Code: CT71   **Subject: ARTIFICIAL INTELLIGENCE**

ALCCS – NEW SCHEME

Time: 3 Hours   **FEBRUARY 2013**   **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:
- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1 a. Write a Prolog/List program to find nth Fibonacci number in the sequence.

    b. What do you understand by unification in Predicate logic? Give an example to illustrate.

    c. What is the benefit of using alpha-beta pruning on minimax game tree? Are there any factors on which this benefit depends?

    d. For what purpose is Bayes' theorem used? Give the mathematical expression of Bayes' theorem.

    e. What do you mean by hill climbing search technique? Explain the term local maxima and plateau associated with it.

    f. Write down the steps of depth first search algorithm for state space search.

    g. Differentiate between forward and backward reasoning. When you are reaching home from an unknown place which of the reasoning is applied (forward/backward)? Justify your answer with reason.   **(7×4)**

Q.2 a. Write a PROLOG/LISP program to find the largest element of a list.   **(6)**

    b. Write a PROLOG/LISP program to find all prefixes of a list.   **(6)**

    c. What is a Hopfield Network? How is it used in learning a network?   **(6)**

Q.3 a. What is Best First Search approach? How does it vary from Hill climbing method? When does this method fail to find the solution?   **(6)**

    b. Define and describe fuzzy logic. For what kinds of applications is it suited?   **(6)**

    c. 8-queens problem seeks to place 8-queens in an 8x8 chessboard such that no two queens attack each other. Formulate this problem as a constrained satisfaction problem.   **(6)**

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Q.4 a. What is the significance of planning in AI systems? Explain the main components of a planning system. **(6)**

b. Define delta rule and give its uses in Back Propagation algorithm. What learning rate should be used for back propagation? **(6)**

c. Develop a concise semantic net for the following facts:-
Pigeons lay eggs. Parrots can fly. Pigeon is a bird. Owl is a bird. Parrots lay eggs. Owl sleep during daytime. Pigeons and parrots sleep during night. Owls lay eggs. Pigeons and owls can fly. Parrots are green. Parrots are birds. **(6)**

Q.5 a. R1: If M (0.5) and N (0.8) then P (0.7)
R2: If G (0.7) or H (0.8) then P (0.5)
Where the numbers indicate the certainty factor of each proposition? What is the final CF for P if both the rules are fired? **(4)**

b. Discuss with examples the scope and limitations of knowledge representation using Propositional logic and First Order Predicate logic. **(4)**

c. (i) Express the following sentences in predicate logic formulae.
All people who are not poor and are smart and happy. Those people who read are not stupid. Many can read and is wealthy. Happy people have exciting lives. Anybody who is wealthy is not poor. John is wealthy but not happy. A smart person is not stupid.

(ii) Convert the formulae into clausal form.

(iii)Use resolution/reputation to answer the query:-
"Can anybody be found with an exciting life?" **(10)**

Q.6 Write short notes on the following:-
(i) Means-Ends Analysis
(ii) Context free grammar
(iii)Agent Classifications **(6×3)**

Q.7 a. Construct a conceptual dependency (CD) for the following sentence:-
John begged Mary for a pencil. **(4)**

b. What is an expert system? Discuss expert system architecture in detail. **(8)**

c. Briefly describe the following phases of natural language processing:
(i) Morphological Analysis
(ii) Syntactic Analysis
(iii)Semantic Analysis
Give suitable examples. **(6)**