Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1710410 **Date: 07-06-2013**

Subject Name: Introduction to Artificial Intelligence

Time: 10.30 am – 01.00 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)** Show the partial state space for Travelling salesman problem using breadth first search and depth first search. **07**

(b) Solve the given 8-puzzle problem using hill climbing. (Apply global heuristic function.) **07**

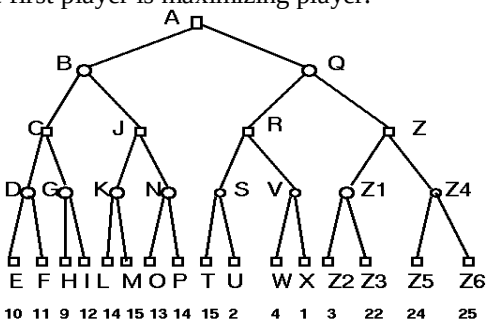
Initial state

2	8	3
1	6	4
7		5

Goal state

1	2	3
8		4
7	6	5

Q.2 **(a)** Consider the following game tree in which static scores are all from first player point of view. Assume that the first player is maximizing player. **07**



1. What move the first player choose?
2. What nodes would not need to be examined using the alpha beta cut off.

(b) Explain Iterative Deepening with suitable example. What is its advantages over other uninformed search methods? **07**

OR

(b) How AND-OR graph differs from OR graph? Explain with suitable example. **07**

Q.3 **(a)** Solve given crypt arithmetic problem using constraint satisfaction. **07**

```
  S E N D
 +M O R E
 ---------
 M O N E Y
```

(b) (1) Following two facts are given. **04**

(i) Heads, I win.

(ii) Tails, you lose.

(a) Express these statements in propositional logic.

(b) Use resolution to prove that, *I win.*

(2) Define Horn clause. Give example of any two horn clauses. **03**

OR

Q.3 **(a)** Solve given crypt arithmetic problem using constraint satisfaction. **07**

```
  C R O S S
+ R O A D S
----------
D A N G E R
```

(b) Convert following propositional wff into clauses. **07**

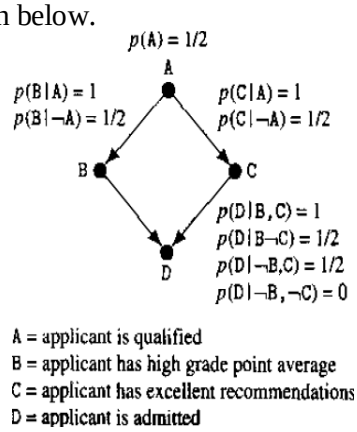
$$\neg[((P \vee \neg Q) \rightarrow R) \rightarrow (P \wedge R)]$$

Q.4 **(a)** Assume the following facts. **07**

1. Kinjal only likes easy courses.
2. Science courses are hard.
3. All the courses of Fine Arts are easy.
4. FA001 is a Fine Arts course.

Use resolution to answer the question ñWhat course would Kinjal like?ò

(b) An admission committee for a college is trying to determine the probability that an admitted candidate is really qualified. The relevant probabilities are given in the Bayes network shown below. **07**



Calculate P(A/D).

OR

Q.4 **(a)** Consider following facts. **07**

1. Jigar likes all kinds of foods.
2. Apples are food.
3. Chicken is food.
4. Anything anyone eats and isnôt killed by is food.
5. Brijesh eats peanuts and is still alive.
6. Sarita eats everything Brijesh eats.

Prove that *Jigar likes peanuts* using Backward chaining.

(b) What is defuzzification? Explain any three defuzzification methods with suitable example. **07**

Q.5 **(a)** Let *high* and *very high* are two fuzzy sets corresponding to variable temperature. **07**

Universal set U = {20, 25, 30, 35, 40, 45, 50, 55, 60}

Fuzzy set *high* = {0.5/25 + 0.6/30 + 0.8/35 + 1/40 + 0.5/45 + 0.2/50}

Very high = {0.4/30 + 0.6/35 + 0.8/40 + 0.8/45 + 0.9/50 + 1/55 + 1/60}

(i) Represent membership function of both fuzzy sets in graphical form.
(ii) Perform union, intersection and difference operations between both.

(b) Explain the architecture of neural network. Also explain the application areas of neural network. **07**

OR

Q.5	**(a)**	Define following terms with respect to GA. Initial population, Population size, Chromosome, Crossover, Mutation, Reproduction, Fitness function.	**07**
	(b)	Explain architecture and characteristics of Expert System.	**07**

****