

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH (CSE)/SEM-7/CS-702/2012-13**

**2012**

**ARTIFICIAL 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 the following :  $10 \times 1 = 10$

- i) NLP (with respect of AI) stands for
- a) Natural Linear Processing
  - b) Natural Language Processing
  - c) Natural Linear Programming
  - d) Natural Language Programming.

7201

[ Turn over

CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

- ii) Searching techniques are used for
- a) goal node searching
  - b) optimization of search space
  - c) finding goal distance of the goal node from start node
  - d) all of these.
- iii) Hill climbing has potential problems like
- a) lake
  - b) foothill trap
  - c) garden
  - d) all of these.
- iv) The form of heuristic function of  $A^*$  is
- a)  $f^*(n) = g^*(n) * h^*(n)$
  - b)  $f^*(n) = g^*(n) + h^*(n)$
  - c)  $f^*(n) = g^*(n) + h(n)$
  - d) none of these.
- v) Which one is wrong representation of list in Prolog ?
- a)  $[a, 4, -5]$
  - b)  $[56], [ab, 7], [5]$
  - c)  $[[[3, 7]4], 7, t]$
  - d)  $[[5, 8], c, 8].$

## CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

- vi) Algorithm that gives optimal solution
- a) hill climbing
  - b) BFS
  - c) blind search
  - d) A\*.
- vii) Inheritable knowledge is best represented by
- a) OR graph
  - b) AND graph
  - c) AND-OR graph
  - d) none o these.
- viii) Skolem function is used in
- a) unification algorithm
  - b) natural deduction
  - c) conversion t casual form
  - d) none of these.
- ix) Find out the most appropriate predicate representation for "every child like to play game".
- a)  $\exists x : [\text{CHILD}(x) \rightarrow [\forall y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
  - b)  $\forall x : [\text{CHILD}(x) \rightarrow [\exists y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
  - c)  $\forall x : [\text{CHILD}(x) \rightarrow [\forall y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$
  - d)  $\exists x : [\text{CHILD}(x) \rightarrow [\exists y : [\text{GAME}(y) \wedge \text{LIKES}(x, y)]]]$ .

CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

- x) Knowledge consists of
- a) concepts and procedures
  - b) facts and rules
  - c) both (a) and (b)
  - d) none of these.

**GROUP – B**

**( Short Answer Type Questions**

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

2. What is expert system ? What is expert system shell ?  
Explain the following terms with examples :  
(i) Tautology, (ii) C ntradiction.  $1 + 2 + 2$
3. Discuss benefits of a production system. What is Dempster  
Shafer Theory ?  $2 + 3$
4. What do you mean by completeness of a search ? Why DFS is  
not always complete ?  $3 + 2$
5. Compare Hill climbing and Best-first search techniques. Find  
all interpretations of  $P \rightarrow Q$ , where  $P$  and  $Q$  are two  
propositions and is an implication sign.  $3 + 2$

CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

**GROUP – C****( Long Answer Type Questions )**Answer any *three* of the following.  $3 \times 15 = 45$ 

6. a) What do you mean by knowledge acquisition ? What is Turing test ?
- b) Art is the father of John. Bob is the father of Kim. Fathers are parents. Prove that Art is the parent of John.
- c) Convert the following sentences into first order predicate logic :
- i) Everyone loves Ram.
  - ii) Not everyone loves Ravana.
  - iii) Not everyone came for all meetings.
  - iv) Some people did not come for all meetings.
  - v) Only one person spoke at the meeting.
- d) With the help of semantic net, represent the following facts :
- i) Tweety is a bird.
  - ii) Tweety has two wings.
  - iii) If a bird has wings and no broken wing, it can fly.
- e) What is the difference between semantic net and frame ?  $1 + 1 + 3 + 5 + 3 + 2$

CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

7. a) What is fuzzy set ? What is the difference between fuzzy set and crisp set ? Explain different fuzzy operations using examples.

b) What do you mean by conflict resolution strategy ? Design a search space for the given set of production rules.

$$p \cap q \rightarrow \text{goal}$$

$$r \cap s \rightarrow p$$

$$w \cap r \rightarrow q$$

$$t \cap u \rightarrow q$$

$$v \rightarrow s$$

start  $\rightarrow v \cap r \cap q$  Resolution act strategy : Conflict resolution strategies fire the most recently added rule in the working memory.

c) What do you mean by Skolem constant and Skolem function ? Explain Inductive Learning.

$$1 + 1 + 2 + 2 + 4 + 2 + 3$$

CS/B.TECH (CSE)/SEM-7/CS-702/2012-13

8. a) You are given two jars — a 4 litre one and a 3 litre one. Neither has any measuring mark on it. How can you get 2 litres of water into the 4 litre jug ? With the help of state-space diagram, find a solution.
- b) Explain the cycle of genetic algorithm. Discuss different types of crossover techniques. 7 + 3 + 5
9. The game of NIM is played as follows :
- Two players alternative in removing one, two or three pennies from a stack initially containing five pennies. The player who picks up the last penny loses.
- i) Draw the full game tree
- ii) Show that the player who has the second move can always win
- iii) Execute  $\alpha - \beta$  procedure on the game tree. How many terminal nodes are examined ? 4 + 5 + 6

=====