Printed Pages : 4   TIT-702

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0151   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. VII) EXAMINATION, 2007-08
ARTIFICIAL INTELLIGENCE

Time : 3 Hours]   *[Total Marks : 100*

Note :   (1)   *Attempt all questions.*
          (2)   *All questions carry equal marks.*
          (3)   *Be precise in your answer.*
   (4)   *No second Answer book will be provided.*

1   Attempt any **four** parts of the following :   5×4=20

   (a)   Give the structure of an intelligent agent and draw schematic diagrams of a model based reflex agent and a learning agent.

   (b)   You have three jugs measuring 12 gallons, 8 gallons, and 3 gallons, and a water tap. You can fill the jugs up or empty them out from one to another or onto the ground. Your objective is to measure out exactly one gallon. Give the complete state space and set of all applicable/ feasible rules.

   (c)   Prove that Breadth-first search, depth-first search are special cases of Best-first search.

   (d)   Give a simple example that shows that if the state evaluation function can return values which are too high, search will not necessarily find the optimal solution.

(e)   Consider the following game tree :
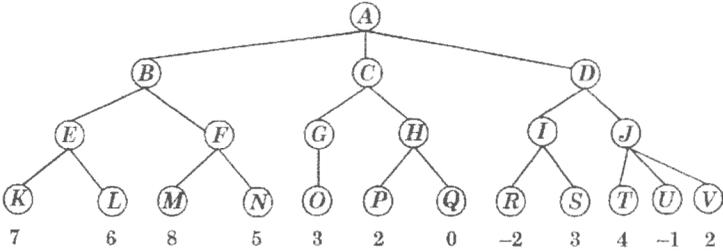
The first player to perform his move is the maximizing player and the scores are all from his point of view. Using alpha-Beta search discuss what move should be choosen next ?

(f)   Discuss some most prominet applications of Artificial Intelligence and describe natural langauage processing in brief.

2   Attempt any **two** parts of the following :   10×2=20

(a)   Using the following rewrite rules develop a parse tree for the sentence "Jack slept on the table" :

$\langle S \rangle \rightarrow \langle NP \rangle \langle VP \rangle$

$\langle NP \rangle \rightarrow \langle N \rangle / \langle DET \rangle \langle N \rangle$

$\langle VP \rangle \rightarrow \langle V \rangle \langle PP \rangle$

$\langle PP \rangle \rightarrow \langle PREP \rangle \langle NP \rangle$

$\langle N \rangle \rightarrow$ Jack / table

$\langle V \rangle \rightarrow$ Slept

$\langle DET \rangle \rightarrow$ the

$\langle PREP \rangle \rightarrow$ on

(b)   Draw an ATN (Augmented Transition Network) to implement the grammer of 2(a). Also give syntax of an ATN specification language.

(c) . Both case grammer and conceptual dependency produce representations of sentences in which nouns phrases are described in terms of their semantic relationships to the verb. In what way are the two approaches similar ? In what way are they different ? Compare representation of the following sentence in the two formalism. "John broke the window with a hammer"

3   Attempt any **two** parts of the following :   10×2=20

(a) Express the following concepts as an associative network structure with interconnected nodes and labelled arcs. ABC is an educational institute. It is affiliated to UPTU. Three departments within the institute are CSE, ET and IT. Jack is a professor of Software Engineering. Joe and Jill are programmers. Jill is married to Merry. Merry is an editor in PHI. They have three children, and live in Kanpur. Jill wears glasses and is five feet four inches tall. Also represent the above concepts using LISP or PROLOG.

(b) Consider the following sentences :
— John likes all kinds of food.
— Apples are food.
— Chicken is food.
— Anything anyone eats and is not killed by is food.
— Jack eats peanuts and is still alive.
— Jill eats everything Jack eats.
Represent these sentences in predicate logic and prove that "John likes peanuts" using deduction or resolution.

(c) Give the general frame structure and discuss its components. Represent 3 (a) using frame structure.

...mpt any **two** parts of the following :

   (a)   Give structure of an expert system and discuss its components in brief.

   (b)   Discuss how the concept of certainty factors is incorporated in rule based expert systems. How are uncertain rules combined ?

   (c)   Briefly describe various aspects such as explanation sub-system, knowledge acquisition, inference mechanism etc. of MYCIN.

5   Attempt any **two** parts of the following : $10 \times 2 = 20$

   (a)   Discuss the complete process of pattern recognition and give various methods of object classification.

   (b)   Write short notes on the following : (any **two**)

       (i)   Speech Recognition

       (ii)   Line Finding

       (iii) Computer Vision.

   (c)   (i)   Write a function in LISP that computes the factorial of a number.

       (ii)   Write a PROLOG program that creates knowledge base of family relationships such as father, mother, brother, sister, parents. Use clauses such as male, female to define rules.