Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2014

Subject code: 730702 **Date: 05-06-2014**

Subject Name: Application of Artificial Intelligence to Power Systems

Time: 02:30 pm - 05:00 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)**	Explain the main modules/architecture of the expert systems and stages for the development of the expert systems.	**07**
	(b)	What is ANN? Discuss important features of ANN.	**04**
	(c)	What is activation function? Explain various activation functions used in ANN.	**03**
Q.2	**(a)**	What is learning in ANN? Explain supervised learning and unsupervised learning.	**07**
	(b)	Discus various structures of ANN.	**07**
		OR	
	(b)	Compare conventional analytical method and Artificial intelligence based method for solving problems like optimization and/or control.	**07**
Q.3	**(a)**	Define (1) Linguistic Variable (2) Membership Function	**02**
	(b)	Explain various types of membership functions used in Fuzzy Systems. What is the effect of shape of membership function and its location in the universe of disclosure on the design of fuzzy systems?	**05**
	(C)	What is de-fuzzification? Why it is required in Fuzzy Systems? Explain various methods of de-fuzzification.	**07**
		OR	
Q.3	**(a)**	Write the essential steps for the development of fuzzy logic based expert systems which can be used in the power systems for controlling the voltage at the load bus. (Write your assumptions clearly)	**07**
	(b)	For the application of Fuzzy logic system in voltage control, discuss the following (1) Selection of input variable and fuzzification (2) Development of Fuzzy rules for the same application and (3) Selection and de-fuzzification of the output variable	**07**
Q.4	**(a)**	How does the GA differ from conventional optimization algorithm? Give the various comparison points	**07**
	(b)	What is mutation in GA? Explain how mutation can be implemented? Explain various programming logic used for the same.	**07**
		OR	
Q.4	**(a)**	How is GA different from Evolutionary programming? Discuss the structure of evolutionary programming algorithm.	**07**
	(b)	Write the main steps for implementation of GA based system for Scheduling maintenance of transmission network.	**07**

Q.5 **(a)** The cost function for three generators at a particular generating plant is given by: $F_i(X) = Ai.x^2 + Bi.x + C_i$, Where i= 1,2 and 3. For the total generation of 850 MW from the plant, write the steps to find ñthe optimal generation of each unitò using GA so that, the generating cost of the total plant becomes minimum. (Assume:(a) the generating range of each generator is from min. 100MW to max 500MW and (b) suitable values of A,B and C) **10**

(b) Discuss the term (1) Population size, (2) Probability of cross over (3) probability of mutation (4) chromosome **04**

OR

Q.5 **(a)** Discuss the application or ANN for load forecasting. Give your comments for Selection of Input to the ANN, Selection of the Output from the ANN, Structure of ANN, Training algorithm used, Numbers of training patterns generated and method of generating training patterns. **10**

(b) Discuss the factors affecting the training time in the (supervised) training of the ANN. **04**

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