) Intelligent Search b) Optimization
- c) Machine Learning d) All of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- 2. Discuss the steps of Breadth First Search algorithm using queue.
- 3. What is backward reasoning ? Explain with a suitable example.
- 4. Starting with the first principle derive the Fuzzy C-means clustering algorithm.



5. Define in your own words the following terms : 5×1
- a) State
 - b) State Space
 - c) Search Tree
 - d) Heuristic Cost
 - e) Generation Cost
6. Explain MINIMAX algorithm.

GROUP - C

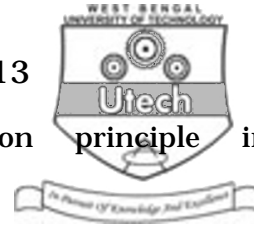
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. The problem may be stated as follows :

A farmer wants to transfer his three belongings, a wolf, a goat and a cabbage, by a boat from the left bank of a river to its right bank. The boat can carry at most two items including the farmer. If unattended, the wolf may eat up the goat and the goat may eat up the cabbage. How should the farmer plan to transfer the items ?

- a) Construct a set of production rules for the above problem.
- b) Show the solution to the problem by state space search. $8 + 7$



8. a) State and explain the resolution principle in propositional logic.

b) State the steps of Wang's algorithm.

c) Using Wang's algorithm prove the following theorem :

$$(p \rightarrow q) \wedge (q \rightarrow p) \Rightarrow (p \wedge q) \vee (\neg p \wedge \neg q)$$

where p and q are atomic propositions. 5 + 5 + 5

9. a) What is heuristic function. What is generation cost ?

b) Define the number of misplaced tiles as the heuristic function and also defining BL, BR, BU and BD as four operations. Solve the number puzzle problem with eight tiles numbered 1 to 8. Problem starting state as given below :

Starting State :

1	3	2
6	5	4
8	7	

Goal State :

1	2	3
4	5	6
7	8	

$$(3+2) + 10$$



10. What is the structure of production rules. Describe about typical architecture of production system. What is the function of working memory and control unit in production system.

6 + 6 + 3

11. Write short notes on any *three* of the following : 3 × 5

- a) Application of Pattern Recognition and Machine Intelligence.
- b) Adductive reasoning using Fuzzy Logic.
- c) Steps of Genetic Algorithm (GA).
- d) Fuzzy C-means clustering algorithm.
- e) Bay's classifier.

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