



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING AND DATA STRUCTURES LAB

Course Code: GR15A1028
I Year II Semester

L:0 T:0 P:2 C:2

Prerequisite: Basic operations of computer

Course Objectives

- To introduce the fundamentals of C programming language and develop the skills for solving problems
- To develop the proficiency in writing programs in a procedural programming language
- To apply the concepts of searching and sorting algorithms for solving real-time problems
- To implement stack and queue operations.

Course Outcomes: At the end of this course students will be

- able to use the programming concepts, c-library and generate code for a given problem
- able to apply sorting and searching algorithm for real time scenario
- able to implement the basic operations of stacks and queues.
- able to understand computer programming environment.

Task- I

- a) The heights of three students are 165, 148, 154 cm. respectively. Write a c program to sort the heights of the students in descending order.
- b) Write a C program to find the roots of a quadratic equation using if-else.
- c) The program should request the user to input two numbers and display one of the following as per the desire of user.
 - (a) sum of numbers
 - (b) difference of numbers
 - (c) product of the numbers
 - (d) division of the numbers.

Write a C program using switch statement to accomplish the above task.

- d) In a mathematical number sequence let the first and second term in the sequence are 0 and 1. Subsequent terms are formed by adding the preceding terms in the sequence. Write a C program to generate the first 10 terms of the sequence.



Task-II

- Write a C program to construct pyramid of numbers.
- The reliability of an electronic component is given by reliability $r=e^{-\lambda t}$ where λ is the component failure rate per hour and t is the time of operation in hours. Determine the reliability at various operating times from 0 to 3000 hours by plotting a graph using a C program. The failure rate λ is 0.001. Plot the graph with a special symbol.
- Write a C program to accept the date of birth and the current date to find the age of the person. The output should specify the age of a person in terms of number of years, months and days.

Task-III

- Write a C program to calculate the following Sum: $\text{Sum}=1-x^2/2!+x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- For a certain electrical circuit with an induction (L) and Resistance (R), the damped natural frequency is given by $f=\sqrt{1/LC - R^2/4C^2}$. Write a C program to calculate the frequency for different values of C starting from 0.01 to 0.1.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task-IV

- Write a C program to find both the largest and smallest number in a list of integers.
- Write a C program to count the lines, words and characters in a given text.
- Write a C program to sort the names of 5 students in the alphabetical order.
Ex: Rita, Sneha, Priti, Briya, kitti as Briya, Kitti, Priti, Rita, Sneha

Task-V

- Write a C program to print all the rotations of a given string.
Ex: Rotations of the string "NEWS" are NEWS
EWSN WSNE SNEW
- Write a C program to perform the following operations:
 - To insert a sub-string in a given main string at a given position.
 - To delete n Characters from a given position in a given string.

Task-VI

- Write a C program that uses functions to perform the following:
 - Transpose of a matrix
 - Addition of Two Matrices
 - Multiplication of two matrices

**Task-VII**

- a) Write a C programs that use both recursive and non-recursive functions
 - i) To find the factorial of a given integer.
 - ii) To find the GCD (greatest common divisor) of two given integers.

Task-VIII

- a) Using pointers, write a function that receives a character string and a character as argument and deletes all occurrences of this character in the string.
- b) Write a function using pointer parameter that compares two integer arrays to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.

Task-IX

- a) Write a c program which accepts employee details like (outer structure : name, employid, salary and (inner structure : area, street number, houseno)).Display the employee names and id belonging to a particular area.
- b) Write a C program that uses functions to perform the following operations:
 - i) Addition of two complex numbers
 - ii) Multiplication of two complex numbers(Note: represent complex number using a structure.)

Task-X

- a) Write a C Program to display the contents of a file.
 - b) Write a C Program merging of two files in a single file.
 - c) Write a C Program to append data into a file.
 - d) Write a C program to reverse the first n characters in a file.
- (Note : The file name and n are specified on the command line.)

Task-XI

- a) Write a C Program to Search for a given element using Linear & Binary Search Techniques.
- b) Write a C Program to Sort a given list of integers using Bubble Sort Technique.

Task-XII

- a) Write a C Program to Sort a given list of integers using Merge Sort Technique.
- b) Write a C Program to Sort a given list of integers using Insertion Sort Technique.



Task-XIII

- A) Write a C Program to Sort a given list of integers using Quick Sort Technique.
b) Write a C Program to Sort a given list of integers using Selection Sort Technique.

Task-XIV

- a) Write a C program to implement the following using arrays.
i) Push and pop operations of a stack
ii) Insert and delete operations of a queue

Text Books

1. The C Programming Language, BRIANW. KERNIGHAN Dennis M. Ritchie, Second Edition, PHI.
2. Programming in C, Pradip Dey, Manas Ghosh, Second Edition, Oxford University Press.
3. Computer Programming and Data structures by EBalaguruswamy, published by Mc Graw Hill.

Reference Books

1. Data structures using C, A.K. Sharma, Pearson publication
2. Let Us C, Yashwanth Kanetkar, 10th Edition, BPB Publications.
3. C& Data structures, P.Padmanabham, B.S. Publications.
4. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
5. Programming with problem solving, J.A.Jones & K.Harrow, Dreamtech Press.
6. Programming in C, Stephen G.Kochan, III Edition, Pearson Education.
7. Data Structures and Program Designing, C,R.Kruse, C.L.Tondo, B P Leung, Shashi M, Second Edition, Pearson Education.
8. Programming in C, Ashok N Kamthane, 2nd edition, Pearson Publication.
9. Introduction to Data Structures in C, Ashok N Kamthane, Pearson Publication.