

**Program: B.Tech/SE/IV/IT/MAY 2022**

**End Semester Examination: B.Tech. Semester IV**

**Course Code: ITC404      Course Name: Design and Analysis of Algorithms**

**Time: 2 hour**

**Max. Marks: 60**

**Instructions: 1. All three questions are compulsory**

Que. No.	Question	Max. Marks	CO	BT
Q1	Solve any <b>Four</b>			
i)	Explain Binary Search with an example.	5	CO1	BT2
ii)	Solve the following recurrence relation using Master's theorem. $T(n) = 2T(n/2) + n \log n$	5	CO1	BT3
iii)	Explain in brief the concept of Multistage Graphs?	5	CO4	BT2
iv)	Differentiate between P and NP.	5	CO6	BT4
v)	Differentiate between Prim's and Kruskal's Algorithm.	5	CO3	BT4
vi)	Explain the asymptotic notations.	5	CO1	BT2

Que. No.	Question	Max. Marks	CO	BT															
Q2 A	Solve any <b>Two</b>																		
i)	Write and explain sum of subset algorithm for $n=5$ $W=\{2,7,8,9,15\}$ $M=17$	5	CO5	BT3															
ii)	Explain the difference between greedy method and dynamic programming.	5	CO3	BT2															
iii)	Explain the concept of backtracking with an example.	5	CO5	BT2															
iv)	Explain Matrix chain multiplication algorithm with an example.	5	CO4	BT2															
Q 2 B	Solve any <b>One</b>																		
i)	Solve the following Job Sequencing with deadline problem using greedy approach. <table border="1"> <tr> <td>Job No</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr> <td>Profit</td><td>100</td><td>10</td><td>15</td><td>27</td></tr> <tr> <td>Deadline</td><td>2</td><td>1</td><td>2</td><td>1</td></tr> </table>	Job No	1	2	3	4	Profit	100	10	15	27	Deadline	2	1	2	1	10	CO2	BT3
Job No	1	2	3	4															
Profit	100	10	15	27															
Deadline	2	1	2	1															
ii)	Explain Travelling Salesman Problem using Branch and Bound.	10	CO5	BT2															

Que. No.	Question	Max. Marks	CO	BT
Q3	Solve any <b>Two</b>			
i)	Explain Huffman coding? Construct a Huffman Tree and determine the code for the following characters and frequencies given.  <b>a=10,e=15,i=12,o=3,u=4,s=13,t=1</b>	10	CO3	BT6
ii)	Solve the following using fractional knapsack where $n=5$ , $M=60$ , Profits/values are $(P_1, P_2, P_3, P_4, P_5) = (30, 20, 100, 90, 160)$ and weights are $(W_1, W_2, W_3, W_4, W_5) = (5, 10, 20, 30, 40)$ . Find the maximum profit.	10	CO3	BT3
iii)	Write a short note on (any 2) (1) N Queen Problem (2) Randomized Algorithms (3) Strassen's Matrix Multiplication	10	CO6	BT3

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**Course Outcomes (CO) -Learner will be able to:**

CO1: Analyze the time and space complexity of algorithms.

CO2. Apply the divide-and-conquer technique to solve the problems.

CO3. Apply the greedy programming technique to solve the problems.

CO4. Apply the dynamic programming technique to solve the problems

CO5. Apply the Solution-space search-based methods to solve the problems

CO6. Analyze problems and apply techniques to solve problems that are not covered by classical algorithm techniques studied earlier.

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BT1- Remembering, BT2- Understanding, BT3- Applying, BT4- Analyzing, BT5- Evaluating, BT6- Creating
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