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Question Paper Code : 70456

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Electrical and Electronics Engineering

EE 6006 — APPLIED SOFT COMPUTING

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

(Regulations 2013)

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

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between supervised and unsupervised learning methods.
2. Sketch the structure of the artificial neuron and mention the elements involved in it.
3. Write the principle of operation involved in feedback networks.
4. Mention any two applications of neural networks in control system.
5. Define core, support and boundary in a membership function along with its diagram.
6. Highlight the operations that can be done on fuzzy relations.
7. Draw the architecture of a simple fuzzy logic controller.
8. Mention the advantages and disadvantages of using the fuzzy logic controllers.
9. Define a chromosome in genetic algorithm. How is it presented?
10. Mention the uses of gradient search technique.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the architecture of back propagation network with a neat sketch.

Or

- (b) (i) Explain the various learning rules used in artificial neural network with an application for each rule. (6)
(ii) Explain the principle of operation involved in a multi-layer feedback network and write about the activation functions used in the network. (7)

12. (a) Consider a discrete hopfield network net with,

$$S(1) = (1 \ 1 \ -1 \ 1) \quad t(1) = (1 \ -1)$$

$$S(2) = (-1 \ 1 \ 1 \ 1) \quad t(2) = (-1 \ 1).$$

Form the weight matrix of the network using outer products rule. Test the above network with mistakes in the third column and fourth column.

Or

- (b) Explain the application of neural network for the control of inverted pendulum in detail.

13. (a) Define defuzzification. Explain the various defuzzification techniques in detail.

Or

- (b) Explain the working of an adaptive fuzzy system with a neat sketch.

14. (a) Explain the working of fuzzy PID controller in detail.

Or

- (b) Explain the home heating system application using fuzzy logic control in detail.

15. (a) Explain the various cross-over techniques used in genetic algorithm with an example for each.

Or

- (b) Explain the working of genetic algorithm in detail.

PART C — (1 × 15 = 15 marks)

16. (a) Design a fuzzy logic system for automatic landing of an aircraft.

Or

- (b) Write a solution for the unit commitment problem using genetic algorithm, mentioning the selection, crossover, mutation and the termination conditions.
