Cluster Innovation Centre, University of Delhi, Delhi-110007

Examination	**: End Semester Examination – Dec 2022**
Name of the Course	**: B. Tech (Information Technology and Mathematical Innovations)**
Name of the Paper	**: Design and Analysis of Algorithm**
Paper Code	**: 32863102**
Semester	**: III**
Duration	**: 2 Hours**
Maximum Marks	**: 50**

Instructions:

- **Question 1 is Compulsory**
- **Attempt any 3 out of Q2-Q5**

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1. **(2x10=20 Marks)**

   a. Is quicksort a stable sorting method? Justify.

   b. Show that $(n \log n - 2n + 13) = \Omega(n \log n)$.

   c. What are the Pros and Cons of using adjacency list and adjacency matrix representation?

   d. What is the smallest value of n such that an algorithm whose running time is $100\ n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?

   e. What is tree edge and cross edge?

   f. What is a Hash Table?

   g. Mention what are the types of Notation used for Time Complexity.

   h. Explain what is Space complexity of insertion sort algorithm?

   i. Why do we need searching?

   j. Why is bubble sort called bubble sort?

2. Differentiate between the following: **(2x5=10 Marks)**

   a. Dynamic programming and divide and conquer.

   b. Stack and Queue.

   c. Singly Linked List and Doubly Linked List data structure.

   d. Best case scenario and Worst case scenario of an algorithm.

   e. BFS and DFS.