

PG CBCS

M.Sc. Semester-IV Examination, 2026

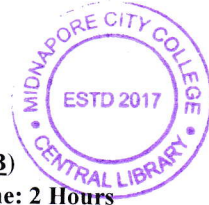
APPLIED MATHEMATICS

PAPER: MTM 409 (PRACTICAL)

(LAB.: SOFT COMPUTING TECHNIQUES USING MATLAB)

Full Marks: 20

Time: 2 Hours

Answer any **TWO** questions of the following (lottery basis): **10×2=20**

1. Write a MATLAB function to implement the complement of two fuzzy sets (for discrete membership functions).
2. Create a MATLAB function to perform the max-min composition on two fuzzy relations.
3. Write a MATLAB program to generate the output of logic AND function by McCulloch-Pits Neuron Model with threshold value 2.
4. Write a MATLAB program to generate the output of logic NOT function by McCulloch-Pits Neuron Model.
5. Implement the selection operator of Binary coded GA in MATLAB for the optimization problem $\text{Max } f(x) = x \cdot \sin(10\pi x) + 1, 0 \leq x \leq 1$.
6. Implement the mutation operator of Binary coded GA in MATLAB for the optimization problem $\text{Max } f(x) = x \cdot \sin(10\pi x) + 1, 0 \leq x \leq 1$.
7. Implement the crossover operator of Binary coded GA in MATLAB for the optimization problem:
 $\text{Max } f(x) = x \cdot \sin(10\pi x) + 1, 0 \leq x \leq 1$.
8. Write a MATLAB program to find intersection, union, and complement of two given fuzzy relations.
9. Implement the mutation operator of Real coded GA in MATLAB for the optimization problem:
 $\text{Max } f(x) = x \cdot \sin(10\pi x) + 1, 0 \leq x \leq 1$.
10. Implement the crossover operator of Real coded GA in MATLAB for the optimization problem:
 $\text{Max } f(x) = x \cdot \sin(10\pi x) + 1, 0 \leq x \leq 1$.
11. Write a MATLAB program to generate the output of logic ANDNOT function by McCulloch-Pits Neuron Model.
12. Write a MATLAB program to train logic AND function with bipolar inputs and targets using Hebbian Learning Rule.
13. Write a MATLAB program to train logic OR function with bipolar inputs and targets using Hebbian Learning Rule.
14. Write a MATLAB program to find the weights required to perform the following classifications using Hebbian Learning Rule. Vectors (1, 1, -1, -1) and (-1, 1, -1, 1) are members of class with target value 1; Vectors (-1, -1, 1, 1) and (1, -1, 1, -1) are members of class with target value -1.

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