ROLL NO. _____

Code: AC74/AT74 Subject: Artificial Intelligence & Neural Net

AMIETE – CS/IT (NEW SCHEME)

Time: 3 Hours **DECEMBER 2011** **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **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. Which of the following verbs can be represented as PTRANS using conceptual dependency?

(A) run **(B)** say
(C) give **(D)** push

b. A^* algorithm does not give an optimal solution

(A) When heuristics is an under estimate
(B) When heuristics is over estimate
(C) When no heuristics is used
(D) If cost function is different for different edges

c. The most general unifier of the predicates f (X) and f (g(Y)), X and Y are variables, is

(A) {a/X, g(a)/Y} **(B)** {g(Y)/X}
(C) {Y/X} **(D)** None of these

d. $\neg p \Rightarrow q$ means

(A) p – q **(B)** $p \vee q$
(C) $p \wedge q$ **(D)** $\neg p \vee q$

e. Let $P(G \wedge T) = 1/3$ and $P(T) = 2/3$, then $P(G/T) =$

(A) 2/9 **(B)** 1/3
(C) 1/2 **(D)** 2/3

f. If P1 denotes plausibility and Bel denotes Belief function, then which of the following is true?

(A) Pl(s) = 1– Bel(s) **(B)** Pl(s) = Bel($\neg s$)
(C) Pl(s) = 1+ Bel(s) **(D)** Pl(s) = 1– Bel($\neg s$)

g. Minimax procedure (in Game playing) is

(A) Breadth-first search **(B)** Depth-first search
(C) Best-first search **(D)** Random search

h. Momentum term in Back propagation learning is used to increase the

(A) speed of learning **(B)** convergence
(C) weight adaptation **(D)** none of these

i. Let A and B be two fuzzy sets with $\mu_A(x) = 0.2$ and $\mu_B(x) = 0.1$, For the rule: If A or B then C, what is fuzzy membership of C?

(A) 0.3 **(B)** 0.1
(C) 0.02 **(D)** 0.2

j. A Computer program that performs a task normally done by a human expert is

(A) Neural Network **(B)** Semantic Network
(C) Expert System **(D)** None of these

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

Q.2 a. Explain important features of turing test. **(6)**

b. Write brief note on the following applications of AI:
(i) Natural language processing
(ii) Intelligent retrieval from databases
(iii) Expert Systems
(iv) Robotics
(v) Scheduling problems. **(10)**

Q.3 a. Give four examples to show knowledge can be represented using Conceptual Dependency (CD formalism). **(8)**

b. Describe the following concept as semantic network:
Sehvan University is an accredited academic institution of higher learning. There are four schools in the university namely, Business, Engineering, Health Science and Physical Science. Bob is the president of the university. Michael is vice-president of the university. Bart is head of school of engineering and he is married to Sussan. Sussan is a lecturer of Economics in Business School. They have one son. They are native of Colorado. **(8)**

Q.4 Consider the following knowledge base:

$\forall x\ \forall y$ cat(x) $\wedge$ fish(y) $\Rightarrow$ likes_to_eat(x, y)
$\forall x$ calico(x) $\Rightarrow$ cat(x)
$\forall x$ tuna(x) $\Rightarrow$ fish(x)
tuna(Charlie)
tuna(Herb)
calico(Puss)

(i) Convert these wff's into Horn clauses.
(ii) Convert the Horn clauses into a Prolog program.
(iii) Write a PROLOG query corresponding to the question, "What does Puss like to eat?" and show how it will be answered by your program. **(16)**

Q.5 a. Explain the following terms used in the Dempster-Shafer theory: Frame of discernment, Belief, Plausibility and Belief interval. **(8)**

b. Given CF (h, o_1) = 0.5, CF (h, o_2) = 0.3 and CF(h, o_3) = –0.2.
Find CF (h, $o_1 \wedge o_2 \wedge o_3$). **(8)**

Q.6 a. Algorithm A* does not terminate until a goal node is selected for expansion. However, a path to a goal node might be reached long before that node is selected for expansion. Why not terminate as soon as a goal node has been found? Explain. **(5)**

b. List the order in which nodes are visited in the tree below for each of the following three search strategies (choosing leftmost branches first in all cases)
(i) Depth-first search (ii) Breadth-first search (Fig.1). **(6)**

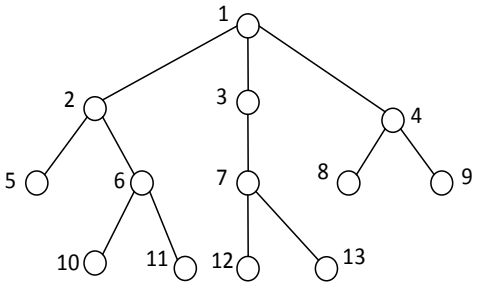

Fig.1

c. Describe a good heuristic function for missionaries and cannibals problem described below:
There are three missionaries, three cannibals and a boat on the left bank of a river and all the six persons have to be transported to the right bank, using the boat. The boat carries only two persons at a time and at least one person must bring the boat back. If the cannibals ever outnumber the missionaries on either bank, then they will devour them. How should they use this boat to cross the river? **(5)**

Q.7 a. What do you mean by knowledge engineering? Discuss various stages of knowledge acquisition. **(8)**

b. Give the structure of a Feedforward Neural Net and explain how it gets trained. **(8)**

Q.8 a. Show how a perception can be trained to learn the following input output pairs.

A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

(6)

b. Contrast expert systems and neural networks in terms of knowledge representation, knowledge acquisition and explanation. Give one domain in which the expert system approach would be more promising and one domain in which the neural network approach would be more promising. **(10)**

Q.9 Write note on the following with respect to use of Artificial Intelligence:

(i) Medical Systems
(ii) E-Tourism
(iii) Online Auctions
(iv) Online Negotiations. **(16)**