

GANPAT UNIVERSITY

B. Tech. Semester: VIII Mechatronics Engineering

Regular Examination May – June 2014

2MC801 Computational Intelligence Techniques

Time: 3 Hours

Total Marks: 70

- Instruction:**
- 1 Start a new question from new page.
 - 2 Draw the figure with right indication.
 - 3 Answer to the two sections must be written in separate answer sheet.
 - 4 Assume necessary data and mention your assumption.

Section - I

- Que. - 1 [12]
- (a) Minimize $f(x) = x^2 + \frac{54}{x}$ using Exhaustive Search Method for interval (0, 5) (05)
 - (b) Minimize $f(x) = (100 - x)^2$ over the interval $60 \leq x \leq 150$ with Golden Section Search Method. Perform maximum three iterations. (05)
 - (c) To achieve interval reduction $(0.618)^9$ how many function evaluation would be needed in Interval Halving Method. (02)

OR

- Que. - 1 [12]
- (a) Minimize $f(x) = 2x^2 + \frac{16}{x}$ using Bisection Method. Perform only two iterations. (06)
 - (b) Minimize $f(x) = x^2 + \frac{32}{x}$ using Newton Raphson Method. Perform maximum two iterations. (06)

- Que. - 2 [11]

Minimize $f(x_1, x_2) = (x_1^2 + x_2 - 8)^2 + (x_1 + x_2^2 - 6)^2$ using Evolutionary optimization method. When you get function value zero stop there.

OR

- Que. - 2 [11]

- (a) Find the minimum of function using Hooke-Jeeves Pattern Search Method. Start from $x^{(0)} = [-4, -4]^T$. Perform one iteration only. (07)

$$f(x_1, x_2) = 8x_1^2 + 4x_1x_2 + 5x_2^2$$

- (b) Consider function (04)

$$f(x) = 4x_1^2 + 3x_2^2 - 4x_1x_2 + x_1$$

Determine the direction $d^{(t)} = (3, -2)^T$ at the point $x^{(t)} = (-2, 1)^T$ is descent direction or not?

- Que. - 3 Do as directed [12]
- (a) Find the Hessian Matrix for the following function. (04)
$$f(x_1, x_2) = 2x_1^2 + 4x_1x_2 - 10x_2^2$$
- (b) Write the algorithm steps for Interval Halving Method. (04)
- (c) Explain positive definite and negative definite matrix. (04)

Section - II

- Que. - 4 [12]
- (a) What is the learning in ANN? Explain the concept of supervisor and unsupervisor learning in ANN. (06)
- (b) Explain the term Artificial Neural Network. Explain the concept of back propagation in ANN (06)

OR

- Que. - 4 [12]
- (a) Explain the difference in de-fuzzification method in fuzzy logic. (06)
- (b) Explain the basic principle of fuzzy controller with block diagram. (06)

- Que. - 5 [11]
- (a) Explain the different concepts of expert system. (06)
- (b) Explain the working of human brain in biological Neural Network. (05)

OR

- Que. - 5 [11]
- (a) What is Artificial Intelligence? Which are various task domain address by AI. (06)
- (b) Short note on tuning test. (05)

- Que. - 6 [12]
- (a) How Prolog is different from other languages explain it. (04)
- (b) Write a prolog program for given factorial number. (04)
- (c) Short note on "Perceptron" in ANN. (04)

END OF PAPER