



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER III [CE]

SUBJECT: (CE-316) DATA STRUCTURE AND ALGORITHMS

Examination : Third Sessional
Date : 09/10/2023
Time : 09:15 AM to 10:30 AM

Seat No : 31
Day : Monday
Max. Marks : 36

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

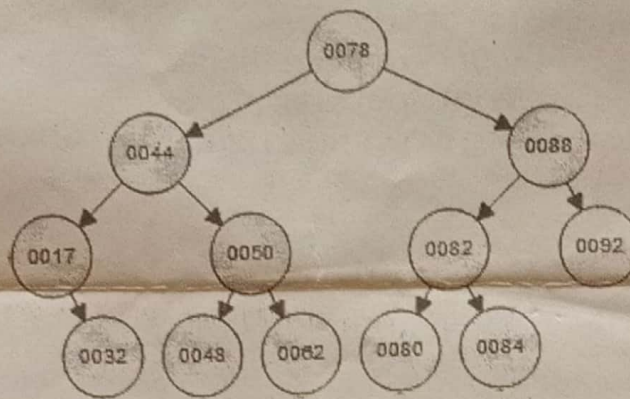
- CO2-A** a) Create a Digital Search Tree by inserting keys 1 to 8 in a reverse order. 2
- CO1-U** b) While inserting a key 27 in the hash table with size = 11, collision occurs. If double hashing is used as a collision resolution technique where, $h_1(k) = k \bmod 10$ and $h_2(k) = k \bmod 8$, what would be the immediate next position for the key 27? Assume that $h'(k) = [h_1(k) + h_2(k) * i] \bmod 11$. 2
- CO1-U** c) What can be the maximum depth of the trie with n strings and m as the maximum length of any string? Note that strings are made up of English alphabets. Explain your answer 2
- CO4-E** d) Perform List Sort on the given Data. First record is R3. 2

	R1	R2	R3	R4
Data	58	23	10	47
Next	0	4	2	1
Previous	4	3	0	2

- CO1-U** e) Given an example of sorting algorithms: 4
1. Which performs maximum Number of Swaps _____
 2. When data is sorted (Best case) time complexity is $O(n)$ _____
 3. Which needs Extra space of $O(n)$ _____
 4. Which performs sorting without comparing elements _____

Q.2 Answer Any Two from the following questions. [12]

- CO3-E** a) Insert the following entries, in the order stated, into an initially empty B-tree of order 4. Show each step separately using appropriate diagram. Data: Z, G, J, K, E, X, B, L, S, V, A. 6
- CO3-A** b) Create a Red-Black Tree for the following entries, by inserting each number, picked in the order from left to right. Show each insertion separately with the diagram and mention the step that is performed. Data: 4, 7, 12, 15, 3, 5, 14, 18, 16, 17, 10, 2 6
- CO3-C** c) Modify the AVL Tree shown in below figure by performing deletion of nodes in the mentioned order: 44, 82, 88, 17, 62, and 48. Show each deletion separately with the diagram and mention the step that is performed. Note that while deleting the internal node, replace its value with its predecessor. 6



Q.3 Answer the following questions.

[12]

- CO3-N a) Write an algorithm for Merge Sort and mention its time complexity.
- CO3-C b) Create **step-by-step** Max Heap for the given Data.
 Data: 4, 7, 42, 15, 3, 5, 74, 68
 Perform Heap Sort on the constructed heap **step-by-step**.

OR

Q.3 Answer the following questions.

[12]

- CO3-N a) Write an algorithm for Count Sort.
- CO3-C b) Perform Quick Sort on the given Data. Consider Pivot as **First Element**.
 85, 75, 65, 55, 45, 25

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