Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –III Examination Dec. - 2011

Subject code: 730702 **Date: 08/12/2011**

Subject Name: Application of Artificial Intelligence to Power Systems

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1

(a) Define Artificial Intelligence? Discuss the applications of AI in various fields (6)

(b) Discuss some of the important properties of intelligent systems. Give comparison between AI and conventional programs (4)

(c) Explain any two defuzzzification methods (4)

Q.2

(a) Give the difference between crisp set and fuzzy set. Explain the following operations on fuzzy sets giving suitable examples (7)
(i) Union (ii) Intersection (iii) Complement

(b) Explain Elman's back propogation neural network (7)

OR

(b) Explain the following in brief:
(i)Feedforward neural network (ii) Recurrent neural network (7)

Q.3

(a) Consider the following membership functions A and B (6)

$$\mu_A(x) = \begin{cases} 0, x \le 7 \\ x-7, 7 \le x \le 8 \\ -x+9, 8 \le x \le 9 \\ 0, x \ge 9 \end{cases}$$

$$\mu_B(x) = \begin{cases} 0, x \le 4 \\ x-4, 4 \le x \le 5 \\ -x+6, 5 \le x \le 6 \\ 0, x \ge 6 \end{cases}$$

Obtain their multiplication using the α-cut method. Derive resultant membership function

(b) Let X = { a,b,c,d} and Y = {1,2,3,4} where X and Y are universe of discourse 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 (8)
(i) If x is A then y is B
(ii) If x is A then y is B, else y is C

OR

Q.3

(a) Discuss various learning models of neural networks. Explain back propogation algorithm in brief. (9)

(b) Explain how genetic algorithms differ from other optimization techniques and search procedures (5)

Q.4

(a) With the help of flowchart explain the procedure of genetic algorithms (8)

(b) Explain any three cross-over techniques adopted in GA with the help of suitable examples (6)

OR

Q.4

(a) Explain the following genetic representations with appropriate illustrations (i)Binary (ii)Hexadecimal (iii)Octal (6)

(b) What is Roulette wheel selection? Prepare a table showing probability, cumulative probability and range of cumulative probability of selection of string 'i' for the mating pool for six strings having fitness values 12,4,16,8, 36 and 24 respectively. If the random numbers generated are 0.41, 0.65, 0.80 0.55, 0.86 and 0.21 find the level of contribution of various strings to mating pool (8)

Q.5

(a) Discuss scheduling maintenance of electric power transmission network using genetic algorithms (7)

(b) What are the major drawbacks of traditional security assessment tools based on numerical algorithms. Explain AI technique for power system state security assessment (7)

OR

Q.5

(a) Discuss the role of intelligent systems in demand forecasting (7)

(b) Discuss artificial intelligence techniques for voltage control (7)

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