(3 Hours) **(Total Marks : 80)**

Note: 1. Question 1 is compulsory.
2. Attempt any 3 from Q2 to Q6.
3. Indicate your answer with various sketches whenever necessary.

Q1 Attempt any **four**. **[20]**

(a) State PEAS Description for online English tutor.

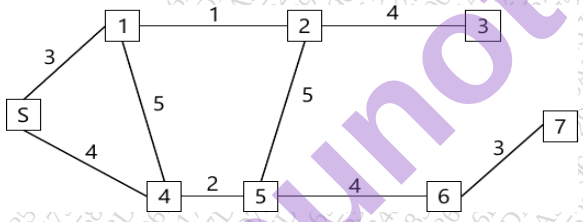
(b) Differentiate between Soft and Hard computing.

(c) Give Local and Global heuristic function for block world problem.

(d) Give different membership functions of fuzzy logic.

(e) Determine (alfa) α-level sets and strong α-level sets for the following fuzzy sets. A={(1,0.2), (2,0.5), (3, 0.8), (4,1), (5, 0.7), (6,0.3)}

Q2 (a) Consider the graph given in Figure 1 below. Assume that the-initial state is S and the goal state is 7. Find a path from the initial state to the goal state using A* Search. Also report the solution cost. The straight line distance heuristic estimates for the nodes are as follows: h(1)=14, h(2)=10, h(3)=8, h(4)=12, h(5)=10, h(6)=10, h(S)=15. **[10]**



(b) The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. **[10]**
Prove that Col. West is a criminal using resolutfion technique.

Q3 (a) Implement AND function using perceptron networks for bipolar inputs and targets. **[10]**

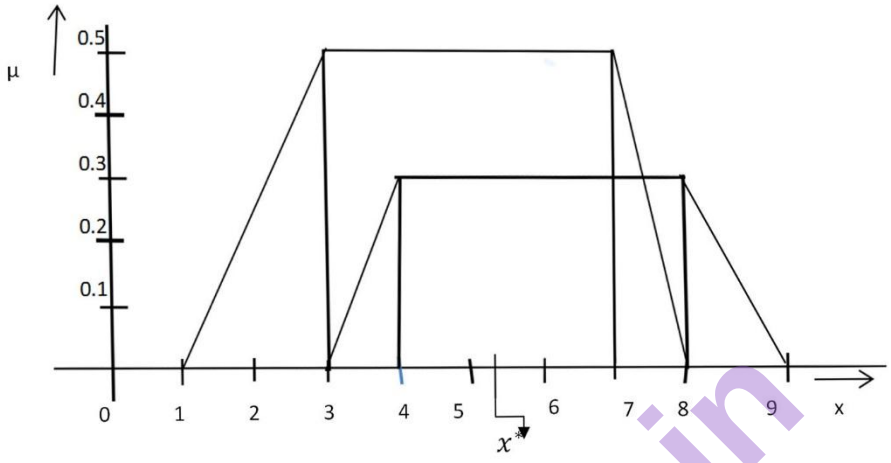
(b) Explain fuzzy controller system for a tipping example.Consider service and food quality rated between 0 and 10. use this to leave a tip of 25%. **[10]**

Q4 (a) Design a Mc-Culloh Pitts model for XOR Gate. **[10]**

(b) Construct kohonen Self-organizing map to cluster the four given vectors, **[10]**

[0 0 11], [1 0 0 0], [0 11 0] and [0 0 0 1]. The number of cluster formed is two. Assume an initial learning rate of 0.5.

Q5 (a) Explain defuzzification techniques. Apply defuzzification by using Center of Gravity (CoG) method on the following: **[10]**



(b) Explain planning problem in AI. What are different types of planning? Consider problem of changing a flat tire. The goal is to have a good spare tire properly mounted on to the car's axle, where the initial state has a flat tire on the axle and a good spare tire in the trunk. Give the ADL description for the problem. **[10]**

Q6 Write Short notes on following **(Any Four)** **[20]**

(a) Genetic algorithm

(b) ANFIS

(c) Hill Climbing algorithm

(d) Wumpus world knowledge base

(e) Different types of Neural Networks