

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME – SEMESTER III (OLD) – • EXAMINATION – SUMMER 2016**

**Subject Code: 730702****Date: 05/05/2016****Subject Name: Application of Artificial Intelligence to Power Systems****Time: 10:30 am to 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) What is Artificial Intelligence? Discuss properties and benefits of AI. **07**
- (b) Define following terms: **07**  
(1) Support (2)  $\alpha$ -cut (3) Linguistic variable (4) Membership Function (5) Fuzzy singleton (6) Fuzzification (7) Cross-over

- Q.2** (a) What do you mean by membership function? Discuss different types of membership functions in brief. **07**
- (b) What is de-fuzzification? Why it is required in Fuzzy Systems? Explain various methods of de-fuzzification. **07**

**OR**

- (b) Explain the main modules/architecture of the expert systems and stages for the development of the expert systems. **07**
- Q.3** (a) Explain feed forward neural network architecture in detail. **07**
- (b) How learning rate of NN affects the convergence? Explain the supervised and unsupervised neural network. **07**

**OR**

- Q.3** (a) Represent vector and Matrix notation of 3 neurons in input layer, 3 neurons in hidden layer and 3 neurons in the output layer. **07**
- (b) What is activation function? Explain various activation functions used in NN. **07**
- Q.4** (a) Explain general structure of recurrent neural network. **07**
- (b) How is GA different from Evolutionary programming? Discuss the structure of evolutionary programming algorithm. **07**

**OR**

- Q.4** (a) What is mutation in GA? Explain how mutation can be implemented? Explain various programming logic used for the same. **07**
- (b) Discuss the structure of Elman and Hopfield NN. **07**
- Q.5** (a) Suggest neural network based design for security assessment. **07**

- (b) Discuss the application of 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. **07**

**OR**

- Q.5** (a) Discuss scheduling maintenance of electric power transmission network using genetic algorithms **07**
- (b) Discuss artificial intelligence techniques for voltage control **07**

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