MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent college of Manipal University, Manipal)

Manipal Karnataka 576 104

Department Of Information and Communication Technology

COURSE PLAN

Department : Information and Communication Technology

Subject : DATA STRUCTURES USING C++ LAB & DATA STRUCTURES LAB

Semester & branch : III B.Tech (Information Technology(ICT-209) &

Computer and Communication Engg.(ICT-259))

Name of the faculty : Mrs. Rashmi N. R, Mr. Akshay K.C, Mrs. Aiswarya,

Mrs. Veena Mayya

No of contact hours/week: 3

TEST/EXAM	Topics
LAB INTERNAL (LAB1 – LAB6)	Implementation of basic data structures using arrays and their applications
FINAL EXAM	Complete syllabus

Submitted by:

Mrs. Rashmi N. R,   Mr. Akshay K.C,   Mrs. Aiswarya,   Mrs. Veena Mayya

(Signature of the faculty)

Date: 04/08/2014

Approved by: Dr. Preetham Kumar

(Signature of HOD)

Date: 05 8. 14

Lab No.	Laboratory Assignment to be discussed
1.	1. Write a program to search a given element in a list using i) Linear search ii) Binary search 2. Write a program to sort a given list of elements .Write the user defined functions to sort using i) Bubble sort ii) Selection sort iii)Insertion Sort **Additional exercises:** 1. Write a program to read two matrices A & B, create and display a third matrix C where $C(i, j) = \max (A(i, j) , B(i, j))$ 2. Write a program to create a text file abc.txt and write any of your previously executed C++ program file (Ex: search.cpp) to the abc text file. Verify your program output by opening the file abc.txt from windows explorer. 3. Write a C++ program to display the contents of the file File.cpp which contains the program itself, onto the output screen.
2.	1. Write a program to perform following string operations a. length of the string b. string concatenation c. string comparison d. to insert a sub string e. to delete a substring 2. Write a C++ program to define a class student with the data members to store name, roll no and grade of the student. Also write the member functions to read, display, and sort according to the roll number of the student. All the member functions will have array of objects as arguments. 3. Define a class time with data members hour, min, sec .Write the user defined functions to (i). Add (ii) To find difference between two objects of class time. Functions take two time objects as argument and return object. Also write the display and read function. **Additional Questions:** 1. Write a C++ program to write the students' records (Name, Roll No., Grade, Branch) into a text file. Read the text file and store the student records branchwise in separate files.
3.	1. Implement the stack ADT using arrays. 2. Write a program to check whether a given string is a palindrome or

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	not using stacks.
	3. Write a program to convert a given decimal number to a number in any base using stack.
	4. Implement Queue ADT using arrays
4.	1. Implement the circular queue ADT using arrays.
	2. Implement Multiple stack using arrays
	3. Write a program to find the fast transpose of a sparse matrix represented using array of objects.
	Additional Questions: 1. Write a program to find the transpose of a sparse matrix represented using array of objects.
5.	1. Write a program to input an infix expression and convert into its equivalent post fix form and display. Operands can be single character.
	2. Write a program to evaluate postfix expression. The input to the program is a postfix expression.
	3. Write a program that converts a post fix expression to a fully parenthesized infix expression.
6.	1. Write a program to input an infix expression and convert into its equivalent prefix form and display. Operands can be single character.
	2. Write a program to evaluate prefix expression. The input to the program is a prefix expression.
	3. Write a program that converts a prefix expression to a fully parenthesized infix expression.

7.	Write a menu driven program to perform the following operations on linked list.
	     i) Create a list
	     ii) Insert an element before another element in the existing list
	     iii) Insert an element after another element in the existing list
	     iv) Delete a given element from the list
	     v) Traverse the list
	     vi) Reverse the list

	vii) Sort the list viii) Delete every alternate node in the list ix) Insert an element in a sorted list such that the order is maintained.
8.	1. Write a program to concatenate 2 linked lists X1 and X2. After concatenation X1 is a pointer to first node of the resulting lists. 2. Implement stack & queue using linked lists. 3. Write a menu-driven program to : i) Create a doubly linked list ii) Insert an element before another element iii) Insert an element after another element iv) Delete a given element v) Traverse the list vi) Reverse the list
9.	1. Write a program to add and multiply 2 polynomials represented as linked lists. 2. Write a program to add 2 polynomials using circular linked list with head node. 3. Write a menu driven program to i) Insert an element into a doubly linked circular list ii) Delete an element from a doubly linked circular list.
10.	1. Write recursive functions for i) Creating a linked list ii) Traversing a linked list. 2. Let x = (x1, x2………..xn) and Y = (y1, y2…….yn) be 2 linked lists. Assume that, in each list, the nodes are in non decreasing order of the data field values. Write an algorithm to merge two lists to obtain a new linked list z in which the nodes are also in the non decreasing order. Following the merge, x and y do not exist as individual lists. Each node initially in x or y is now in z. No additional nodes may be used. 3. Let list1 = (x1, x2…….xn) and list2= (y1, y2…….ym). Write a function to merge list1 and list2 to obtain list3 = (x1,y1, x2,y2…..xm,ym,xm+1…xn) for m<=n; and list3=(x1, y1,x2,y2…..xn, yn, xn+1……..xm) for m>n.
11.	Write user defined functions to perform the following operations on binary trees. i) In order traversal (Iterative) ii) Post order traversal (Iterative) iii) Preorder traversal (Iterative)

	iv) print the parent of a given element v) depth of the tree vi) print the ancestors of a given element vii) Count the no. of leaf nodes in a binary tree.
12.	1. Write a recursive function to i) Create a binary tree and ii) print a binary tree 2. Write a program to insert an element into a binary search tree. 3. Write a program to delete an element from a binary search tree. 4. Write a program to search for a given element in a binary search tree. 5. Write a program to traverse a binary search tree and print it.
13.	Write a program to sort a given list of elements using i) Quick sort ii) Heap sort iii) Radix sort iv) Merge Sort

REGULAR EVALUATION GUIDELINES:

Regularity Evaluation: 05 marks
Students has to make up the missed lab exercises within a week time of his/her absence

Regular Evaluations (35 Marks)
Evaluation 1: lab4(syllabus: lab1 – lab3),10 marks
Evaluation 2: lab6(syllabus: lab7 – lab9),10 marks
Evaluation 3: Viva based on all previous lab exercises, 05 marks.
Record: 10 marks, to be submitted as given below. In case of students' absence on the day of his/her record submission, he has to submit in the immediate next lab. G1 group :Lab3, 5,7,10,12 G2 group: Lab 4, 6, 9,11,12