



Name :

Roll No. :

Invigilator's Signature :

**CS/M.Tech(ECE-COMM)/SEM-2/MCE-204B/2011
2011**

ARTIFICIAL INTELLIGENCE & SOFT COMPUTING

Time Allotted : 3 Hours

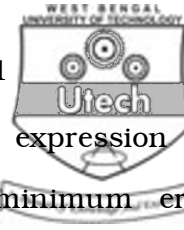
Full Marks : 70

The figures in the margin indicate full marks.

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

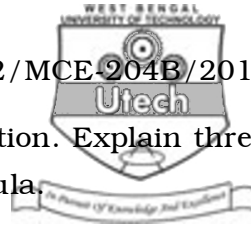
Answer Q. No. 1 and any *four* from the rest. Answer all parts
of any question at one place.

1. a) What is intelligence ? How does it vary from human's intelligence ?
- b) Briefly illustrate, how the Truth Maintenance System (TMS) is designed to handle complication. 1 + 3 + 6
2. a) Prove that, the Breadth First Search (BFS) is a special case of uniform cost search.
- b) Derive the expression of multi-objective fuzzy pattern recognition model, for a decision making problem.
- c) What is support vector machine (SVM) classifier ?
What is the need of that ? 4 + 6 + 5



3. a) What is feature vector ? Derive the expression for classification error. Why is Baye's minimum error classifier required ?
- b) Obtain the different Discriminant Functions for Multivariate Normal Disribution. 1 + 4 + 3 + 7
4. a) What do you mean by perception ? Explain different types of learning.
- b) Consider a two-class classification problem with $P(w_1) = 0.6$, $P(w_2) = 0.4$,
 $P(x | w_1) = 1/\sqrt{2\pi} \exp[-0.5x^2]$ and
 $P(x | w_2) = 1/\sqrt{2\pi} \exp[-0.5(x-1)^2]$. Find the decision regions and boundaries for the minimum error rate Baye's classifier.
- c) Write down the predicate logic statements for the following :
- i) Raj likes all kinds of food
 - ii) Hari likes anything which Raj likes
 - iii) Ram likes those which Raj and Hari both like.

1 + 4 + 4 + 6



5. a) Mention the need for the De-fuzzification. Explain three types of De-fuzzification with its formula.
- b) How does predicate logic differ from propositional logic ? Explain in brief.
- c) Let $X = \{ a, b, c, d \}$, $Y = \{ 1, 2, 3, 4 \}$ and
 $\tilde{A} = \{ (a, 0) (b, 0.8) (c, 0.6) (d, 1) \}$,
 $\tilde{B} = \{ (1, 0.2) (2, 1) (3, 0.8) (4, 0) \}$,
 $\tilde{C} = \{ (1, 0) (2, 0.4) (3, 1) (4, 0.8) \}$
- Determine the implication relations :
- i) IF X is \tilde{A} THEN Y is \tilde{B}
- ii) IF X is \tilde{A} THEN Y is \tilde{B} ELSE Y is \tilde{C} .
- d) Test, $((P \supset Q) \supset (P = Q)) = (\supset P = Q)$ is a tautology or, contradiction. 4 + 3 + 5 + 3
6. a) Write down the training algorithm for a Radial Basis Function (RBF) with fixed centres.
- b) What is linear separability ? Explain.
- c) What is the difference between single and multi-objective optimizations ? 8 + 4 + 3
7. a) Develop a perceptron for the AND function with bipolar inputs and bipolar targets.
- b) Write down the working principle of Genetic Algorithm. Why is fitness function required in Genetic Algorithm ?
- c) Discuss about different types of clusters. 7 + 4 + 4