Question Paper Code : 10817

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

Elective

Control and Instrumentation Engineering

IN 5091 — SOFT COMPUTING TECHNIQUES

(Common to M.E. Electrical Drives and Embedded Control/M.E. Instrumentation Engineering/M.E. Power Electronics and Drives/M.E. Power Systems Engineering)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Soft computing technology and list few techniques.

2. What is an artificial neural network?

3. What is Boltzmann Machine?

4. What is Hopfield net?

5. When to go for fuzzy logic based modeling scheme?

6. Mention the three properties for matrix relations that define fuzzy equivalence relation.

7. Define one point crossover.

8. List the different selection methods in Genetic Algorithm.

9. Define fuzzy logic controller.

10. Mention few Evolutionary programming techniques.

PART B — (5 × 13 = 65 marks)

11.   (a)   Explain the architecture and algorithm of standard back propagation algorithm.

Or

(b)   Explain briefly the training algorithm for an ADALINE.

12.   (a)   Explain briefly the Full Counter propagation with architecture and its functioning.

Or

(b)   Explain the architecture and training algorithm of Adaptive Resonance Theory.

13.   (a)   State any four the properties of Fuzzy sets with examples.

Or

(b)   Calculate (i) complement (ii) Union (iii) Intersection (iv) Difference (v) De Morgan's Principles for the two given fuzzy sets

$$A = \left\{ \frac{1}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5} \right\} \text{ and } B = \left\{ \frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5} \right\}.$$

14.   (a)   Explain briefly Multi-Objective optimization problem formulation with an example.

Or

(b)   Explain the major components of Genetic Algorithm with flow chart.

15.   (a)   Explain any two hybrid control schemes.

Or

(b)   Describe the architecture and algorithm of support vector machine.

PART C — (1 × 15 = 15 marks)

16.   (a)   (i)   Derive back propagation algorithm.   (7)
            (ii) Describe a typical application of artificial neural network.   (8)

Or

(b)   (i)   Discuss the design of FLC of a typical non – linear systems.   (8)
      (ii) Briefly describe particle swarm optimization algorithm.   (7)

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