

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech - V Semester (BI)

COURSE CODE(CREDITS): 18B11BI511 (03)

MAX. MARKS: 25

COURSE NAME: Design and Analysis of Algorithms

COURSE INSTRUCTOR: Dr. Tiratha Raj Singh

MAX. TIME: 1 Hour 30 minutes

Note: (a) All questions are compulsory. (b) Marks are indicated against each question in square brackets. (c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving algorithmic problems. Calculator is permitted.

Q.No	Question	CO	Marks
Q1	Explain the various methods used to solve recurrence relations. Demonstrate the iteration method and master theorem with a suitable example and derive their time complexities.	CO-2, 3	4
Q2	Consider the recurrence relation $T(n)=3T(n-1)+2$ for $n \geq 1$ with initial condition $T(0)=1$. Obtain the solution using the substitution method and verify your result.	CO-3	4
Q3	For the following functions, identify their asymptotic upper bound (Big-O notation) and discuss their relative growth order: (a) $f(n)=8n+12$ (b) $f(n)=9n^2+5n$ (c) $f(n)=2n^3+10n$ (d) $f(n)=20n^2+30$	CO-2, 3	4
Q4	Discuss various properties of algorithms with their involvement in the analysis of algorithms complexity. Justify with an example.	CO-1	3
Q5	Solve the Longest Common Subsequence (LCS) problem for the following DNA sequences: $S1=ACGTACGS$ and $S2=CGTAGS$. Construct the dynamic programming table, explain the recurrence relation, and find the final LCS.	CO-4	5
Q6	The time complexities of two algorithms are given as: Algo-1: $T_1(n)=K_1n^3+K_2n^2$ Algo-2: $T_2(n)=K_3n^2$ If $K_1=2$, $K_2=5$, and $K_3=150$, find the range of n for which: (a) $T_1(n) \leq T_2(n)$ (b) $T_1(n) \geq T_2(n)$ Show all computation steps clearly.	CO-3	5