Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2720510 **Date: 03/06/2015**
Subject Name: Introduction to Artificial Intelligence
Time: 2:30 PM – 5:00 PM **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) What is Artificial Intelligence? List out ten major applications of AI and explain any one in detail. 07

(b) Explain state space search with suitable example. Also compare Depth first search and Breadth first search. 07

Q.2 (a) Solve 8-puzzle problem (initial state and goal state are given below) using Best First Search algorithm up to depth *Five* showing details of OPEN List, CLOSE List and Search Tree at every step. Assume that initial state is at depth *Zero*. 07


Initial State *Goal State*

(b) Explain constraint satisfaction and heuristic repair with suitable example. 07
OR
(b) Why and how IDA* and RBFS algorithms are better than A* algorithm for real-time applications. 07

Q.3 (a) Consider the game tree given below, where static scores mentioned in terminal nodes are all from first player point of view. Assume that the first player is maximizing player. 07
1. What move the first player choose if he uses Mini-Max algorithm?
2. Determine how many nodes would not be examined if first player uses the Mini-Max with alpha beta cut off algorithm.
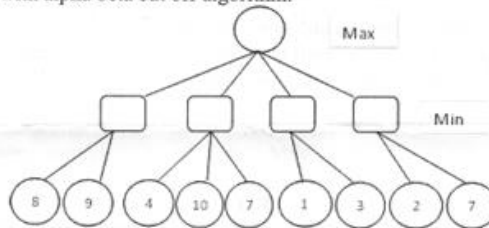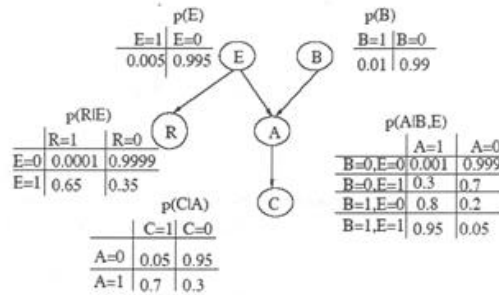

(b) Assume following facts for a problem: 07
1. Vijay only likes easy courses. 2. Engineering courses are hard.
3. All the courses of Science are easy. 4. SCI05 is a Science course.
(i) Convert these natural language facts into predicate logic statement.
(ii) Convert predicate logic statements into clause form.
(iii) Use resolution to answer the question "What course would Vijay like?"
OR
Q.3 (a) Explain following in relation to predicate logic: 07
(a) Rules of inference   (d) Unification   (f) Soundness of rules
(b) completeness of rules (e) Resolution refutation (g) Semantic Nets
(c) Frames

1

(b) What is practical importance of Bayes Network in real-time applications? Bayes network with probability table is given below. Calculate P(A/C). **07**

p(E)

E=1	E=0
0.005	0.995

p(B)

B=1	B=0
0.01	0.99

p(R|E)

	R=1	R=0
E=0	0.0001	0.9999
E=1	0.65	0.35

p(A|B,E)

	A=1	A=0
B=0,E=0	0.001	0.999
B=0,E=1	0.3	0.7
B=1,E=0	0.8	0.2
B=1,E=1	0.95	0.05

p(C|A)

	C=1	C=0
A=0	0.05	0.95
A=1	0.7	0.3

Q.4 (a) Let high and very high are two fuzzy sets corresponding to variable Temperature. **07**
Universal set U = {10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60}
Fuzzy set
High (H)= {0.0/10+0.4/20 + 0.75/30 + 1/40 + 0.5/50 + 0.3/55+ 0.0/60}
Very High (VH) = {0.0/20 + 0.4/30 + 0.8/40 + 0.9/50 + 1/55 + 1/60}
(i) Represent membership function of both fuzzy sets in graphical form.
(ii) Perform union, intersection and complement (of both) operations.

(b) What is single layer perceptron Neural Network? Explain various leaning rules. Also explain important recent application areas of neural network. **07**

OR

Q.4 (a) Explain following terms: **07**
   (i)   Certainty Factor   (iii) Fuzzy set theory
   (ii)   Fuzzy relation   (iv) Fuzzification

(b) Explain how multi-layer Neural Network can be used for solving the problem of character recognition. Explanation should include: **07**
- Neural Network architecture with Number of layer, Number of input & outputs, hidden layer nodes, etc
- Number of character patterns, size of each character pattern
- Training set, Testing set, Learning function, Transfer function, etc

Q.5 (a) Explain different leaning methods with suitable example. How supervised and unsupervised learning methods are different from the basic learning methods. **07**

(b) Explain following with their importance in real-time applications: **07**
   (i)   Expectations and moments (v) Co-relation and regression
   (ii)   Seasonal effects   (vi) Cyclical fluctuation
   (iii)   Moving average   (vii) MSE
   (iv)   Predictions

OR

Q.5 (a) What is Min-Max composition and Defuzzification? Explain their importance in fuzzy based systems with suitable example. **07**

(b) Describe the steps in the developing an Expert System. Also state advantages and limitations of Expert System. **07**

****