

**GANPAT UNIVERSITY**  
**M. TECH SEM- II (ELECTRICAL)**  
**REGULAR EXAMINATION APRIL-JUNE 2016**  
**3EE201: Application of AI in Electrical Engineering**

MAX. TIME: 3 HRS

MAX. MARKS: 60

- Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.  
 (2) Figures on right indicate marks.  
 (3) Be precise and to the point in answering the descriptive questions.

**SECTION: I**

- Q.1 (A) Explain the classification and regression problems in detail. (05)  
 (B) On which parameters the number of hidden layer and number of neurons in each layer depends? (05)

**OR**

- Q.1 (A) How to implement classification problem using artificial neural network? (05)  
 (B) Explain the selection of parameters for multi-layer feed-forward networks. (05)
- Q.2 (A) Compare the radial basis function network with multi-layer perceptron. (04)  
 (B) How to create clusters using radial basis function network for the classification problem? (06)

**OR**

- Q.2 (A) Explain the architecture of Radial Basis Function Network. (04)  
 (B) What are the learning techniques for the radial basis function network? Explain in detail. (06)
- Q.3 (A) Explain the significance of the following with reference to the biological neuron and relate them with an artificial neuron. (05)  
 (a) Axon  
 (b) Synaptic junction  
 (c) Excitatory Signals  
 (d) Inhibitory signals.  
 (B) Compare artificial intelligence with natural intelligence. Also discuss the superiority of one on other. (05)

**SECTION: II**

- Q.4 (A) Explain how genetic algorithm converges to optimal solution? (05)  
 (B) How to select the probability of mutation and crossover? Explain in detail. (05)

**OR**

- Q.4 (A) How instantaneous mode and batch mode of training affects the result of back propagation learning? (05)  
 (B) Explain the genetic algorithm with suitable flowchart. (05)

Q.5 (A) Apply the fuzzy modus ponens rule to deduce rotation is quite slow given (05)

(i) If the temperature is high then the rotation is slow.

(ii) The temperature is very high.

Let H (High), VH (Very high), S (Slow) and QS (Quite slow) indicate the associated fuzzy sets follow: For  $X = \{30, 40, 50, 60, 70, 80, 90, 100\}$ , the set of temperature and  $Y = \{10, 20, 30, 40, 50, 60\}$ , the set of rotations per minute,

$$H = \{(70, 1)(80, 1)(90, 0.3)\}$$

$$VH = \{(90, 0.9)(100, 1)\}$$

$$QS = \{(10, 1)(20, 0.8)\}$$

$$S = \{(30, 0.8)(40, 1)(50, 0.6)\}$$

To derive R (x, y) representing the implication relation.

(B) Let  $X = \{a, b, c, d\}$ ,  $Y = \{1, 2, 3, 4\}$  and  $A = \{(a, 0)(b, 0.8)(c, 0.6)(d, 1)\}$ ,  $B = \{(1, 0.2)(2, 1)(3, 0.8)(4, 0)\}$ ,  $C = \{(1, 0)(2, 0.4)(3, 1)(4, 0.8)\}$  (05)

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.

OR

Q.5 (A) Consider a set  $P = \{P1, P2, P3, P4\}$  of three varieties of paddy plants, Set  $D = \{D1, D2, D3, D4\}$  of the various diseases affecting the plants and  $S = \{S1, S2, S3, S4\}$  be the common symptoms of the diseases. (05)

Let  $\hat{R}$  be a relation on  $P \times D$  and  $\hat{S}$  be a relation on  $D \times S$ .

For $\hat{R} =$		D1	D2	D3	D4
	P1	[ 0.6	0.6	0.9	0.8 ]
	P2	[ 0.1	0.2	0.9	0.8 ]
	P3	[ 0.9	0.3	0.4	0.8 ]
	P4	[ 0.9	0.8	0.1	0.2 ]

For $\hat{S} =$		S1	S2	S3	S4
	D1	[ 0.1	0.2	0.7	0.9 ]
	D2	[ 1	1	0.4	0.6 ]
	D3	[ 0	0	0.5	0.9 ]
	D4	[ 0.9	1	0.8	0.2 ]

Obtain the association of the plants with different symptoms of the diseases using max-min composition.

(B) Let  $\tilde{A} = \{(x_1, 0.2), (x_2, 0.7), (x_3, 0.4)\}$  and  $\tilde{N} = \{(y_1, 0.5), (y_2, 0.6)\}$  be two fuzzy sets (05) defined on the universe of discourse  $X = \{x_1, x_2, x_3\}$  and  $Y = \{y_1, y_2\}$  respectively. Find fuzzy relation R resulting out of the fuzzy Cartesian product  $\tilde{A} \times \tilde{N}$ .

Q.6 Attempt the following questions.

(A) Define fuzzy set theory. How fuzzy set are different from crisp sets? (03)

(B) What do you mean by defuzzification? Explain the different methods of defuzzification. (04)

(C) Show that the compound proposition  $((P \rightarrow Q) \wedge (R \rightarrow S) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow S)$  is a tautology. (03)

-----END OF PAPER-----