

Code No: RT32054

R13

SET - 1

III B. Tech II Semester Regular Examinations, April - 2017**DESIGN AND ANALYSIS OF ALGORITHMS**

(Common to Computer Science Engineering and Information Technology)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is Amortized analysis? Explain. [4M]
- b) Explain the basic principle of Divide and Conquer method. [3M]
- c) Define Minimum Cost Spanning tree and list its applications. [4M]
- d) Compare the time complexities of solving the All Pairs Shortest Path problem using Floyd's algorithm and using the Dijkstra's algorithm by varying the source node. Justify your answer. [4M]
- e) State the Subset Sum problem. [3M]
- f) Differentiate between Backtracking and Branch & Bound techniques. [4M]

PART -B

- 2 a) What are the Asymptotic notations? And give its properties. [8M]
- b) What are the features of an efficient algorithm? Explain with an example. [8M]
- 3 a) Show the result of running Merge sorting technique on the sequence 38,27,43,3,9,82,10 [8M]
- b) Derive the Best, Worst and Average time complexities of Merge sorting technique. [8M]
- 4 a) Explain the general principle of Greedy method and also list the applications of Greedy method. [8M]
- b) Explain the greedy technique for solving the Job Sequencing problem. [8M]
- 5 a) What is the principle difference between the divide and conquer technique and dynamic programming technique? [8M]
- b) Explain the Travelling sales man problem. [8M]
- 6 a) Give the solution to the 8-queens problem using backtracking [8M]
- b) Write an algorithm to determine the Hamiltonian cycle in a give graph using backtracking. [8M]
- 7 a) Explain how branch and bound technique is used to solve 0/1 knapsack problem. [8M]
- b) What are the differences between FIFO and LC branch and bound solutions? [8M]

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Define Omega notation. [3M]
- b) Derive the worst case complexity of the Quick sort algorithm. [4M]
- c) State the general principle of greedy method. [4M]
- d) Explain how reliability of a system is determined using dynamic programming. [4M]
- e) Explain the Hamiltonian Circuit Problem with an example? [4M]
- f) State the difference between FIFO and LC branch and bound algorithms [3M]

PART -B

- 2 a) What is Amortized analysis and explain with an example. [8M]
- b) What is the time complexity of following function fun ()? Explain [8M]
int fun(int n)
{
 for (int i = 1; i <= n; i++)
 {
 for (int j = 1; j < n; j += i)
 {
 Sum = Sum +i*j;
 }
 }
 return(Sum);
}
- 3 a) Explain the basic methodology of divide and conquer algorithm. List the advantages of divide and conquer algorithm. [8M]
- b) Explain the principle of Binary search technique with an example and also List the drawbacks of it. [8M]
- 4 What is Minimum cost spanning tree? Explain an algorithm for generating minimum cost spanning tree and list some applications of it. [16M]
- 5 a) Write the algorithm to compute 0/1 Knapsack problem using dynamic programming and explain it. [8M]
- b) Explain the Optimal Binary Search Tree with an example. [8M]
- 6 a) Explain the solution to the graph coloring problem using backtracking. [8M]
- b) State and explain the subset sum problem with an example. [8M]
- 7 a) What are the principles of branch and bound algorithms? [6M]
- b) Explain how the traveling salesperson problem is solved by using LC Branch and Bound. [10M]



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Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What is Amortized analysis of algorithms and how is it different from Asymptotic analysis? [4M]
- b) In how many passes does the Merge sort technique sorts the following sequence 3,27,4,11,45,39,2,16,56? [3M]
- c) What is the importance of knapsack algorithm in our daily life? [4M]
- d) Define Optimal binary search tree with an example. [4M]
- e) Explain 8-queens problem. [3M]
- f) State the methodology of Branch and Bound. [4M]

PART -B

- 2 a) What are the features of efficient algorithm? Explain with an example. [8M]
 - b) Explain the Omega and Theta notations. [8M]
 - 3 a) Show the result of running Quick sorting technique on the sequence 38,27,43,3,9,82,10 [8M]
 - b) Derive the Best, Worst and Average time complexities of Quick sorting technique. [8M]
 - 4 Consider the following 5 jobs with their associated deadline and profit. [16M]
- | | | | | | |
|----------|-----|----|----|----|----|
| Index | 1 | 2 | 3 | 4 | 5 |
| job | j2 | j1 | j4 | j3 | j5 |
| deadline | 1 | 2 | 2 | 3 | 1 |
| profit | 100 | 60 | 40 | 20 | 20 |
- Solve the problem to earn maximum profit when only one job can be scheduled or processed at any given time.
- 5 a) Explain the methodology of Dynamic programming. List the applications of Dynamic programming. [8M]
 - b) Describe the Matrix multiplication chains problem. Apply the recursive solution of dynamic programming to determine optimal sequence of pair wise matrix multiplications. [8M]
 - 6 a) Explain the basic principle of Backtracking and list the applications of backtracking. [8M]
 - b) Using backtracking technique solve the following instance for the subset problem $s=(1,3,4,5)$ and $d=11$. [8M]
 - 7 a) What are the differences between backtracking and branch and bound solutions? [8M]
 - b) Explain the LC branch and bound algorithm. [8M]



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PART -A

- 1 a) What are the Asymptotic notations and its properties? [4M]
- b) In how many passes does the Quick sort technique sorts the following sequence 3,27,4,11,45,39,2,16,56? [3M]
- c) What is the time complexity of the Job sequencing with deadlines using greedy algorithm? [4M]
- d) What is Travelling Sales Man Problem? Explain [3M]
- e) Define Backtracking? List the applications of Backtracking. [4M]
- f) Explain LC branch and bound algorithm [4M]

PART -B

- 2 a) What is space complexity? Illustrate with an example for fixed and variable part in space complexity? [8M]
- b) Define Big Oh notation and also discuss its properties. [8M]
- 3 a) Determine the number of passes required to search the element 44 in the following list of elements 5,12,17,23,38,44,77,84,90. [8M]
- b) Write the Binary search algorithm and analyze for its best, worst and average case time complexity. [8M]
- 4 a) Explain the Single source shortest path problem with an example. [8M]
- b) What is the need for generating a spanning tree? Explain an algorithm for generating spanning tree. [8M]
- 5 a) How the reliability of a system is determined using dynamic programming? Explain. [10M]
- b) Explain the Knapsack problem with an example? [6M]
- 6 State n-queens problem and Explain 8-queens problem using backtracking. [16M]
- 7 a) State the concept of branch and bound method and also list its applications. [8M]
- b) Solve the Travelling Salesman problem using branch and bound algorithms. [8M]
