

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-1 (NEW) EXAMINATION – WINTER 2018

Subject Code: 3710215

Date: 02/01/2019

Subject Name: Advanced Data Structures

Time: 02:30 PM To 05:00 PM

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
 - 2. Make suitable assumptions wherever necessary.**
- Figures to the right indicate full mark.**

- Q.1** (a) What is Hash function? What are the collision resolution techniques? 7
(b) What is dictionary? Demonstrate the applications of dictionary. 7
- Q.2** (a) Consider the insertion of items with the following keys (in the given order) into an initially empty AVL tree: 42, 6, 54, 62, 88, 50, 22, 32, 12, 33. Draw step by step tree. 7
(b) Draw the 11-item hash table resulting from hashing the keys 12, 44, 13, 88, 23, 94, 11, 39, 20, 16, and 5 using the hash function $h(i) = (2i + 5) \bmod 11$ and assuming collisions are handled by quadratic probing, up to the point where the method fails because no empty slot is found. 7
- OR**
- (b) What is skip lists? Describe about various operation performed on skip lists with examples. 7
- Q.3** (a) Explain Boyer Moore Pattern matching algorithm with example. 7
(b) Draw a standard trie for the following set of strings: {abab, baba, ccccc, bbaaaa, caa, bbaacc, cbcc, cbca}. 7
- OR**
- Q.3** (a) Explain Huffman code algorithm using greedy approach. Also mention example. 7
(b) Write Knuth-Morris-Pratt pattern matching algorithm and explain with an example. 7
- Q.4** (a) Explain the use of Divide and Conquer Technique for Binary Search Method. Give the algorithm for Binary Search Method. What is the time complexity of Binary Search Method? 7
(b) How many trinode restructuring operations are needed to perform the zig-zig, zig-zag, and zig updates in splay trees? Use figures to justify the counting. 7
- OR**
- Q.4** (a) Will the root of red-black tree always be black after performing deletion operation? Justify with an example. Also draw red black tree for following keys: 7
7, 5, 9, 8, 11, 10, 12
(b) Construct a priority search tree for the point set of given below: 7
{(1, 2), (4, 10), (14, 3), (6, 6), (3, 15), (2, 2), (3, 12), (9, 4), (12, 14)}.
- Q.5** (a) What would be the worst-case space usage of a range tree, if the primary structure were not required to have $O(\log n)$ height? 7

- (b) Explain how to find out Longest Common Subsequence of two strings using Dynamic Programming method. Find any one Longest Common Subsequence of given two strings using Dynamic Programming. 7
X=abbacdcba and Y=bcdbbcaa

OR

- Q.5** (a) Draw a quad tree for the following set of points, assuming a 10×10 bounding box: 7
{(3, 7), (8, 1), (6, 6), (2, 6), (1, 7), (8, 6), (5, 9)}.
- (b) List out various recent trends in hashing and explain one of them in detail. 7

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