

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATIONS- 2026

B.Tech-IV Semester (CSE/IT)

COURSE CODE (CREDITS): 25B11CI412/18B11CI412

MAX MARKS: 35

COURSE NAME: Design and Analysis of Algorithms

COURSE INSTRUCTOR: Dr. (Amit, Amol, Arvind, Ravi) Mr. Saurav

MAX. TIME: 2 Hrs

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is not allowed

Q.No	Question	CO	Marks
Q1	i. List of the characteristics of dynamic programming by mentioning the difference with divide and conquer.	4	2
	ii. Given a chain of 4 matrices A, B, C, D with dimensions: (5x4x6x2x7). Find the minimum number of multiplications required to multiply the given metrics using dynamic programming.		5
Q2	i. Given a string S of length n, determine the length of the longest palindromic subsequence present in the string. A subsequence is a sequence derived from the string by deleting zero or more characters without changing the order of the remaining characters. A palindromic subsequence is a subsequence that reads the same forward and backward. Note: A subsequence does not need to be contiguous. Example: Input: "BBABCBCAB" Output: 7 Longest Palindromic Subsequence = "BABCBAB" or "BACBCAB"	4	5
	ii. Write the Time and Space Complexity of the used algorithm in part 2(i).		2
Q3	i. Suppose that you are given a pattern to search in the given text. Mention at least three ways to get the result with their respective complexity in the worst case.	3	2
	ii. The following text (T) and a pattern (p) are given T = 31415926535 and P = 26. Consider q = 11 to compare the hash value of the pattern and text, like P mod q. Show the step-by-step procedure and find out how many minimum comparisons is required to get the pattern.		5
Q4	i. Specify the properties and algorithm used in backtracking approach. Is backtracking is used for optimization problem, give your answer in T/F.	2	2
	ii. Consider 4-Queens problem to fix on a board of 4x4. Find out the solution with appropriate constraints. Also mention the time complexity in the worst case.		5
Q5	i. Define the concept of P, NP, NP-Hard and NP-Complete with at least one problem of each category.	1	3
	ii. Mention the important factors for checking the efficiency of an algorithm and also describe the concept of asymptotic notations.		2
	iii. $T(n) = 3T(n/4) + cn^2$ using recursive tree method		2