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21CS151 INTRODUCTION TO C PROGRAMMING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on basic concepts of C programming language and problem solving through programming. It covers basic structure of C program, data types, operators, decision making statements, loops, functions and static data structures. At the end of this course students will be able to design, implement, test and debug modular C programs.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Understand how to write simple, but complete, C programs.
2	Identify suitable data type for operands and design of expressions having right precedence.
3	Apply decision making and iterative features of C Programming language effectively.
4	Select problem specific data structures and suitable accessing methods.
5	Design and develop non- recursive and recursive functions and their usage to build large modular programs.
6	Develop C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.

SKILLS:

- ✓ *Analysis of the problem to be solved.*
- ✓ *Design of algorithm/solution for a given problem.*
- ✓ *Identification of suitable data types for operands.*
- ✓ *Application of suitable control statements for decision making.*
- ✓ *Design of non-recursive and recursive functions to perform different tasks.*
- ✓ *Selection of static data structures for a given problem and manipulation of data items.*
- ✓ *Development of C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.*

UNIT - I **L- 9**

INTRODUCTION TO ALGORITHMS AND PROGRAMMING LANGUAGES: Basics of algorithms; Flow charts; Generations of programming languages.

Introduction to C: Structure of a C program - Pre-processor statement, Inline comments, variable declaration statements, Executable statements; C Tokens - C character set, Identifiers and keywords, Type qualifiers, Type modifiers, Variables, Constants, Punctuations and operators.

UNIT - II **L- 9**

DATA TYPES AND OPERATORS: Basic data types; Storage classes; Scope of a variable; Formatted I/O; Reading and writing characters; Operators - Assignment, Arithmetic, Relational, Logical, bitwise, ternary, address, Indirection, Size of, dot, arrow, parentheses operators; Expressions - operator precedence, Associative rules.

UNIT - III **L- 9**

CONTROL STATEMENTS: Introduction to category of control statements; Conditional branching statements - if, if– else, nested-if, if – else ladder, switch case; Iterative statements - for, while, do - while, nested loops; Jump statements - break, jump, go to and continue.

UNIT - IV **L- 9**

ARRAYS: Introduction; Types of arrays; Single dimensional array - Declaration, Initialization, Usage, reading, Writing, Accessing, Memory representation, Operations; Multidimensional arrays.

UNIT - V **L- 9**

FUNCTIONS: User-defined functions; Function declaration - definition, header of a function, body of a function, function invocation; Call by value; Call by address; Passing arrays to functions; Command line arguments; Recursion; Library Functions.

ACTIVITIES:

- *Analysis of a given problem.*
- *Design of algorithm/ solution.*
- *System testing.*
- *Implementation (coding and unit testing) of algorithm.*

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS:30**

Experiment 1:

(a)Write a C program to display a simple text on the standard output device using puts (). (b)Every character holds an ASCII value (an integer number in the range of 0 to 255) rather

than that character itself, which is referred to as ASCII value. Likewise, for a given input whether it is character or digit or special character or lower case or upper case letter, find corresponding ASCII value.

Example: ASCII value of 'A' is 65.

Experiment 2:

(a)For the given Basic salary, compute DA, HRA and PF using the following criteria and find out the Net Salary of an Employee by deducting PF and IT.

DA = (Basic salary *25)/1000

HRA= (Basic salary * 15)/100

Gross salary = Basic salary + DA + HRA

PF = Gross salary * 10/100

IT= Gross salary * 10/100

Net Salary = Basic Salary + DA + HRA – (PF + IT)

(b) Write a C program to swap the two integers with and without using additional variable.

Example: Before swapping values of a =4, and b = 5 and after swapping a = 5, and b = 4.

Experiment 3:

(a)Write a C program to check whether a given character is a vowel or consonant.

Hint: Read input from the user, and check whether it is an alphabet or not. If it is an alphabet, then check whether it is a vowel or a consonant. Otherwise display it is not an alphabet.

(b)The marks obtained by a student in 'n' different subjects are given as an input by the user. Write a program that calculates the average marks of given 'n subjects and display the grade. The student gets a grade as per the following rules:

Average	Grade
90-100	O
80-89	E
70-79	A
60-69	B
50-59	C
<50	F

Experiment 4:

(a) Write a C program to find HCF and LCM of the given two numbers.

Hint: Highest Common Factor (HCF) is also known as the greatest common divisor (GCD).

Example: HCF of the 9, 24 is 3, and LCM is 72

Experiment 5:

(a) Write a C program to check whether a given number is an Armstrong number or not.

Hint: An Armstrong number is a number which is equal to the sum of digits raise to the power total number of digits in the number.

Example: Consider the Armstrong numbers are: $0(0^1)$, $1(1^1)$, $2(2^1)$, $3(3^1)$, $153(1^3+5^3+3^3=153)$, $370(3^3+7^3+0^3)$, $407(4^3+0^3+7^3)$, etc.

Experiment 6:

(a) Write a C Program to print Floyd triangle for the user given number of rows. If the user entered 4 rows, then the output follows:

1

2 3

4 5 6

7 8 9 10

Experiment 7:

(a) Write a C Program to check whether the given number is a palindrome or not.

Hint: To check whether a number is a palindrome or not, reverse the given number and compare the

reversed number with the given number, if both are same then the number is palindrome otherwise not.

Example: Given Number = 121, Reversed number = 121. Hence, given number is palindrome.

Experiment 8:

Write a program to search for a given number in the given list of numbers.

Example: Read set of numbers L={2,4,6,1}. Search whether 4 is present in the given list or not.

Experiment 9:

(a) Write a program to perform the following operations on a given list of elements. (a)Insert the given element at the beginning of the list and at the end of the list.

Example: The given list is L={1,2,3,8}. Insert '0' at the beginning of the list and at the end of the list. Hence the resultant list is L={0,1,2,3,8,0}

Experiment 10:

(a) Write a C program to perform the following operations on a list. (a)Find the maximum or the largest element in a given list.

(b) Find the minimum or the smallest element in a given list.

Hint: Choose one dimensional array data structure.

Experiment 11:

(a) Calculate and print the sum of the elements in a one dimensional array, keeping in mind that some of those integers may be quite large.

Input Format: The first line of the input consists of number of data items in the array.

The next line contains n space-separated integers contained in the array and print the sum of the elements in the array.

Example:

Enter 4 integers: 1000000001 1000000002 1000000003 1000000004.

The sum of the given list is: 4000000010

TEXT BOOKS :

1. Behrouz A. Forouzan, Richard F.Gilberg, "Programming for Problem Solving", 1st edition, Cengage publications, 2019.
2. Ajay Mittal, "Programming in C - A practical Approach", 1st edition, Pearson Education, India, 2010.

REFERENCE BOOKS:

1. Reema Thareja, "Computer Fundamentals and Programming in C", 1st edition, Oxford University Press, India, 2013.
2. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata McGraw-Hill, 2017.
3. Byron S Gottfried, "Programming with C", 4th edition, Tata McGraw-Hill, 2018.