

AMIETE – CS/IT (OLD SCHEME)

Time: 3 Hours

JUNE 2012

Max. Marks: 100

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

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Goal-Driven search is
- (A) forward search (B) backward search
(C) random search (D) none of these
- b. In production system the knowledge is encoded in the form of
- (A) if-then-else rule (B) semantic networks
(C) frames (D) CD formalism
- c. Fairly good way of dealing with local maxima is
- (A) backtrack to some earlier node and try going in a different direction
(B) make a big jump in some direction to try to get to a new section of search
(C) apply two or more rules before doing the test
(D) none of these
- d. The functions introduced to remove existence quantifier under universal quantifier are
- (A) constant functions (B) recursion functions
(C) skolem functions (D) none of these
- e. Prolog is
- (A) Procedural Programming Language
(B) Declarative Programming Language
(C) Formula Programming Language
(D) All the above

f. Best first search algorithm is simplification of _____ algorithm

- (A) AO* (B) A*
(C) O* (D) all of the above

g. Goal stack planning is

- (A) Linear (B) Non-Linear
(C) Both (A) and (B). (D) None of the above

h. Declarative meaning of the rules

$p :- a, b.$

$p :- c.$

- (A) $p \Leftarrow (a \vee b) \wedge c$ (B) $p \Leftarrow (a \wedge b) \wedge c$
(C) $p \Leftarrow (a \wedge b) \vee c$ (D) $p \Leftarrow (a \vee b) \vee c$

i. Learning by analogy involves learning

- (A) from a single training instance by explaining it.
(B) from a teacher or a knowledge source.
(C) new concepts through use of similar concepts and their solutions.
(D) none of these.

j. Inference Engine in MYCIN expert system is

- (A) Backward chaining. (B) Forward chaining.
(C) Both (A) and (B). (D) None of these.

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

Q.2 a. Write a PROLOG program for merging two ordered lists X and Y. (8)

b. Would you use breadth-first or depth-first search for each of the following problems? What would you base your choice on?

- (i) A chess playing program.
(ii) A medical diagnostic program. (8)

Q.3 a. The Sliding Tile problem: There are three black tiles, three white tiles and an empty space in the configuration shown below.

B	B	B		W	W	W
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The puzzle has two legal moves with associated costs:

- (i) A tile may move into an adjacent empty location. This has a cost of 1.
(ii) A tile can hop over one or two other tiles into the empty position. This has a cost equal to the number of tiles jumped over.

The goal is to have all the white tiles to the left of all the black tiles. The position of the blank is not important.

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Propose a heuristic for solving this problem and analyze it with respect to admissibility, monotonicity and informedness. (10)

- b. The game nim is played as follows: Two players alternate in removing one, two or three pennies from a stack initially containing five pennies. The player who picks up the last penny loses. Show by drawing the game graph that the player who has the second move can always win. (6)

Q.4 a. Express the following sentence in predicate logic format
"There is no car as good as a Mercedes" (5)

b. Draw CD representation of the following sentence
Mala took the book from Madhu. (5)

c. Draw semantic network of the following sentence
John is taller than Bill. (6)

Q.5 a. Consider the following Prolog program:

p(1).
p(2):- !.
p(3).

Write all Prolog's answers to the following queries:

(i) ?- p(X), p(Y). (ii) ?- p(X), !, p(Y) (8)

b. Write a PROLOG program to count the elements in a list (a list within a list counts as one element). (8)

Q.6 a. Explain the reasons why sigmoid function is as important and popular as an activation function in neural networks. (8)

b. Discuss Hopfield network. (8)

Q.7 a. Explain the various components of a planning system. (10)

b. Let A and B be two fuzzy sets given by
A = $\{(x_1, 0.2), (x_2, 0.5), (x_3, 0.6)\}$
B = $\{(x_1, 0.1), (x_2, 0.4), (x_3, 0.5)\}$
Find $(A-B)^2$ (6)

Q.8 a. Discuss the architecture of Expert System and explain its components. (8)

b. Explain Recursive Transition Network, with an example. (8)

Q.9 a. What are the limitations of knowledge representation using predicate logic? How are these taken care of in other schemes? (8)

b. Explain with an example how Bayesian Networks are used for handling uncertainty. (8)