School of Information Technology
Indian Institute of Technology, Kharagpur

IT 60108: Soft Computing Applications
Class test -I
Spring, 2015-2016

Full Marks: 20 Time: 30 minutes

Instructions:

1. All questions are of multiple choice type. There may be one or more option(s) is/ are correct. Select the correct option(s) only.

2. **One mark** will be awarded for the correct answer to every question. The answer will be considered correct, **if and only if ALL** correct option(s) have been selected.

3. **For each incorrect option selected, 0.25 mark will be deducted**.

Name: _____ Roll No: _____Mobile:_____

For Office/ internal use only:

S.No	Option	Total	Marks
1.	Number of correct answers.		(x)
2.	Number of wrong answers.		(Y)
3.	Number of questions not attempted.		
	Grand Total	X-Y	

1. Any soft-computing methodology is characterized with

(a) precise solutions
(b) control actions are unambiguous and accurate
(c) extensive mathematical model of the problem to be investigated
(d) algorithm which can easily adapt with the change of dynamic environment

2. Given that

R1: IF x is A THEN z is C
R2: IF y is B THEN z is c

Then, the Fuzzy rule "IF x is A OR y is B THEN z is C" can be expressed as (with all symbols bearing usual meaning)

(a) $(A \times B) + (B \times C)$
(b) $(A \times B) \rightarrow C$
(c) $(A \times B) \rightarrow (B \times C)$
(d) $(A \times C) \cup (B \times C)$

3. If A and B are two fuzzy sets and $x \in A, y \in B$. Let $C = A \oplus B$. Then

(a) $\mu_C(x, y) = \min\{\mu_A(x), \mu_B(y)\}$
(b) $\mu_C(x, y) = \min\{1,\ \mu_A(x) + \mu_B(y)\}$
(c) $\mu_C(x, y) = \max\{0,\ \mu_A(x) + \mu_B(y) - 1\}$
(d) $\mu_C(x, y) = \max\{\mu_A(x), \mu_B(y)\}$

4. The ***support*** of Fuzzy set A is the set of all points *x* in *X* (is the universe of discourse) such that

(a) $\mu_A(x) > 0$
(b) $\mu_A(x) = 1$
(c) $\mu_A(x) = 0.5$
(d) $\mu_A(x) \neq 1$

5. A transfer function $f(I)$ with transfer coefficient α follows its partial derivative with respect to input *I* as $\frac{\partial f}{\partial I} = \alpha f(I)(1 - f(I))$. The transfer function is most likely the

(a) Linear transfer function
(b) Log-sigmoid transfer function
(c) Tan-sigmoid transfer function
(d) Hard limit transfer function

6. If $x\ is\ A\ then\ y\ is\ B\ else\ y\ is\ C$. The output of the above fuzzy rule is

(a) a fuzzy set
(b) a crisp set
(c) a fuzzy relation
(d) a membership function

7. Given two Fuzzy sets *A* and *B* with MFs μ_A and μ_B, respectively where μ_A is of m-dimensional MF and μ_B n-dimensional MF. A relation $R = A \times B$ can be represented with

(a) Two dimensional matrix of size $m \times n$
(b) $m \times n$ dimensional matrix
(c) Two dimension matrix of size $p \times q$ where $p = |A|$ and $q = |B|$
(d) $p \times q$ dimensional matrix of size $m \times n$ where $p = |A|$ and $q = |B|$

8. Given that "$x\ is\ Sweet$" with $T(x) = 0.8$ and "$y\ is\ Sweet$" with $T(y) = 0.6$. The Fuzzy truth value of "$If\ x\ is\ Sweet\ then\ y\ is\ Sweet$" is

(a) 0.4
(b) 0.2
(c) 0.8
(d) 0.6

9. An equivalence between *Fuzzy vs. Probability* to that of *Prediction vs. Forecasting* is

(a) $Fuzzy \approx Prediction$
(b) $Probability \approx Prediction$
(c) $Fuzzy \approx Forecasting$
(d) $Probability \approx Forecasting$

10. One difference between Mamdani approach and Takagi-Sugeno appraoch to FLC design is that

(a) Mamdani approach needs defuzzification module whereas Takagi-Sugeno approach does not
(b) Mamdani approach is easy to interpret but less accurate
(c) Takagi-Sugeno approach does not require any fuzzification module whereas Mamdani approach needs
(d) Takagi-Sugeno approach is less interpretable but more accurate

11. For the same size of training data as input, the fastest learning techniques is

(a) Supervised training with error correction.
(b) Supervised training with stochastic method.
(c) Supervised training without error calculation.
(d) Supervised training with Hebbian method.

12. In case of layer calculation, the maximum time involved in

(a) Output layer computation.
(b) Hidden layer computation.
(c) Equal effort in each layer.
(d) Input layer computation.

13. The **Back Propagation Learning** algorithm is used to train

(a) a single layer feed forward neural network only
(b) a multiple layer feed forward neural network only
(c) a recurrent neural network only
(d) any artificial neural network

14. Which of the following are not necessarily an essential neural network parameters.

(a) Weight matrices.
(b) Value of l, m and n in $l - m - n$ network.
(c) Threshold values.
(d) Transfer functions.

15. If the problem is to classify input patterns, then the more preferred type of learning is/are is

(a) Reinforced learning.
(b) Unsupervised learning with competitive method.
(c) Supervised with error calculation.
(d) Unsupervised learning with Habbian method.

16. Which of the following logic can not be modelled with a single neuron.

(a) $3 - AND$
(b) $3 - XOR$
(c) NOT
(d) $(A\ XOR\ B)\ AND\ (A\ OR\ C)$

17. Both fuzzy logic and artificial neural network are soft computing techniques because,

(a) Both gives precise and accurate results.
(b) Artificial neural network gives accurate result but fuzzy logic does not.
(c) In each, no precise mathematical model of the problem is required.
(d) Fuzzy gives exact result but artificial neural network does not.

18. An ANN learn quickly if η, the learning rate assumes the following value(s).

(a) $\eta = 1$
(b) $\eta < 1$
(c) $\eta > 1$
(d) $\eta = 0$

19. Which of the following is true for neural networks?

(i) The training time depends on the size of the network.
(ii) Neural networks can be simulated on a conventional computer.
(iii) Artificial neurons are identical in operation to biological ones.

(a) (i) and (ii) are true
(b) (i) and (iii) are true
(c) (ii) is true.
(d) all of them are true

20. Which of the following is true for neural networks?

(i) The error calculation which is followed in "Back-propagation algorithm" is the steepest descent method.
(ii) Simulated annealing approach is followed in unsupervised learning.
(iii) A problem whose output is linearly separable can also be solved with MLFFNN.
(iv) The output of the perceptron with hard limit transfer function is more accurate than it is defined with any sigmoid transfer function.

(a) (i) and (iii) are true
(b) (i) and (ii) are true
(c) (ii) and (iv) are true
(d) all are true