

II B. Tech II Semester Regular Examinations, April - 2018
ADVANCED DATA STRUCTURES
 (Computer Science and Engineering)

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 **FOUR** Questions from **Part-B**

PART -A

1. a) Define Latency time and Transmission time? (2M)
- b) Define Hash table and Hash function? (2M)
- c) Explain the Binary Heap Structure Property? (3M)
- d) List the properties of Red-Black trees? (3M)
- e) Explain redistribute and merging of nodes in AVL tree? (2M)
- f) Is Digital Search Tree similar to binary search tree? (2M)

PART -B

2. a) Explain the external sorting technique using a list containing 4500 records and internal memory capable of sorting at most 750 records. Block length is 250 records. (7M)
- b) Analyze the complexity of above external sort technique? (7M)
3. a) Write short notes about Secure Hash Functions? (7M)
- b) Write the Secure Hash algorithm. The input to SHA is any message with maximum length less than 2^{64} bits. Its output is a 160-bit code? (7M)
4. Do the following operations of priority queues? (14M)
 - (i) Construct the min and max priority queue with the following elements 20, 10, 5, 18, 6, 12, 14, 4, and 22.
 - (ii) Insert 2 and 28 in the min priority queue?
 - (iii) Perform two successive deletion operations on max priority queue?
5. a) Create an AVL Tree using the following data entered as a sequence set. Show the balance factors in the resulting tree:
13, 22, 6, 9, 32, 55, 79, 65, 70 (7M)
- b) Insert 42, 43, 46 and 49 in the above constructed AVL tree and show a balanced AVL Tree. (7M)
6. a) Explain the insertion operation in B+ tree with suitable example? (7M)
- b) Construct 2-3 tree by using the following sequence of numbers (7M)
6, 7, 9, 22, 13, 31, 35, 28, 24, 5, 34, 8, 25, 10, 11, 12, 14 and 39.
7. a) Explain the insertion, deletion and search operations on Digital Search Trees with an example? (7M)
- b) What is Patricia? Explain the step to be followed to obtain Patricia from a compressed Binary Trie? (7M)



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PART -A

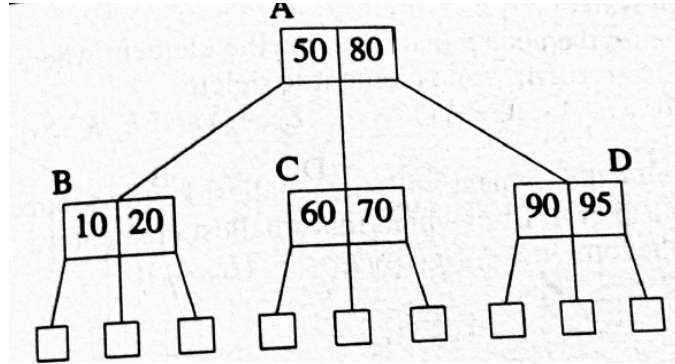
1. a) Discuss the applications of external sorting algorithm? (2M)
- b) Explain the Mid-Square Hashing techniques with suitable examples? (3M)
- c) Explain Binary Heap-Order-property? (2M)
- d) Define Optimal Binary Search Tree? (2M)
- e) Explain how to split an internal node for right and left branch in 2-3 trees? (2M)
- f) What is a Binary Tries? Explain with example? (3M)

PART -B

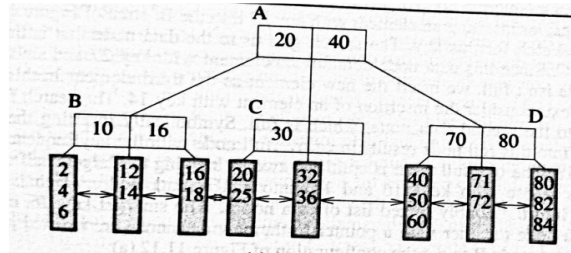
2. a) Explain K-Way merging with suitable example? (7M)
- b) Suppose we have the weights $q_1=2$, $q_2=3$, $q_3=5$, $q_4=7$, $q_5=9$ and $q_6=13$. Write the step by step process to construct the Huffman tree? (7M)
3. Explain the following overflow handling techniques with suitable examples? (14M)
 - (i) Open Addressing.
 - (ii) Chaining.
4. a) Explain the implementation methods of Priority Queues? (7M)
- b) Write insertion and deletion algorithms of priority heap? (7M)
5. a) Create a Red-Black tree by inserting the following sequence of numbers 8, 18, 5, 15, 17, 25, 40 and 80 and explain the process? (7M)
- b) Write the AVL tree Deletion algorithm? (7M)



6. a) Use the deletion algorithm to delete the elements with keys 90, 95, 80, 70, 60 and 50 in this order from given following 2-3 trees. Show the resulting 2-3 tree following each deletion. (7M)



