Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER –I-(New) EXAMINATION – SUMMER 2019

Subject Code: 3710215 **Date: 09/05/2019**

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.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Construct the open hash table (separate chaining) and closed hash table (open addressing – use linear probing) for the input: 32, 20, 56, 77, 40, 81, 63, 76, 37, 90 using the hash function h(k) = k mod 10. Explain each step in detail. **07**

(b) What is Skip list? Write pseudo code for inserting a node in skip list. **07**

Q.2 **(a)** i) Why rehashing is needed? State different ways in which rehashing can be implemented. **03**

ii) Write a recursive pseudo code for Preorder and In Order traversal of a binary Search tree. **04**

(b) Insert the following letters into an empty B-tree of order 5: **07**
C N G A H E K Q M F W L T Z D P R X Y S

OR

(b) 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. **07**

Q.3 **(a)** Describe Longest Common Subsequence problem. Find Longest Common Subsequence of following two strings. **07**

X = <A, B, B, A, C, D, C, B, A>

Y = <B, C, D, B, B, C, A, A, C>

(b) Which data structures can be used for 1-D Range searching? Explain any one with suitable example. **07**

OR

Q.3 **(a)** Find an optimal Huffman code for the following set of frequencies. Also find how much compression is achieved over fixed-length (3bits) coding scheme. **07**

A	B	C	D	E	F
27	08	16	03	12	07

(b) What is K-D Tree? Create K-D Tree for inserting (3, 6), (17, 15), (13, 15), (6, 12), (9, 1), (2, 7), (10, 19) values. Delete (13, 15) and (2, 7). Draw tree after each operation. **07**

Q.4 **(a)** Write Knuth-Morris-Pratt Algorithm. Also compute its time complexity. **07**

(b) What are the different types of imbalances that occur while deleting a node from AVL trees? Explain with an example for each type of imbalance? **07**

OR

Q.4 **(a)** What are tries? Generate suffix tries for the following text. **07**

Text: banana\0

	(b)	Build an AVL tree for inserting 14, 17, 11, 7, 53, 4, 13, 12, 8 values. After this insertion delete 53 and 11. Show the step by step construction	**07**
Q.5	**(a)**	Which Data structures can be used for 1-D Range searching? Explain any three with example.	**07**
	(b)	Populate the following hash tables using Cuckoo Hashing. **Input:** {20, 50, 53, 75, 100, 67, 105, 3, 36, 39} **h1(key)** = key%11 **h2(key)** = (key/11)%11 **Table size** = 11	**07**

OR

Q.5	**(a)**	How 1-D Range searching can be applicable in BST with data stored in leaves? Create 1-D BST for the 50, 45, 100, 25, 49, 120, 105, 46, 90, 95 values. Retrieve all points in [25, 95].	**07**
	(b)	Explain Hopscotch Hashing with suitable example.	**07**

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