*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 correc alternatives for the following : $10 \times 1 = 10$

i) NLP (with r spect of AI) stands for

a) Natural Linear Processing

b) Natural Language Processing

c) Natural Linear Programming

d) Natural Language Programming.

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 lik

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) $[[5, 8], c, 8]$.

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) $\exists x : [\text{CHILD}\ (x) \rightarrow [\exists y : [\text{GAME}\ (y) \wedge \text{LIKES}\ (x, y)]]]$ .

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

## 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

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.

$p \cap q \rightarrow$ 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

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

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