

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

III SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2017

SUBJECT: DATA STRUCTURES [CSE-2103]

REVISED CREDIT SYSTEM (26/12/2017)

Time: 3 Hours

MAX. MARKS: 50

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Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitable assumed.
- **1A.** Give a suitable way to store group of integer values stored row wise where the number of values in each row are not fixed and total number of rows are known in advanced. Write a program to implement the method you have specified.
- **1B.** Write a C program to find the Nth Fibonacci term using recursive function and give a call tree to find the 5th term.
- **1C.** Create a structure 'Date' with date as numeric field, month as string field and the year of the type numeric. Create another structure 'Employee' with employee name of string type, salary of float type, employee id of numeric type and the date of join which is of structure type 'Date'. Write a program in 'C' to create an array of N instance of such 'Employee records', to read values and display all its member fields.
- **2A.** Write a algorithm to convert the given infix expression to its prefix. Trace the algorithm to convert infix expression A*(B+C-D)/E\$F\$G to its equivalent prefix by filling the table as symbol scanned, action taken, stack top, prefix.
- **2B.** Implement a circular queue of integers which includes functions *void insertcq(int Q[], int ele)* which inserts an element to the circular queue, *int deletecq (int Q[])* will delete an element from the circular queue and *void display(int Q[])* will display the elements from the circular queue. Include queue full and queue empty conditions.
- **2C.** Show how to evaluate the given postfix expression 5 3 6 2 * 2/2 * + with the single digit operand.
- **3A.** Write a 'C' code to perform the following
 - i. Function *insert_rear(NODE *head, int info)*: which adds node containing *info* field in it to the rear side of doubly linked list and returns the starting node's address.
 - ii. Function *insert_front* (*NODE *head, int info*) : which adds node containing info field in it to the front of doubly linked list and returns the starting node's address.
 - iii. Function Display (NODE *head) which displays all the elements in the



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doubly linked list, where *head* is the starting node's address.

Write a program to create a *List1*, and *List2* to represent two long integer number (read as string input) using the function defined in the question **3A.i**. Find the sum of these two numbers and create a new *List3* using the function created in question number **3A.ii**. Use function defined in question *3A.iii* to display *List1*, *list2 and List3*. Assume node is the structure with data as a information field, pervious is a pointer which points the previous node and next is the pointer which points next node.

3B. Given a singly linked list without header and circular and two integers M and N write a function *void skipMdeleteN(NODE *First,int M, int N)* which traverse the linked list and retains M nodes and then delete next N nodes. The same procedure is continued till the end of the list. The First refers to the starting node's address of the list

Example

- **3C.** Write a function to reverse a singly linked list without changing node's position in in the list.
- **4A.** Write a function **delete_node** () which takes address of root node and the element to be deleted as the parameters to delete a node from a Binary Search Tree(BST) and returns the modified tree's root address.
- **4B.** Write an algorithm to construct an expression tree for given infix expression. Using the same construct an expression tree for the given infix expression : A+B*C-D/E
- **4C.** Draw the binary tree whose inorder and preorder traversal are as given below: Inorder traversal : *B* H D A F E G C and Preorder traversal : H D B F G E C A
- **5A.** What are the methods used to represent the graphs. Represent graph given in fig5A using both the methods.



- **5B.** Write the function to sort the elements in ascending order using Merge sort. Show by diagram how to sort the numbers: *38, 27, 43, 3, 9, 82, 10* in ascending order using merge sort.
- **5C.** What are the properties of red black tree? Give an example of such a tree.

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