Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/M.TECH (IEM)/SEM-2/IEM-204C/2011

2011
SYSTEM ANALYSIS TECHNIQUES

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any *five* questions out of the following.

$$5 \times 14 = 70$$

1. Define the term soft computing. Mention important components of soft computing and define each of them briefly.

$$2 + 2 + 10$$

2. What are fuzzy goals ? Define different types of fuzzy goals with simple examples. Formulate linear membership functions corresponding to each type of fuzzy goals.

$$3 + 3 + 8$$

3. Define multi-objective programming problems in general. Discuss the nature of solutions of such a problem. Explain the use of fuzzy programming technique to solve a multi objective programming problem with a simple example.

$$3 + 3 + 8$$

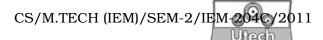30453 (M.Tech)   [Turn over

4. How can a genetic algorithm be used to solve an optimization problem (explain with all the steps in details) ? Why are the non-traditional techniques so useful in present decision-making context ? 10 + 4

5. List the commonly used activation function. What is the impact of weight in artificial neural network ?

Find the weights required to perform the following classification using perceptron network. The vectors (1, 1, 1, 1) and (−1, 1, −1, −1) are belonging to the class (*so have target value 1*), vectors (1, 1, 1, −1) and (1, −1, −1, 1) are not belonging to the class (*so have target value −1*). Assume learning rate as 1 and initial weights as 0. 4 + 2 + 8

6. Explain the steps of back-propagation algorithm and derive the expressions for weight update relations. 8 + 6

7. What are topology preserving maps ? State the applications of Kohonen Self Organizing Map.

Consider & Kohonen Self Organizing net with two cluster units and five inputs. The weight vectors for the cluster units are given by

$$W_1 = \begin{bmatrix} 1 \cdot 0 & 0 \cdot 9 & 0 \cdot 7 & 0 \cdot 5 & 0 \cdot 3 \end{bmatrix}$$
$$W_1 = \begin{bmatrix} 0 \cdot 3 & 0 \cdot 5 & 0 \cdot 7 & 0 \cdot 9 & 1 \cdot 0 \end{bmatrix}$$

Use the square Euclidean distance to find the winning cluster unit for input pattern $x = \begin{bmatrix} 0 \cdot 0 & 0 \cdot 5 & 1 \cdot 0 & 0 \cdot 5 & 0 \cdot 0 \end{bmatrix}$ using a learning rate of $0 \cdot 25$. Find the new weights for the winning unit. 2 + 2 + 10

8. What is the activation function used in radial basis function network ? What is the influence of linear equation over the net input calculation ? How does a momentum factor make faster convergence of a network ? Define 'over fitting' or 'over training' with an example. 4 + 3 + 4 + 3

9. How can the equation of a straight line be formed using linear separability ? State the training algorithm used for the Hebb network. What are the factors that improve the convergence of learning in BPN network ? 3 + 5 + 6