THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA
ELECTRICAL & INSTRUMENTATION ENGINEERING DEPARTMENT
END SEMESTER EXAMINATION (DECEMBER 13, 2006)

Course Code: IN-004 **Course Name: Artificial Intelligence Control Techniques**

Time: 3Hours **Marks: 36**

Date: December 13, 2006 **Instructor: Gagandeep Kaur**

Note: Attempt all questions sequentially.

Q1(a) Design Hopfield net for 4bit bipolar patterns. The training patterns are sample S1 = [1 1 -1 -1], S2 = [-1, 1, -1, 1], S3 = [-1,-1,-1,1,1]. Find weight matrix and the energy for three input samples. Determine to which sample S = [-1,1,-1,-1] associates.

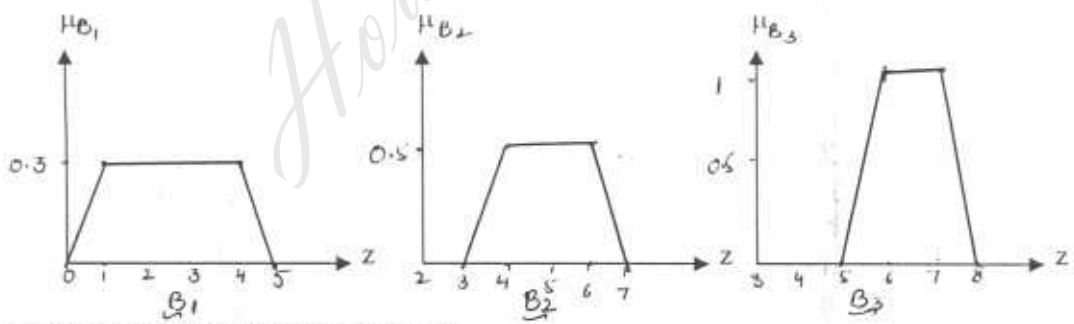
(b) What is competitive learning rule? How it is different from Out Star learning? **(5, 2.5)**

Q2(a) Give algorithm for GA. Explain steps in detail with suitable example. Mention engineering application of Genetic Algorithm.

(b) Give steps of Perception Algorithm for several output classes. **(5, 2.5)**

Q3. What do you mean from cardinality of crisp relations? Prove conventional thevenin theorem using fuzzy membership values of current, voltage and resistance. Show all the membership functions graphically assuming their values accordingly. **(7)**

Q4. The fuzzy sets $\underset{\sim}{B}_1$, $\underset{\sim}{B}_2$, $\underset{\sim}{B}_3$ are shown below. Find their defuzzification patterms using centroid method, weighted average method, centre of sums method, centre of largest area. **(7)**



Q5.(a) Give block diagram of MNN.

(b) Show output net having activation function with threshold factor.

(c) What is the significance of second modification in hetero associative memory neural network?

(d) Give fuzzy equivalence relation for reflexivity and symmetry properties.

(e) First of maxima, method of defuzzification determines smallest value of the domain with maximized membership degree. (True / False)

(1.5,1.5,1.5,1.5, 1)