

AMIETE – CS/IT

Time: 3 Hours

DECEMBER 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. A formula expressed as disjunction of literals is called

- (A) Relation (B) Clause
(C) Well formed formula (D) Negation

b. Which one would be the equivalent relation to $A \vee (B \vee C)$?

- (A) $(A \vee B) \vee (A \vee C)$ (B) $(A \wedge B) \vee (A \wedge C)$
(C) $(A \vee B) \wedge (A \vee C)$ (D) $(A \wedge B) \wedge (A \vee C)$

c. Given a PROLOG segment

$p(X) :- a(X), b(X).$

$p(X) :- c(X), d(X), e(X).$

$a(1), a(2), b(1), b(2), c(1), c(2), c(3), d(1), d(2), d(3), e(1), e(2), e(3).$

which is the correct solution to the query $?- p(X)$

- (A) $X=1; X=2$ (B) $X=1; X=2; X=1; X=2; X=3$
(C) $X=1; X=2; X=3$ (D) $X=1; X=2; X=1; X=2$

d. Bolts man's machine is a variation of _____ network.

- (A) Hopfield Network (B) ART Network
(C) Kohonen Network (D) SOM

e. Let $\text{Love}(y,x)$ represent y loves x in predicate calculus. If $\forall(\cdot)$ represents a universal quantifier and $\exists(\cdot)$ represents an existential quantifier, which one of the following will be a correct representation for *Everyone is loved by someone*.

- (A) $\forall(y) \exists(x) \text{Love}(y,x)$ (B) $\forall(x) \exists(y) \text{Love}(y,x)$
(C) $\forall(y) \exists(x) (x \rightarrow \text{Love}(y,x))$ (D) $\forall(y) \forall(x) \text{Love}(y,x)$

f. Given a search tree, the optimal path from the initial node to the goal node can be found by

- (A) breadth first search (B) depth first search
(C) A* algorithm (D) by all of these indicated methods

g. Identify the appropriate Conceptual Dependency primitive to represent the sentence: *Atul took the book from Rima.*

- (A) MTRANS (B) PTRANS
(C) ATRANS (D) ATTEND

h. Which one of the following is not a blind search technique?

- (A) Best first search (B) Depth first search
(C) Uniform cost search (D) Iterative Deepening search

i. To handle uncertainty in reasoning, MYCIN uses MB for measure of belief and MD for measure of disbelief and the following expression for confidence factor

- (A) $CF = \frac{MB + MD}{1 - \min(MB, MD)}$ (B) $CF = \frac{MB - MD}{1 + \min(MB, MD)}$
(C) $CF = \frac{MB - MD}{1 - \max(MB, MD)}$ (D) $CF = \frac{MB - MD}{1 - \min(MB, MD)}$

j. _____ is a linear separable problem.

- (A) NOR (B) NAND
(C) XOR (D) OR

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

Q.2 a. Find the most general unifier for the following set. Show the complete steps as you use the unification algorithm.

$$S = \{ D(t, z, m(t, y, f(z))), D(y, f(t), w) \} \quad (6)$$

b. Consider the following PROLOG segment:

function1([], 0).

function1([H | T], Z) :- H > 0, ! function1(T, Z1), Z is 1 + Z1.

function1([_ | T], Z) :- function1(T, Z).

What will be the response to the queries

?- function1([1, 0]).

?- function1([5, -5, 4, -4, 3, -3, 2, -2], X). (5)

c. Given the prolog segment

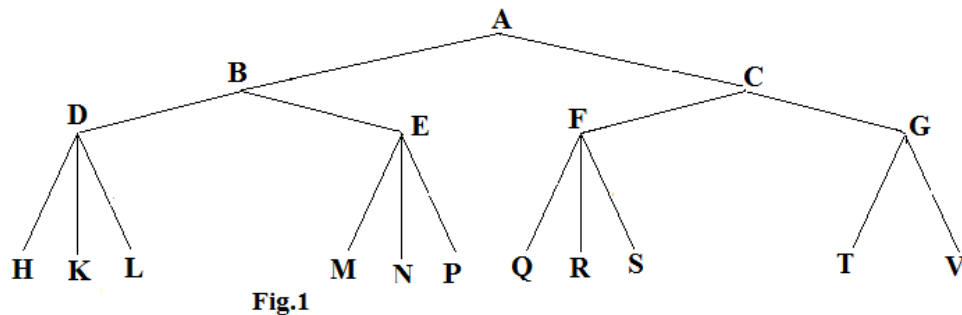
p(alpha).

p(beta):- !.

p(gamma).

What will be the response to the query ?- p(X), !, p(Y). (5)

- Q.3** a. Apply Breadth first search on the search graph shown in Fig.1 to find the shortest path from the node A to node R. Indicate the order in which the nodes will be examined. (8)



- b. Explain the branch and bound algorithm for a search tree in which the underestimates of the remaining distances are available. (8)
- Q.4** a. Describe how a Knowledge Representation and Reasoning system is built with a semantic network processing system. (6)
- b. In a diagnostic set up using Dempster Shafer theory for uncertainty handling, involving variables Flu (F), Cold (C), Allergy (A), Pneumonia (P), the following belief values are proposed based on evidences :

evidence		
m ₁	{ F, C, P } 0.7	{ Θ } 0.3
m ₂	{ F, C, A } 0.8	{ Θ } 0.2
m ₃	{ A } 0.9	{ Θ } 0.1

Show how the beliefs can be combined in the light of the various evidences. (10)

- Q.5** a. What are the essential abilities for possessing intelligence? (5)
- b. Compare and contrast numeric and symbolic processing techniques. (5)
- c. Describe Turing test of the turing test is passed, does this show that computers exhibit intelligence? (6)
- Q.6** a. What are the four main features of a Knowledge Representation language? Elaborate. (8)
- b. Indicate the various control strategies used for selecting two clauses, when carrying out resolution on a set of clauses. (8)

Code: AC74/AT74 Subject: ARTIFICIAL INTELL. & NEURAL NETWORKS

- Q.7** a. After coming to know that one could build expert systems if proper experts are available, Mr Satish Jain, one entrepreneur approaches you with the idea of developing an expert system for earthen articles which could be sold in a handicraft fair. Would you be able to help him? What would be your response to Mr Jain? (6)
- b. What are the four attractive features of a Biological Neural Network that make it superior to even most sophisticated computers? Indicate briefly. (6)
- c. List basic characteristics of an expert system. (4)
- Q.8** a. Describe self-organizing maps. Show Kohonen network with the help of a diagram. (8)
- b. What is meant by a linearly separable function? Discuss perceptron training algorithm. (8)
- Q.9** a. Illustrate several hard problems that artificial intelligence research has not yet been able to solve. (8)
- b. Explain briefly what do you understand by the term “Autonomy” in the context of multiagent systems. (8)