

Code No: RT22053

R13

SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017

ADVANCED DATA STRUCTURES

(Com. to CSE, IT)

Time: 3 hours

Max. Marks: 70

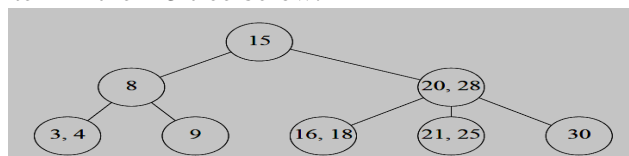
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) What are Hash functions? List some techniques that are used to implement Hash functions. (4M)
- b) Briefly discuss insertion and deletion to double ended priority queue (4M)
- c) What is rehashing? (3M)
- d) What is the difference between storing data on the heap vs. on the stack? (3M)
- e) Write the applications of DFS & BFS (4M)
- f) Give mode of operation in Dijkstra's algorithm. (4M)

PART -B

2. a) The Keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table? (12M)
- b) What do you mean by hashing? Why do we need it? (4M)
3. a) What is an AVL search tree? How do we define the height of it? Explain about the balance factor associated with a node of an AVL tree. (8M)
- b) Write Dijkstra's algorithm to calculate Single Source Shortest Path on a directed Graph. (8M)
4. a) The elements 32, 15, 20, 30, 12, 25 and 16 are inserted one by one in the given order into a Max-heap. What is the resultant Max-heap? (8M)
- b) Sort the following elements using radix sort 101, 56, 245, 389, 51, 678, 89, 9, 121, 3, 46, 712. Explain about the lower bound on average case complexity. (8M)
5. a) Write an algorithm to sort N keys in ascending order using Quick Sort. Write the recurrence equation algorithm and solve it to arrive at Asymptotic Notation for Best case and Worst Case. (8M)
- b) Sort the following elements using merge sort 101, 56, 245, 389, 51, 678, 89, 9, 121, 3, 46, 712. (8M)
6. a) What information we can store at the nodes of a 2-3 tree to quickly find the key-value of the i th smallest item? Explain the use of this information to find the 9th item in the 2-3 tree below. (8M)



- b) What is Pattern Matching? Briefly describe compressed Tries. (8M)
7. a) Discuss briefly about Knuth-Morris-Pratt pattern matching algorithm. (8M)
- b) Explain about the system calls for file structure. (8M)

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

PART -A

1. a) List the methods of the Hashing function & What are Heap Properties? (4M)
- b) Explain single ended priority queue operations (4M)
- c) What is the best case time complexity of Quick sort? (3M)
- d) List some techniques that are used to implement Hash functions. (3M)
- e) Differentiate Binary Tries and Multiway Tries (4M)
- f) What is Big Oh & Big Omega notation? (4M)

PART -B

2. a) Explain about hash table restructuring with examples. (8M)
- b) Construct AVL tree for the following numbers 14, 8, 12, 46, 23, 5, 77, 88, 20. (8M)
3. a) What is 2-3 tree? How is it better than other search trees? Construct a 2-3 B tree for the list C, O, M, P, U, T, I, N, G. (8M)
- b) Explain with an example how a node is inserted into an AVL tree, explain its basic operations. (8M)
4. a) What is an Ascending Priority Queue? Explain how to implement this using Binary Heap? Explain the insertion and deletion operation performed on binary heap, with an example. (8M)
- b) Explain about the kruskal's algorithm with example. (8M)
5. a) Construct the Binary Heap for the following data 11, 45, 23, 9, 4, 16, 8, 29, 1, 12, 21, 15. Write a routine for delete min from Binary Heap (8M)
- b) Derive the time complexity of Merge sort in average case (8M)
6. a) Write an algorithm to search a key K in a N * N Matrix in which each row column is sorted in ascending order. What is the time complexity of your algorithm? (8M)
- b) Explain the various asymptotic notation used for calculating time and space complexities. (8M)
7. a) Explain the Prim's algorithm with suitable example. (8M)
- b) Explain about file processing operations with examples (8M)

