



RAMCO INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course code/TitleAD3251 - Data Structure Design

CLASS ASSIGNMENT PROBLEMS

05.05.2022

1. Array problems

- Write a python program to
 - Missing number in array
 - Kth smallest element
 - Find duplicates in an array
 - Sort an array of 0s, 1s and 2s
 - Majority Element
 - Peak element
 - **Merge two sorted arrays**
 - Minimize cost to sort given array by sorting unsorted subarrays
 - Find the Minimum length Unsorted Subarray, sorting which makes the complete array sorted

2. Single linked list

- Write a python program to
 - sort a given linked list into ascending order in python
 - Delete all nodes of the Linked List
 - Count nodes in the Linked List
 - Delete even nodes of the Linked List
 - Delete odd nodes of the Linked List
 - **Delete alternate nodes of a Linked List**

- Search an element in the Linked List
- Reverse the Linked List
- **Reverse alternate K nodes in a Singly Linked List**
 - Inputs: 1->2->3->4->5->6->7->8->9->NULL and k = 3
 - Output: **3->2->1->4->5->6->9->8->7->NULL.**
- Swap node values of a Linked List
- Finding middle element in a linked list
- Merge two sorted linked lists
- **Identical Linked Lists**

3. Circular linked list

- Python program to create and display a Circular Linked List
- Python program to sort the elements of the Circular Linked List
- Python program to search an element in a Circular Linked List
- Python program to remove duplicate elements from a Circular Linked List
- Python Program to Convert a given Singly Linked List to a Circular List
- Check if a linked list is Circular Linked List
- Python program to delete a node from the middle of the Circular Linked List
- Python program to delete a node from the end of the Circular Linked List
- Count nodes in Circular linked list

4. Double Linked list

- **Reverse a doubly linked list in groups of given size**
- **Python Program to Rotate Doubly linked list by N nodes**

5. Convert the following infix expression to postfix expression and prefix expression

- $(A*B)-C$
- $A+(B/C)-D\%E$
- $(X*Y)-(W\%Z)+V$
- $(A-B)*(C+(D/E)*F)*G$

– $A + (((B * C) / (D + E) * F) / G) \% (H \wedge J)$

6. Convert the following postfix expression to infix expression

– $AB - C *$

– $A B * C +$

– $A B + CD - EF - * \wedge$

– $A B C * D + /$

– $X Y Z \wedge A B + \% *$

7. Convert the following prefix expression to infix expression

$+ * ABC$

$+ A \wedge B C$

$+ * A - * \wedge B C D \% + XY - EFG$

$/ + \wedge XYZ * A \% * BCD$

$+ * X Y + \% WZV$

8. Stack

1. Design a Data Structure SpecialStack that supports all the stack operations like push(), pop(), isEmpty(), isFull() and an additional operation getMin() which should return minimum element from the SpecialStack. All these operations of SpecialStack must be $O(1)$. To implement SpecialStack, you should only use standard Stack data structure and no other data structure like arrays, list, . etc
2. Sort a stack using a temporary stack
3. Reverse a stack without using extra space in $O(n)$
4. Reverse a stack using recursion
5. Implement two stacks in a list
6. Check if the two given stacks are same
7. Merging and Sorting Two Unsorted Stacks

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