

Name :

Roll No. :

Invigilator's Signature :

CS/BCA/SEM-6/BCAE-601B/2013

2013

INTELLIGENT SYSTEMS

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 answers for the following : $10 \times 1 = 10$

i) Heuristic cost of goal node is

- a) $1 +$ generation cost of goal node
- b) same as generation cost
- c) zero
- d) none of these.

ii) Which one is heuristic search ?

- a) Breadth First Search b) Depth First Search
- c) A* Search d) None of these.



iii) Which one is the search for OR GRAPH ?

- a) A^*
- b) AO^*
- c) Generate and Test
- d) None of these.

iv) What is generation cost ?

- a) Distance from goal node
- b) Distance from start node
- c) Distance from goal node–Distance from start node
- d) None of these.

v) Simulated annealing is a variation of

- a) Hill Climbing
- b) BFS
- c) Heuristic Search
- d) Constraint Satisfaction.

vi) To make a decision about the selection of a move at depth d in alpha-beta cutoff procedure, the tree should be expanded at least up to a depth of

- a) 2
- b) $d + 2$
- c) $d - 2$
- d) $d * 2$.



vii) Which of the following is a tautology ?

- a) $p \wedge q \rightarrow p$
- b) $p \vee q \rightarrow p$
- c) $p \rightarrow q$
- d) none of these.

viii) According to Modus-Ponens inference rule, from P and $P \rightarrow Q$ infers

- a) P
- b) Q
- c) Not P
- d) Not Q .

ix) The forward reasoning in problem is generally represented by

- a) Semantic Net
- b) FOPL
- c) Frame
- d) none of these.

x) Frame is a collection of

- a) Slots
- b) Filler
- c) Resolution
- d) Knowledge.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

$3 \times 5 = 15$

2. What is production system ? What are its different types ?

2 + 3

3. Compare and contrast between BFS and DFS with respect to its advantages and disadvantages.

4. Represent the given facts about a person with the help of a frame structure :

"John is a manager, his age is 50, his wife's name is Maria, he is having 3 children Smith, Alice and Bob and his address is 100 Hamstad, Dallas, Texas-750001"

5. Derive the parse tree for the following :

$2\frac{1}{2} + 2\frac{1}{2}$

- (i) The frog kissed a boy
(ii) The boy ate a popsicle.

Where are the following rewrite rules used ?

$S \rightarrow NP VP$

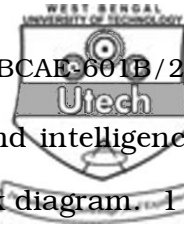
$NP \rightarrow ART N$

$VP \rightarrow V NP$

$N \rightarrow \text{boy popsicle frog}$

$V \rightarrow \text{ate kissed flew}$

$ART \rightarrow \text{the a}$



6. What is the difference between knowledge and intelligence ?
Describe knowledge representation with block diagram. 1 + 4

GROUP - C

(Long Answer Type Questions)

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

7. a) Write a LISP function called "match" that takes two arguments and returns *T* if the two are identical, returns the two arguments if one is a variable and the other a term and returns "NIL" otherwise. 5
- b) Define two fuzzy sets "tall" and "short" and compute the distance between them using the appropriate equation. 5
- c) Define learning. 5
8. a) You are given two jugs, a 4 gallon and a 3 gallon neither has any measuring marker on it. There is a pump that can be used to fill the water. How can you get exactly 2 gallons of water into the 4 gallon jug ? 7
- b) Derive the parse tree for the sentence "Sachin plays for the Mumbai Indians" where the following rewrite rules are used :

$S \rightarrow NP / VP$	$N \rightarrow Sachin / IPL-6$	
$NP \rightarrow N$	$V \rightarrow played$	
$NP \rightarrow DET/N$	$DET \rightarrow the$	
$VP \rightarrow V/PP$	$PREP \rightarrow for$	
$PP \rightarrow PREP/NP$	$N \rightarrow Mumbai Indians.$	8



9. a) What is Clausal Form ? Change the following expression in Clausal Form :

$$\exists x \forall y (\forall z P (f (x), y, z) \rightarrow (\exists u Q (x, y) \wedge \exists v R (y, v)))$$

1 + 4

- b) Represent the following expressions in F.O.P.L. (Necessary assumptions must be made) :

- (i) All employees earning Rs. 1400 or more per year pay taxes
- (ii) Some employees are sick today
- (iii) No employees earn more than the President.

2 + 2 + 2

- c) Write down the WFF of the following statements :

- (i) Everyone is loyal to someone
- (ii) Marcus hates ruler and Caesar is ruler so Marcus hates Caesar.

2 + 2

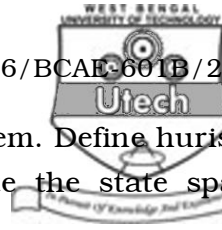
10. a) What do you mean by informed search and uninformed search ? 2

- b) Explain the various problems that a heuristic search may face. 2

- c) Write down AO* algorithm. 5

- d) Explain under which condition A* algorithm gives an optimal solution. 3

- e) Discuss Best First Search Algorithm in brief. 3



11. a) Consider the following 8-puzzle problem. Define heuristic function for it to solve and generate the state space graph. 10

Start :

1	2	3
8	5	6
4	7	

Goal :

1	2	3
4	5	6
7	8	

- b) What is AND-OR graph ? Which heuristic search procedure is used in AND-OR graph ? 5

