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**Question Paper Code : 52936**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6006 — APPLIED SOFT COMPUTING

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulation 2013)

(Also Common to PTEE 6006 — Applied Soft Computing for B.E. (Part-Time) – Electrical and Electronics Engineering Sixth Semester Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give the workflow of a simple fuzzy logic control system.

2. Write about cardinality of crisp relations.

3. Discuss the Assumptions in a Fuzzy Control System Design.

4. What is Storkey learning rule?

5. Define Fuzzification.

6. Describe about discrete time Hopfield networks.

7. Comment on gradient search.

8. List the applications of Fuzzy Logic Systems.

9. State the term "Mutation".

10. How does a neuro fuzzy system learn?

PART B — (5 × 13 = 65 marks)

11. (a) Illustrate the usage and difference between supervised and unsupervised learning mechanisms. Provide example by exploring any one of the algorithmic model in each of the category.

Or

(b) Determine the working mechanism of single layered and multilayered Neural Network with an architectural diagram. Explain the competitive layer with the mechanism of setting weights over the network.

12. (a) Demonstrate the workflow model of neural networks for control of inverted pendulum. Illustrate its applicability by a mathematical model with parameters such as mass of pendulum, mass of cart, length of the bar, standard gravity and moment of inertia of the bar. Draw the free body diagrams for the cart and the pendulum.

Or

(b) Illustrate the working paradigm of Hopfield neural network with clear architectural model. Compute the following for the training phase of the network with its periodic weight updates.

(i) Binary input patterns

(ii) Bipolar input patterns

Depict clearly about the energy function evaluation over a stable condition. Also explain is a Hopfield network with a continuous activation variable and a discrete time variable possible?

13. (a) Apply the concept of neuro fuzzy system for any real time application by depicting the clear architectural view of neuro fuzzy system and its layers with parametric functions.

Or

(b) Construct the basic structure of a neural expert system with its inference paradigm and rule extraction process. Also, provide clear demonstration that how the system distinguishes 'a bird from an aero plane' justify your answer with appropriate rules.

14. (a) Demonstrate briefly about the fuzzy rule base for the home heating system with a fuzzy rule function condition.

Or

(b) Demonstrate the mechanism of fuzzy rule based Aircraft Landing System with its fuzzy conditions.

15. (a) Identify the application of genetic algorithm to economic load dispatch problem.

Or

(b) Differentiate the terms gradient and non-gradient searches with accordance to the algorithmic workflow-representation in addition to time and space complexity. Give examples for each category.

PART C — (1 × 15 = 15 marks)

16. (a) One of the decisions your project team faces with each new computer product is what type of Printed Circuit Board (PCB) will be required for the unit. Depending on the density of tracks (metal interconnect traces on the PCB that act like wire to connect components together), which is related to the density of the components, we may use a single-layer PCB, a double-layer PCB, a four-layer PCB, or a six-layer PCB. A PCB layer is a two-dimensional plane of interconnecting tracks. The number of layers on a PCB is the number of parallel interconnection layers in the PCB. The greater the density of the interconnections in the design, the greater the number of layers required to fit the design onto a PCB of given size- One measure of board track density is the number of nodes required in the design. A node is created at a location in the circuit where two or more lines (wires, tracks) meet.

Evaluate the following for proper decision making logic over the described system.

(i) Specify the fuzzy states of nature.

(ii) Generate fuzzy alternatives.

(iii) Evaluate orthogonal fuzzy information system.

(iv) Organize the prior probabilities.

(v) Use new data samples for computation.

(vi) Summarize the utility values.

Or

(b) In metallurgy materials are made with mixtures of various metals and other elements to achieve certain desirable properties. In a particular preparation of steel, three elements, namely iron, manganese, and carbon, are mixed in two different proportions. The samples obtained from these two different proportions are placed on a normalized scale, as shown in the figure and are represented as fuzzy sets Al and A2. You are interested in finding some sort of "average" steel proportion. For the logical union of the membership functions shown we want to find the defuzzified quantity. For each of the methods learned assess

(i) Plan whether each is applicable and, if so,

(ii) Generate the defuzzified value, z*.