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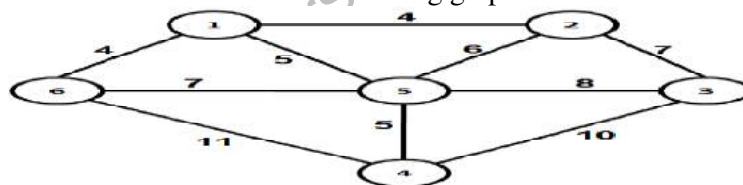
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2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) List the methods of the Hashing function & What are Heap Properties? (4M)
- b) Discuss about record organization. (4M)
- c) What is the maximum number of nodes in an AVL tree of a given height h? (3M)
- d) What is a spanning Tree? Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes? (3M)
- e) What do you mean by Heap Order Property? (4M)
- f) Write the applications of DFS & BFS (4M)

PART -B

2. a) Explain about the analysis of closed hashing for successful search and deletion (8M)
- b) Explain the different collision resolution strategies for hashing. State the advantages and disadvantages of each techniques. (8M)
3. a) Insert the following sequence of elements into an AVL tree, starting with an empty tree: 10, 20, 15, 25, 30, 16, 18, 19. (8M)
- b) Delete 30 in the AVL tree that you got. (8M)
4. a) A natural Merge Sort is to be used to sort the file of integers: 12, 37, 42, 9, 5, 7, 50, 40, 45, 92. What is order of the numbers after one pass of the sort? (8M)
- b) Write and explain Kruskal's algorithm for finding the minimum spanning tree. Also find the MST for the following graph. (8M)



5. a) Write an algorithm to sort N keys in descending order using Merge Sort. Write the recurrence Equation the algorithm and solve it to arrive at Asymptotic Notation. (8M)
- b) Explain the minimum cost spanning tree. Write its application and also write the algorithm for finding minimal spanning trees. (8M)
6. a) Write a routine for shortest path algorithm with example. (8M)
- b) Derive the time complexity of Quick sort in average case. (8M)
7. a) Explain about the special characters in files. (8M)
- b) Explain about Patricia with examples. (8M)

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PART -A

1. a) What do you mean by hashing? Why do we need it? (4M)
- b) What is Big Oh & Big Omega notation? (4M)
- c) What is a Priority Queue? (3M)
- d) Differentiate Backtracking and Branch and bound. (3M)
- e) What are Binomial Heaps? What are its applications? (4M)
- f) What is Breadth First Search and Depth First Search? (4M)

PART -B

2. a) Explain the different collision resolution strategies for hashing. State the advantages and disadvantages of each technique. (8M)
- b) Construct AVL tree for the following numbers 14, 8, 12, 46, 23, 5, 77, 88, 20. (8M)
3. a) Define balanced binary search tree. Construct binary search tree for the data 8, 10, 3, 2, 1, 5, 4, 6, and 11. Insert an element 7 into binary search tree and balance the tree using AVL rotation. (8M)
- b) Write a routine for inserting an element into an AVL tree. (8M)
4. a) Write Dijkstra's algorithm to calculate Single Source Shortest Path on a directed Graph. (8M)
- b) Sort the following elements using Merge Sort 9, 17, 5, 28, 3, 11, 7, 78, 1, 33, 8, 45, 2, 4, 12, 6, and 34. Explain about the lower bound on average case complexity. (8M)
5. a) Explain about the BFS with example. (8M)
- b) Construct the binary heap for the following data 11, 45, 23, 9, 4, 16, 8, 29, 1, 12, 21, 15 (8M)
6. a) Write a routine for Warshall's algorithm. (8M)
- b) What is Pattern Matching? Briefly describe compressed Tries. (8M)
7. a) Explain the main features of Boyer-Moore algorithm. (8M)
- b) Describe about Search Engine and Inverted Files. (8M)