- b) Show the resulting B+ tree after deleting each of the following keys 6, 71, 14, 18, 16 and 2 (7M)



7. Discuss the following. (14M)
- What is a compressed trie?(4m)
 - Construct Compressed Tries with Skip Fields(4m)
 - Construct Compressed Tries with Labeled Edges(4m)
 - Space Required by a Compressed Tries(2m)



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PART -A

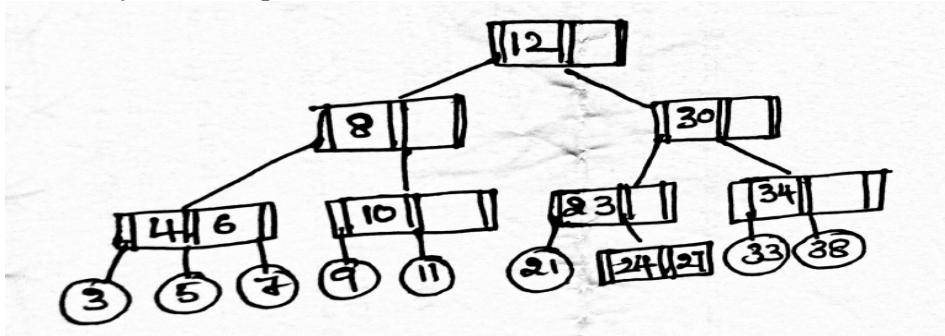
1. a) Define Seek Time? (2M)
- b) Explain the Folding Hashing techniques with suitable examples? (3M)
- c) Define a Priority Queue? (2M)
- d) Explain the Left of right rotation of an AVL tree? (3M)
- e) Explain how to split a leaf node for right and left branch in 2-3 trees? (2M)
- f) Briefly explain Height of a Trie? (2M)

PART -B

2. a) Briefly explain Buffer Handling for Parallel Operation with suitable example? (7M)
- b) Explain the step by step process of K-Way sorting technique with 900 megabytes of data using 100 megabytes of RAM? (7M)
3. a) Discuss the techniques for insert a directory pair into a dynamic hash table that uses a directory? (7M)
- b) Write an algorithm to delete a directory pair from a directory less dynamic hash table? (7M)
4. a) Define Binomial Queues? Explain the properties of Binomial Queues? (7M)
- b) Explain the following operations of binomial queues with suitable example? (7M)
 - (i) Merging of two Binomial Queues.
 - (ii) Union of two Binomial Queues.
5. a) How to split the Red-Black tree explain with an example? (7M)
- b) Write AVL Tree insertion algorithm? (7M)



6. a) Deletion 38, 5, 8 from the following 2-3 trees and show the resulting 2-3 tree after every deletion operation. (7M)



- b) Explain the insertion procedure with suitable example in B+ trees. (7M)
7. a) Briefly explain the construction of Multi-way tries with an example? (7M)
- b) Explain the creation of 1-Bit Tries with an suitable example? (7M)



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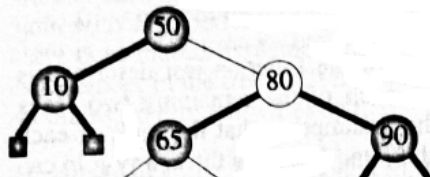
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PART -A

1. a) Define disk block? (2M)
- b) Explain the Digit analysis Hashing techniques with suitable examples? (3M)
- c) List the operations supported by a minimum priority queue? (2M)
- d) Explain the Right of Left rotation of an AVL tree? (3M)
- e) What is a B-Tree? (2M)
- f) Give the analysis of Tries search algorithm? (2M)

PART -B

2. a) Using Huffman function how to find a binary tree of minimal weighted external path length, explain with suitable example? (7M)
- b) Write the algorithm for k-way merge with floating buffers? (7M)
3. a) Discuss the techniques for deleting a directory pair into a dynamic hash table that uses a directory? (7M)
- b) Write an algorithm to insert a directory pair from a directory less dynamic hash table? (7M)
4. a) Show the result of constructing a binomial heap using the following elements 9, 11, 1, 13, 5, 4, 7, 14, 2, 8, 6, 3, 10, 12, and 15 one at a time, into an initially empty binomial heap. (7M)
- b) Show the resultant Binomial heap after perform delete minimum element and reconstruct the binomial heap twice on the above constructed binomial heap? (7M)
5. a) Inset 60, 65, and 62 in the following Red-Black Tree. Show the resultant Red-Black Tree (7M)



- b) Explain the step by step process of Joining two Red-Black trees? (7M)
6. a) Give the definition and properties of m-Way search tree? (7M)
- b) Construct the 2-3 tree with the following sequence of numbers 5, 21, 8, 63, 69, 32, 7, 19 and 25 (7M)



7. a) Explain insertion and deletion operations into Tries with an example? (7M)
- b) What is Fixed-Stride Tries? How to implement a Fixed-Stride Tries explain with an example? (7M)

