

# Algorithms Assignment 1

## Design and Analysis of Algorithms - Assignment 1

**\*\*Due Date\*\***: 15th Oct 2025

### Questions

1. **\*\*Big-O Notation\*\***:

Prove that  $3n^2 + 10n + 5 = O(n^2)$ .

2. **\*\*Sorting\*\***:

Explain the working of Merge Sort with an example array: [12, 11, 13, 5, 6, 7].  
Analyze its time complexity.

3. **\*\*Recurrence Relations\*\***:

Solve the recurrence relation:  $T(n) = 2T(n/2) + n$  using Master Theorem.

4. **\*\*Dynamic Programming\*\***:

Write the algorithm for finding the nth Fibonacci number using DP (Memoization).

### Submission Guidelines

- Submit as a PDF file.
- Include your name and roll number.