(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0935   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.Tech.
(SEMESTER-IV) THEORY EXAMINATION, 2011-12
INTRODUCTION TO SOFT COMPUTING
(NEURAL NETWORKS, FUZZY LOGIC AND GENETIC ALGORITHM)

Time : 3 Hours]   *[Total Marks : 100*

Note :   Answer **all** the Sections.

Section – A

1.   Attempt **all** the parts.   10 × 2 = 20

(a)   Why Neural Networks is also called as Parallel Distributed Processing ?

(b)   Define Gradient descent learning.

(c)   Name all types of error based learning algorithms.

(d)   Justify – "The use of adaptive coefficient where the value of the learning coefficient is the function of error derivative on successive updates."

(e)   List all the tuning parameters of the Back-propagation Neural Network.

(f)   Define Multiple Training Encoding Strategy.

(g)   How to define Power of a Fuzzy Set ?

(h)   In propositional logic, name the widely used rules for inferring facts.

(i)   How Genetic algorithms are very different from most of the traditional optimization methods ?

(j)   Define Fitness Function in Gas.

Section – B

2. Attempt any **three** parts :   **3 × 10 = 30**

   (a) What are the characteristics of Neural Networks.? Explain three fundamentally different classes of Networks.

   (b) Explain the selection criteria of various parameters in BPN.

   (c) Let X = {a, b, c, d} Y = {1, 2, 3, 4} and A' = {(a, 0) (b, 0.8) (c, 0.6) (d, 1)}
       B' = {(1, 0.2) (2, 1) (3, 0.8) (4, 0)} C' = {(1, 0) (2, 0.4) (3, 1) (4, 0.8)}

   Determine the implication relations

   (i) IF x is A' then y is B'

   (ii) If x is A' then y is B' else y is C'

   (d) Use GA to solve the following non-linear programming problem :

   Minimize $(x_1 - 2.5)^2 + (x_2 - 5)^2$ subject to $5.5x_1 + 2x_2^2 - 18 <= 0$ $0 <= x1$, x2 <= 5.

   Give three and two decimal places of accuracy to variable x1, x2 respectively.

   (i) How many bits are required for coding variable ?

   (ii) Write down the fitness function which you would be using in reproduction.

Section – C

Attempt **all** parts.   **5 × 10 = 50**

3. Attempt any **two** parts :

   (a) Explain Augmented BP Networks with its architecture and transfer function.

   (b) Explain the different types of artificial neural networks.

   (c) Implement a MADALINE network to solve the XOR problem.

4. Attempt any **two** parts :

   (a) Explain how an auto-correlator results in the refinement of the pattern or removal of noise to retrieve the closest matching stored pattern.

   (b) Explain the Multiple Training Encoding Strategy.

   (c) Explain BAM architectures employ bipolar/binary encoding of patterns.

5. Attempt any **two** parts :

(a) Explain Cartesian product of two sets A & B with example.

(b) Consider the fuzzy sets A' and B' defined on the interval $X = [0, 5]$ of real numbers, by the membership grade functions

$$\mu_{\tilde{A}}(x) = x / (x + 1), \mu_{\tilde{B}}(x) = 2^{-x}$$

Determine the mathematical formulae & Graphs of the membership grade function of each of the following sets :

(i) A^c, B^c

(ii) $A \cup B$

(c) Multiply a fuzzy set $\tilde{A}$ by a crisp number a results in a new fuzzy set product $a.\tilde{A}$ with the membership function $\mu_{a \cdot \tilde{A}}(X) = a^{\cdot} \mu_{\tilde{A}}(X)$

6. Attempt any **one** part :

(a) Explain Defuzzification and widely used methods.

(b) Explain Fuzzy rule base for the air conditioner control.

7. Write short notes on any **two** :

(a) Roulette-Wheel Selection

(b) Cross Over & Inversion

(c) Convergence of GA.

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