**II B.Tech II Semester Regular Examinations, August/September 2023**

# DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE, IT, AIML & DS)

3 hours                                                    Max Marks: 70

uctions:

Question paper comprises of **Part-A** and **Part-B**
**Part-A** (for 20 marks) must be answered at one place in the answer book.
**Part-B** (for 50 marks) consists of **five questions with internal choice,** answer all questions.
**CO** means Course Outcomes. **BL** means Blooms Taxonomy Levels.

## PART – A
**(Answer ALL questions. All questions carry equal marks)**

10 * 2 = 20 Marks

| | | | | |
|---|---|---|---|---|
| a. | Define Big-O and Omega-$\Omega$ Notations. | [2] | CO1 | BL1 |
| b. | Define time complexity. | [2] | CO1 | BL2 |
| c. | Write the differences between divide and conquer and greedy method. | [2] | CO2 | BL1 |
| d. | Write the union algorithm of disjoint set. | [2] | CO2 | BL2 |
| e. | Define principle of optimality. | [2] | CO3 | BL1 |
| f. | Write the general method of dynamic programming. | [2] | CO3 | BL2 |
| g. | Write the control abstraction for Greedy technique. | [2] | CO4 | BL1 |
| h. | What is sum of subsets problem. | [2] | CO4 | BL2 |
| i. | Define class P and class NP. | [2] | CO5 | BL1 |
| j. | What is FIFO Branch and Bound solution? | [2] | CO5 | BL2 |

## PART – B
**(Answer ALL questions. All questions carry equal marks)**

5 * 10 = 50 Marks

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|---|---|---|---|---|
| a) | Explain about the asymptotic notations with an example for each. | [5] | CO1 | BL1 |
| b) | Show that the following equality is correct $5n^2 - 6n = \Theta(n^2)$ | [5] | CO1 | BL3 |

### OR

| | | | | |
|---|---|---|---|---|
| a) | List out the steps in mathematical analysis of recursive algorithms. | [5] | CO1 | BL3 |
| b) | Explain about recursive algorithms. | [5] | CO1 | BL2 |

4.  a)  Explain quick sort with suitable example.    [5]   CO

    b)  Give the worst-case time complexity of quick sort.    [5]   CO

**OR**

5.  a)  Compare simple FIND and COLLAPSING FIND operations on disjoint sets and write the algorithms.    [5]   CO

    b)  What is an articulation point? Write an algorithm to find an articulation point in a given graph.    [5]   CO

6.  a)  What is All Pair Shortest Path problem (APSP)? Discuss the Floyd's APSP algorithm and discuss the analysis of this algorithm    [5]   CO

    b)  Explain Optimal rod cutting problem.    [5]   CO

**OR**

7.  a)  Explain 0/1 Knapsack algorithm? Solve the following 0/1 Knapsack Problem by using Dynamic Programming approach. N=3, (w1, w2, w3) = (2, 3, 4) (p1, p2, p3)=(1, 2, 5) and m= 6    [5]   CO3

    b)  How do you solve travelling sales man problem using dynamic programming? Explain with an example.    [5]   CO3

8.  a)  Describe the greedy technique for solving the job sequence problem.    [5]   CO4

    b)  Explain Kruskal's algorithm.    [5]   CO4

**OR**

9.  a)  Discuss Hamiltonian cycle with an example and also write algorithm    [5]   CO4

    b)  Find all sum of subsets for n=4, (w1, w2, w3, w4) = (11, 13, 24, 7) and M=31.Draw the portion of the state space tree    [5]   CO4

10  a)  Explain Cook's Theorem in detail.    [5]   CO5

    b)  What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.    [5]   CO5

**OR**

11  a)  Consider the knapsack problem n=4 (p1,p2,p3,p4)=(10,10,12,18) ,(w1,w2,w3,w4)=(2,4,6,9) and m=15 find the optimal solution using LC branch and bound.    [5]   CO5

    b)  Explain travelling sales person problem using Branch and Bound.    [5]   CO5

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