AUC
LOB
6/1116 FN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21485

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Electrical and Electronics Engineering

EE 2025/EE 702 — INTELLIGENT CONTROL

(Regulations 2008)

(Common to PTEE 2025 – Intelligent control for B.E. (Part-Time) Sixth Semester EEE – Regulations 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the three basic approaches to intelligent control?

2. When to go for Expert system based control?

3. Write down the parameters to be tuned in an artificial neural network.

4. Draw the perceptron neural network model.

5. What is mutation in GA?

6. Write pseudo-code for ACO.

7. Distinguish between classical set theory and fuzzy set theory.

8. List the de-fuzzification methods.

9. Mention any two power system problems for which GA can be applied.

10. List various activation functions supported by MATLAB NN toolbox.

PART B — (5 × 16 = 80 marks)

11. (a) With neat diagram explain architecture of intelligent control system. (16)

Or

(b) (i) Explain the applications of expert system. (8)

(ii) Write the theory of rule-based system. (8)

12. (a) Using McCulloh-Pittts neuron model, design a neural network for 3-input OR function. (16)

Or

(b) Classify the two dimensional input pattern shown in Fig. 1 using perceptron network. The symbol "(R)" indicates the data representation to be +1 and "(C)" indicates data to be –1.

The Patterns are I & F. For pattern I, the target is +1 and for F, the target is –1. (16)

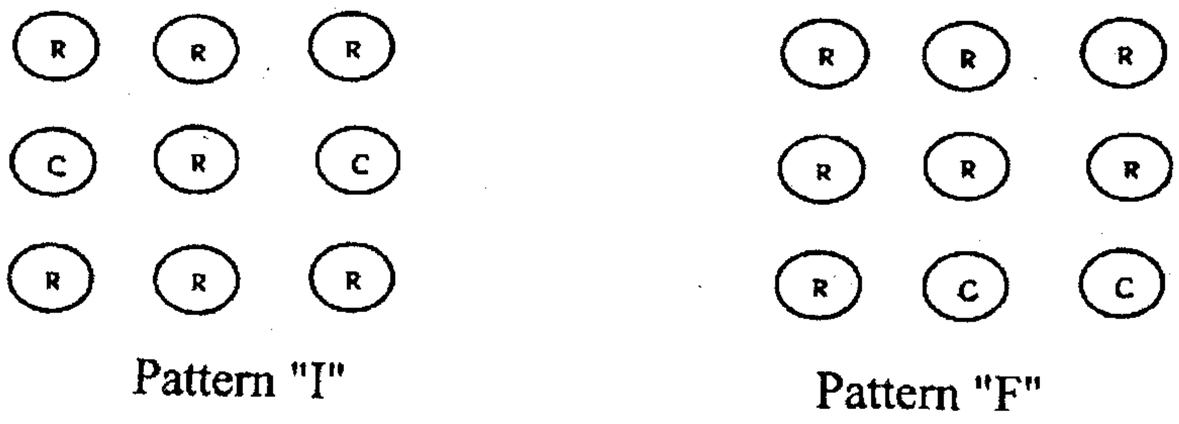

Fig. 1

13. (a) Perform two generations of simple binary coded genetic algorithm to solve for the following optimization problem.

Max $f(x) = x^2 + 2x + 3;\ 0 \le x \le 32$

Where x is an integer.

Use population size is 4, single point crossover, binary mutation and Roulette wheel selection. (16)

Or

(b) Explain the working of Tabu search technique with an example. (16)

14. (a) (i) Explain the concept of Gain scheduling in fuzzy controller with suitable diagram. (8)

(ii) Describe the architecture of a Mamdani type fuzzy logic controller and compare it with a conventional PID controller. (8)

Or

(b) Let the membership functions of two fuzzy numbers A and B defined as

$$\mu_A(x)=\begin{cases}0, & x\le 7\\ x-7, & 7\le x\le 8\\ -x+9, & 8\le x\le 9\\ 0, & x\ge 9\end{cases} \qquad \mu_B(x)=\begin{cases}0, & x\le 3\\ x-3, & 3\le x\le 4\\ -x+5, & 4\le x\le 5\\ 0, & x\ge 5\end{cases}$$

Find the multiplication and division of two fuzzy numbers using α-cut method. (16)

15. (a) Explain the stability analysis method for Fuzzy control systems controlling nonlinear processes. (16)

Or

(b) Develop a fuzzy controller to fill a water tank which is empty using a ON-OFF controller and with a DC motor. Assume suitable data wherever necessary. (16)
