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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, April/May - 2023
DATA STRUCTURES
(Common to CSE, IT, ECM, CSBS, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(IOT), CSE(N), AI&DS, AI&ML, CSD)

Time: 3 Hours   **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
       ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
       iii) In Part B, Answer any one question from each unit. Each question carries 10 marks
           and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Give examples for stack.	[2]
b)	How to construct a queue using stacks?	[3]
c)	What is a skip list?	[2]
d)	List the drawbacks of open addressing.	[3]
e)	What does the color notate in red-black tree?	[2]
f)	What operations are performed on Splay trees?	[3]
g)	What is a max heap?	[2]
h)	Give example for adjacency list of a graph.	[3]
i)	Define trie.	[2]
j)	What are the merits and demerits of brute force method for pattern matching?	[3]

PART – B

(50 Marks)

2.   Write and explain algorithms for Push and pop operations of stack using linked list.[10]
OR
3.a)   Describe the conditions of overflow and underflow in a queue.
  b)   Discuss the applications of queues.   [5+5]

4.a)   Demonstrate skip list representation of a dictionary.
  b)   How to perform reassign operation on a dictionary.   [5+5]
OR
5.   Explain the algorithm for implementing quadratic probing on a hash table.   [10]

6.a)   Illustrate search operation on binary search tree.
  b)   Discuss the importance of height balanced trees for searching.   [5+5]
OR
7.a)   With suitable examples, illustrate right-left rotation on AVL tree.
  b)   Differentiate between splay tree and red-black tree.   [5+5]

8. Make a comparison of breadth first search and depth first search for a graph. [10]

OR

9. Write an algorithm for merge sort and explain with a suitable example. [10]

10. Describe the Knuth-Morris-Pratt algorithm for pattern matching. [10]

OR

11. "A compressed trie is an advanced version of the standard trie." Support or oppose this statement with necessary explanation. [10]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, August/September - 2022
DATA STRUCTURES
(Common to CSE, IT, ECM, CSBS, CSIT, ITE, CSE(SE), CSE(CS), CSE(AIML), CSE(DS), CSE(IOT), CSE(N))

Time: 3 Hours   **Max.Marks:75**

Answer any five questions
All questions carry equal marks
- - -

1.a) The following numbers 10, 20, 50, 30, 90, 60 (Top) are present in a stack of size 10. Perform the following operations in sequence. pop(), push(30), push(40), pop(), push (60), pop(), pop(), pop() What is the peek element at last? Draw and explain it.
   b) Implement a queue data structure using Single Linked list.   [8+7]

2.a) The Professor Lilly is very strict in class room. She never gives the attendance to those who are coming last in her class. Write a function to help Professor to delete the last Occurrence of a student from the list.
   b) Implement a stack data structure using Single Linked list.   [8+7]

3.a) Explain how Insertion, Deletion and Search is done in skip lists with example.
   b) What is the expected number of probes for both successful and unsuccessful searches in a linear probing table with load factor 0.25?   [7+8]

4.a) Given the input (4371, 1323, 6173, 4199, 4344, 9679, 19891), a fixed table size of 10, and a hash function $H(X) = X \mod 10$, show the resulting quadratic probing hash table.
   b) Outline Double Hashing with an example.   [8+7]

5.a) In an initially empty AVL tree insert the following keys: DEC, JAN, APR, MAR, JUL, AUG, OCT, FEB, NOV. Draw AVL tree after every insertion and apply rotations where ever necessary.
   b) Briefly discuss about different cases of imbalance that might be caused by a red-black tree insertion and corresponding methods to rebalance the tree.   [7+8]

6.a) Construct Splay tree with the following node values: 18, 10, 5, 28, 13, 25, 42,3,56,2,68,1,90. And perform normal splaying at nodes 1 and at node 90.
   b) Explain insertion operation with following numbers into Red Black tree 45, 10, 8, 9, 34, 35, 12, 60, 90.   [7+8]

7.a) Assume a list containing 4500 records is to be sorted using a computer with internal memory capable of sorting at most 750 records at a time and input list is maintained on a disk that has block length of 250 records. For this scenario explain how external sorting may be performed to accomplish the task.
   b) Compare BFS and DFS with suitable examples.   [8+7]

