



**SIDDHARTH GROUP OF INSTITUTIONS:: PUTTUR
(AUTONOMOUS)**

Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

**Subject with Code: Design and Analysis of
algorithms analog Circuits (19MC9116)**

Course & Branch: MCA

Regulation: R19

Year & Sem: II-MCA & I-Sem

**UNIT –I
INTRODUCTION & DIVIDE AND CONQUER**

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| 1 | a) Explain the properties of an algorithm with an example.
b) Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step count method. | [L2,L3][CO1] [12M] |
| 2 | Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm. | [L1,L4][CO2] [12M] |
| 3 | a. Differentiate between Bigoh and omega notation with example.
b. Distinguish between Algorithm and Psuedocode | [L1,L3][CO3] [12M] |
| 4 | Define time complexity and space complexity. Write an algorithm for adding n natural numbers and find the space required by that algorithm. | [L2,L5][CO2] [12M] |
| 5 | List out the steps that need to design an algorithm. | [L1,L4][CO3] [12M] |
| 6 | Explain Strassen's algorithm for matrix multiplication with the help of an example | [L2,L5][CO4] [12M] |
| 7 | Discuss the concepts of asymptotic notations and its properties | [L2,L3][CO4] [12M] |
| 8 | What do you mean by randomization? Describe asymptotic notation | [L2,L4][CO3] [12M] |
| 9 | Discuss the General plan for analyzing efficiency of Non recursive & Recursive algorithms Understand and Selection Sort with example? | [L1,L5][CO5] [12M] |
| 10 | Define Merge Sort with example and importance of Merge Sort | [L1,L3][CO3] [12M] |

UNIT –II
Greedy Method and Dynamic Programming

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| 1 | What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example. | [L2,L3][CO1] | [12M] |
| 2 | Explain the general principle of Greedy method and also list the applications of Greedy method | [L1,L4][CO1] | [12M] |
| 3 | What is the time complexity of the Job sequencing with deadlines using greedy algorithm? | [L1,L3][CO2] | [12M] |
| 4 | What is Minimum cost spanning tree? Explain an algorithm for generating minimum cost spanning tree and list some applications of it. | [L2,L5][CO2] | [12M] |
| 5 | Explain the Single source shortest path problem with an example. | [L1,L3][CO3] | [12M] |
| 6 | Write the algorithm to compute 0/1 Knapsack problem using dynamic programming and explain it. | [L1,L4][CO2] | [12M] |
| 7 | Briefly explain Multistage graphs with suitable examples? | [L2,L3][CO4] | [12M] |
| 8 | Explain the applications of depth first search algorithm | [L1,L3][CO4] | [12M] |
| 9 | Describe Traveling sales person problem with suitable example. | [L1,L2][CO3] | [12M] |
| 10 | Illustrate optimal binary search trees. | [L1,L5][CO5] | [12M] |

UNIT –III
Basic Traversal and Search Techniques , Back Tracking

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| 1 | Explain any one application back tracking with example? | [L1,L2][CO1] | [12M] |
| 2 | Describe in detail 8-queens problem using back tracking? | [L2,L5][CO2] | [12M] |
| 3 | Explain 0/1 knapsack problem by using backtracking with an examples? | [L1,L3][CO2] | [12M] |
| 4 | Describe in detail graph coloring using back tracking? | [L1,L4][CO3] | [12M] |
| 5 | What is DFS? Explain DFS with suitable example | [L1,L3][CO2] | [12M] |
| 6 | What is a Spanning tree explain with suitable examples and also explain the importance of Spanning trees. | [L1,L4][CO3] | [12M] |
| 7 | What are the Techniques about Graphs explain it ?Describe Bi-connected components | [L1,L3][CO4] | [12M] |
| 8 | Determine Sum of subsets problem. | [L2,L4][CO5] | [12M] |
| 9 | Define binary trees and Explain techniques for binary trees | [L1,L3][CO4] | [12M] |
| 10 | Illustrate Hamiltonian Cycle. Explain Hamiltonian cycles with examples | [L2,L4][CO3] | [12M] |

UNIT –IV
Branch and Bound, Lower Bound Theory

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|-----------|--|--------------|-------|
| 1 | Explain the general method of branch and bound | [L1,L2][CO1] | [12M] |
| 2 | Apply branch and bound to 0/1 knapsack problem and elaborate it? | [L2,L3][CO2] | [12M] |
| 3 | Explain the method of reduction to solve TSP problem using branch and bound? | [L3,L4][CO3] | [12M] |
| 4 | Explain the principles of FIFO branch and bound. | [L1,L3][CO1] | [12M] |
| 5 | a) Explain the properties of LC-search
b) Explain control abstraction of LC-branch and bound | [L2,L4][CO2] | [12M] |
| 6 | Briefly explain the FIFO brach and bound solution with example | [L1,L3][CO2] | [12M] |
| 7 | Briefly explain the LC brach and bound solution with example? | [L1,L4][CO1] | [12M] |
| 8 | State 0/1 knapsack problem and design an algorithm of LC Branch and Bound and find the solution for the knapsack instance with any example | [L1],L5[CO3] | [12M] |
| 9 | a) Explain Multiplying triangular matrices
b) Describe inverting a lower triangular matrices | [L1,L4][CO2] | [12M] |
| 10 | Define efficiency considerations of Branch and bound | [L1,L5][CO5] | [12M] |

UNIT –V
NP – Hard and NP – Complete Problems, Reductions

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| 1 | a) How are P and NP problems related?
b) Differentiate Time Efficiency and Space Efficiency | [L1,L2][CO1] [12M] |
| 2 | Compare NP-hard and NP-completeness with examples. | [L2,L3][CO2] [12M] |
| 3 | Write the non-deterministic sorting algorithm and also analyze its complexity? | [L2,L4][CO3] [12M] |
| 4 | Explain the class of P and NP with example? | [L1,L3][CO2] [12M] |
| 5 | Differentiate between NP- complete and NP-hard problems? | [L1,L2][CO3] [12M] |
| 6 | State and explain cook's theorem. | [L1,L3][CO4] [12M] |
| 7 | Explain the strategy to prove that a problem is NP-hard. | [L2,L4][CO2] [12M] |
| 8 | Explain the satisfiability problem and write the algorithm | [L1,L4][CO1] [12M] |
| 9 | What is halting problem explain with an example? | [L1,L5][CO5] [12M] |
| 10 | a) Discuss the general plan for analyzing Time efficiency of recursive algorithm.
b) Explain Reduction Source Problems. | [L1,L5][CO1] [12M] |

Prepared by:

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