Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Even) Semester Examination March 2025

Roll no. 2392164

Name of the Course and semester: BCA IV Semester
Name of the Paper: Introduction to Design and Analysis of Algorithms
Paper Code: TBC 401
Time: 1.5 hour   Maximum Marks: 50

Note:
  (i)   Answer all the questions by choosing any one of the sub questions
  (ii) Each question carries 10 marks.

Q1.   (10 Marks)   CO1   CO2
  a. Define Big-O (O), Big-Omega (Ω), and Big-Theta (Θ) notations. How do they differ?

                                OR

  b. Find the growth function for the given equation with proper explanation:

$$T(n)=3n^4+10n^3+6n^2+2n+1$$

Q2.   (10 Marks)   CO1   CO2
  a. Implement a recursive function to find the greatest common divisor (GCD) of two numbers using Euclid's algorithm.

                                OR

  a. Write a recursive function with worst case complexity for binary search algorithm with a suitable example.

Q3.   (10 Marks)   CO1
  a. Compare Merge Sort with Quick Sort in terms of time and space complexity.

                                OR

  b. Explain the partitioning process in Quick Sort and explain the Big-O complexity of Quick sort algorithms?

Q4.   (10 Marks)   CO1
  a. Illustrate the time complexity of any algorithm with nested loops? Explain with an example.

                                OR

  b. How permutation is different from combination prove with suitable example.

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Q5. (10 Marks) CO1 CO2

a. Solve Tower of Hanoi for **n=3** and write the sequence of moves.

OR

b. Define the fractional knapsack problem. Solve the following instance using the greedy approach, given that the capacity of the knapsack is 50.

Item	Weight	Value
A	10	60
B	20	100
C	30	120