8.a) Solve the Boyer-Moore algorithm for the following Example:
      Text: ABCABCDABABCDABCDABDE
      Pattern: ABCDABD
  b) Solve the Knuth Morris-Pratt algorithm for the following Example:
      Text: HEREISASIMPLEEXAMPLE
      Pattern: EXAMPLE   [8+7]

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Code No: 153AK

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2021
DATA STRUCTURES
(Common to CSE, IT, ITE)

Time: 3 hours   **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a)   Discuss in brief about single linked list.
  b)   Write a C program to convert infix to postfix expression.   [7+8]

2.   What are different methods of collision resolution in hashing? Explain in brief.   [15]

3.a)   Discuss in detail about red-black trees.
  b)   Explain briefly about binary search trees.   [7+8]

4.   How a graph is traversed using depth first search? Explain with example.   [15]

5.   Explain the process of heap sort with example.   [15]

6.   Explain in brief about tries with example.   [15]

7.   Compare and contrast different sorting methods.   [15]

8.   Explain in detail about skip lists in data structures.   [15]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2022
DATA STRUCTURES
(Common to CSE, IT, ECM, CSBS, CSIT, ITE, CSE(SE), CSE(CS), CSE(AIML), CSE(DS), CSE(IOT), CSEN)

Time: 3 Hours   **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) Define a single linked list. Write the structure of the linked list with a neat sketch.
  b) Explain the operations of queue.   [8+7]

2.a) Write a program to implement stack operations.
  b) What are the applications of the queue? Explain.   [8+7]

3.a) Explain the operations of the skip list representation.
  b) Is linear probing and open addressing same? Justify your answer.   [10+5]

4.a) Discuss the hash functions.
  b) List and explain the advantages of extendible hashing.   [10+5]

5.a) Construct a Red-Black tree with the following elements 40, 16, 36, 54, 18, 7, 48, 5. Delete element 18 and add element 66.
  b) Write an algorithm of single rotation and double rotation of an AVL tree.   [9+6]

6.a) Explain the splaying operations of splay tree with an example.
  b) Define Binary search tree.   [12+3]

7.a) Write an algorithm to implement a depth-first search with an example.
  b) Perform heap sort algorithm for (10 15 6 2 25 18 16 2 20 4).   [12+3]

8.a) Difference between tree and tries.
  b) Illustrate the Brute force algorithm.   [5+10]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020
DATA STRUCTURES
(Common to CSE, IT)

Time: 2 hours   **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) Write an algorithm of Insert and Delete operation in Singly Linked List.
  b) Convert the following infix expression into postfix expression
      $A + B - C * D * E \$ F \$ G$ [7+8]

2. Explain about the various hash collision resolution techniques with an example. [15]

3. Insert the following list of elements from the AVL tree. Delete the elements 18, 2 and 30
    from the AVL tree 12, 30, 36, 18, 25, 9, 4, 2, 17, 14 , 20, 47   [15]

4.a) Differentiate between BFS and DFS.
  b) Explain about external sorting with an example.   [7+8]

5.a) Write an algorithm of compressed Trie.
  b) Explain about the Brute force algorithm with an example.   [7+8]

6.a) Write a program to implement stack using linked list.
  b) Explain the operations of Queue with an example.   [8+7]

7. Explain about:
    a) Rehashing
    b) Extendible hashing.   [15]

8. Write an algorithm to delete an element from the binary search tree.   [15]

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R18

Time: 3 hours Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Write an algorithm of Push and Pop operations on a stack.
 b) Differentiate between stack and queue. [8+7]

2. Insert the following list of elements into the hash table by using Quadratic probing (size of Hash table is 13) 65, 34, 79, 114, 26, 85, 55, 89, 22, 98. [15]

3. Insert the following list of elements from the Red- Black tree. Delete the elements 18, 2 and 30 from the Red-Black tree 12, 30, 36, 18, 25, 9, 4, 2, 17, 14, 20, 47. [15]

4. Sort the following list of elements by using Merge sort
    30, 56, 78, 99, 12, 43, 10, 24, 85 [15]

5.a) Write an algorithm of Standard Trie.
 b) Explain the features that distinguish between Boyer Moore algorithm from the conventional algorithms. [7+8]

6.a) Write an algorithm for insertion of node at last position in Linear Linked List.
 b) Evaluate the following postfix expression using stack. Show each step
 5 3 + 6 2 / * 3 5 * +. [7+8]

7. Write an algorithm of skip list operations insertion and deletion. [15]

8. Explain the operations of Splay tree with an example. [15]

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