Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH (MMS)/SEM-2/MMS-204/2013

2013

INTELLIGENT COMPUTING

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. 5 × 14 = 70

1. a) Compare and contrast between propositional logic and first order predicate logic (FOPL).

   b) Express the following statements as FOPL wffs :

      i) All costly cars are comfortable but not all comfortable cars are costly.

      ii) For all positive integers there is a greater positive integer.

      iii) If you are good then I am better but if you are bad then I am worse.

2. What is a clause ? How to convert an FOPL well-defined formula to an equivalent set of clauses ? Apply the procedure to find the set of clauses equivalent to the following FOPL expression :

$$(\forall x)\{\neg P(x) \vee \{(\forall y)[\neg P(y) \vee P(f(x, y))] \wedge \neg (\forall y)[\neg Q(x, y) \vee P(y)]\}\}$$

3. Explain the terms ‘state space’ and ‘state space search’ with proper examples. Write an algorithm for the basic state space search procedure and with reference to this procedure, differentiate between exhaustic search and heuristic search.

4. Describe the basic structure of a biological neuron. Also, show the structure of an artificial neuron inspired by this biological neuron. What is a perceptron ? ‘A perceptron is the computational model of a hyperplane in an *n*-dimensional hyperspace’ — elaborate. Explain that a perceptron is unable to classify a set of vectors that are not linearly separable.

5. Explain, with appropriate examples, the following terms related to Genetic Algorithms (GAs) :

   a) Crossover operation

   b) Fitness function

   c) Roulette wheel selection

   d) GA parameters.

   Present the basic GA procedure.

6. Define the following transformations on a fuzzy set :

   a) Dilation

   b) Concentration

   c) Contrast intensification

   d) Fuzzification.

   Show the effect of these transformations on a triangular membership function.

7. Write short notes on any *two* of the following topics :

   a) Resolution refutation system

   b) AO* algorithm

   c) A* algorithm.