# ABV- Indian Institute of Information Technology & Management, Gwalior

## Design and Analysis of Algorithms (IT203)

Minor Examination (Session 2024–25)

**Maximum Time: 1.5 Hours**                                          **Max Marks: 40**

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**Note: Attempt all questions. All questions carry equal marks.**

1. (a) Define and compare Big-O, Big-, and Big- notations with one example each. (b) Why is asymptotic analysis preferred over exact running time measurement?     (8 Marks)

2. Solve the following recurrences using the Master Theorem: (a) $T(n) = 2T(n/2) + n$ (b) $T(n) = 3T(n/4) + n^2$                                          (8 Marks)

3. (a) Write pseudocode for Binary Search. Prove its worst-case time complexity. (b) Apply Binary Search on the array $\{2, 5, 9, 12, 17, 21, 28, 36, 47\}$ to search for 21. Show each step.                                          (8 Marks)

4. (a) Explain the Divide and Conquer approach with an example (other than Merge Sort). (b) Solve the Maximum Subarray Problem for the array $\{2, 1, 3, 4, 1, 2, 1, 5, 4\}$ using Divide and Conquer.                                          (8 Marks)

5. Short Notes (any two): (i) Applications of Graphs in real-world problems. (ii) Characteristics of a Greedy Algorithm. (iii) Difference between Dynamic Programming and Divide & Conquer.                                          (8 Marks)