**R13**

**II B. Tech II Semester Regular Examinations, April/May - 2016**
**ADVANCE DATA STRUCTURE**
(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**

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## PART –A

1. a) What are the methods used to represent Dictionary?                    (4M)
   b) Give Time complexities of AVL trees?                                  (3M)
   c) Discuss the properties of Binomial tree.                              (4M)
   d) For a sample graph, represent an adjacency matrix.                    (3M)
   e) What is best case and worst case analysis of quick sort?             (4M)
   f) Give, applications for pattern matching.                              (4M)

## PART -B

2. a) What is a hash table? What is hash function? What is bucket and home bucket?   (8M)
   b) With example, explain folding and rotation hashing methods.          (8M)

3. a) How do you represent AVL tree and what will be the height of AVL tree.   (8M)
   b) Write the AVL tree insertion algorithm.                              (8M)

4. a) Explain reheap up, reheap down  operations and show the heap implementation   (8M)
      steps using arrays.
   b) Explain parental property of a heap. Give the difference between complete binary   (8M)
      tree and almost complete binary tree.

5. a) Write and explain breadth first algorithm with an example.            (8M)
   b) How to find shortest path between vertices using all pairs shortest path floyd's   (8M)
      algorithm.

6. a) Write heap sort algorithm and analyze the time complexity.           (10M)
   b) Explain heap sort using following elements.        78, 32, 56, 8, 23, 45   (6M)

7. a) Define and explain the concepts of digital search trees.              (8M)
   b) Explain error handling during file I/O.                              (8M)

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## PART –A

| | | | |
|---|---|---|---|
| 1. | a) | What are the applications of Dictionary? | (4M) |
| | b) | Explain the properties of 2-3 trees. | (3M) |
| | c) | What is a priority queue? | (4M) |
| | d) | What is path, cycle, loop and Adjacency vertex of a graph. | (4M) |
| | e) | What is the best sorting algorithm? Why? | (4M) |
| | f) | Define tries. | (3M) |

## PART -B

| | | | |
|---|---|---|---|
| 2. | a) | When collision will occur? Explain quadratic probing with example. | (8M) |
| | b) | With example explain how insertion and deletion operations performed on dictionaries. | (8M) |
| | | | |
| 3. | a) | Discuss how the deletion operation performed in 2-3 tree with example. | (8M) |
| | b) | Discuss how single and double rotations performed in AVL trees. Give some applications of AVL tree | (8M) |
| | | | |
| 4. | a) | Construct a binary heap with the following values: 23, 7, 92, 6, 12, 14, 40, 44, 20, 21 | (8M) |
| | b) | What are the applications of priority queue and binomial queue? | (8M) |
| | | | |
| 5. | a) | Write and explain depth first algorithm with example. | (8M) |
| | b) | How to find shortest path between two vertices using Dijkstra's algorithm? | (8M) |
| | | | |
| 6. | a) | Perform quick sort using the following elements. 78, 21, 14, 97, 87, 62, 74, 85, 76, 45, 84, 22 | (8M) |
| | b) | Give best case, Average case analysis of quick sort. | (8M) |
| | | | |
| 7. | a) | Give a brief description on pattern matching problem and explain Boyer-moor algorithm with an example. | (8M) |
| | b) | Discuss fundamental file processing operations. | (8M) |

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## PART –A

1. a) Explain the characteristics of good hashing function. (4M)
   b) Define 2-3 tree. (3M)
   c) List all the operations performed in binomial heap. (3M)
   d) What is the need of minimum-cost spanning tree. (4M)
   e) Explain the difference between quick sort and merge sort. (4M)
   f) Give some applications of Digital search trees. (4M)

## PART –B

2. a) Explain about a skip list with an example. Give applications of skip list. (8M)
   b) With example explain how insertion and deletion operations performed in skip list. (8M)

3. a) Explain with example, what are the different cases followed while inserting a node in 2-3-Tree. (8M)
   b) Create a 2-3 tree from the following list of data items 5,6,8,21,12,30,34,27,23,4,33,7,24,9,10,11,13,38 (8M)

4. a) What is binomial queue? Discuss binomial amortized analysis. (8M)
   b) What is a priority queue? Explain operations performed in priority queue. (8M)

5. a) Explain kruskal's algorithm with example. (8M)
   b) Define Graph? Discuss about weakly connected, strongly connected, Disjoint Graphs. (8M)

6. a) What is divide and conquer strategy? Explain merge sort using following elements 10, 5, 7, 6, 1, 4, 8, 3, 2, 9 (8M)
   b) Discuss the analysis for merge sort. (8M)

7. a) Explain KMP algorithm with example. (8M)
   b) Discuss all files/classes present in iostream header file. (8M)

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## PART –A

1.  a)  Write short notes on Skip list.                                                           (4M)
    b)  Define an AVL Tree.                                                                        (3M)
    c)  Discuss about binary heap.                                                                 (4M)
    d)  For an example graph, represent possible spanning trees.                                   (4M)
    e)  Give time complexity for merge sort                                                        (3M)
    f)  What are the pointers associated with random access binary files.                          (4M)

## PART –B

2.  a)  Consider the given values 72, 27, 36, 24, 63, 81, 92, 101 and perform linear,
        quadratic probing operations in a given hash table of size 10.                             (8M)
    b)  With example, explain modulo division and digit extraction hashing methods.                (8M)

3.  a)  Build an AVL tree with the following values 15, 20, 24, 10, 13, 7, 30, 36, 35.             (8M)
    b)  Explain about deletion procedure in AVL tree. With example explain deletion                (8M)
        operation in AVL tree.

4.  a)  Write short notes on lazy binomial queue.                                                  (6M)
    b)  Perform insert and delete operations on binomial queue by taking an example.               (10M)

5.  a)  Explain briefly about operations on graphs.                                                (6M)
    b)  Explain Prim's algorithm with an example. Give analysis of prim's algorithm                (10M)

6.  a)  Explain Radix sort using following elements. 45, 37, 05, 09, 06, 11, 18, 27               (8M)
    b)  Give algorithm for Radix sort. Discuss the analysis of radix sort                          (8M)

7.  a)  Explain how to manage fixed field and fixed length buffers,                                (8M)
    b)  What are the advantages and disadvantages of tries with respect to binary search           (8M)
        trees

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