NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Science & Information Technology

Subject Name: C Programming	**L-T-P [0-0-6]**
Subject Code: BCSE0152	**Applicable in Department: B.Tech.- First Semester CSE/CSE-R/IT/CS/IOT/M.Tech.(Int.)**
Pre-requisite of Subject: Basic knowledge of computers	
Course Objective: The objective of a C programming course is to provide students with a solid foundation in the C programming language. The course aims to familiarize students with the syntax, concepts, and principles of C programming, as well as develop their ability to write efficient and effective C code.	

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level(KL)**
CO 1	Implement and trace the execution of conditional and iteration programs.	K3
CO2	Implement Pointers, Functions, Recursion and Memory allocation concepts.	K3
CO3	Acquire the knowledge of memory allocation and binding, array, structure to solve complex problems	K3
CO4	Compare and contrast between Structure and union along with concepts of DMA	K4
CO5	Understand and apply the concepts of File Handling and Embedded Programming	K3

Syllabus

Unit No	**Module Name**	**Topic covered**	**Pedagogy**	**Lecture Required (L+P)**	**Practical/ Assignment/ Lab Nos**	**CO Mapping**

Unit-1 : **Basic Concepts of C Programming**	Module 1.1: Introduction to Algorithm and C Program	Programming using C: Concepts of Algorithm and Flowchart, Translator and its types, Applications of C programming, Structure of C program, Overview of compilation and execution process in an IDE, transition from algorithm to program, Syntax, logical errors and Run time errors, object and executable code,	T3, R1, Chalk & Duster/PPT/Online Programs	2+2	Basic Program in C	**CO1**
	Module 1.2: Tokens & Operators	Keywords, identifiers, constant, data types. Operators and their types, Arithmetic expressions and precedence: Operators, operator precedence and associativity, type conversion, mixed operands	T3, R1, Chalk & Duster/PPT/Online Programs	3+3	Basic Program in C	**CO1**
	Module 1.3: Conditional Branching	if, else-if, nested if - else, switch statements, use of break, and default with switch	T3, R1, Chalk & Duster/PPT/Online Programs	1+2	Programs using Conditional Statement	**CO1**
	Module 1.4: Iteration and loops	Concept of loops, for, while and do- while, multiple loop variables, use of break and continue statements, nested loop.	T3, R1, Chalk & Duster/PPT/Online Programs	1+2	Programs using Looping Statement	**CO1**
Unit-2 : **Iteration, Recursion & Memory Concepts**	Module 2.1: Functions	Concept of Sub-programming, function, types of functions, passing parameters to functions: call by value Definition	T3, R1, Chalk & Duster/PPT/Online Programs	3+3	Function Programs	**CO2**
	Module 2.2: Recursion	Definition, Types of recursive functions, Tower of Hanoi problem,	T3, R1, Chalk & Duster/PPT/Online Programs	1+2	Recursion Programs	**CO2**
	Module 2.3: Storage	scope of variable, local and global variables, Nesting of Scope, Storage classes: Auto, Register, Static and Extern	T3, R1, Chalk & Duster/PPT/Online Programs	1+1	Programs showing use of Storage	**CO2**
	Module 2.4: Pointers	defining and declaring pointer, pointer arithmetic and scaling, Pointer Aliasing. call by reference	R1, R3, R4 Chalk & Duster/PPT/ Labs	2+2	Programs illustrating use of Pointers Arithmetic/Addressing/Call by Reference	**CO2**
Unit-3 : **Arrays & Strings**	Module 3.1: Arrays	Array notation and representation (one and two dimensional), array using pointers, manipulating array elements,2-D array s used in matrix computation.	R1, R3, R4 Chalk & Duster/PPT/ Labs	2+2	Programs illustrating use of Pointers Arithmetic/Addressing/Call by Reference	**CO3**

	Module 3.2: Strings	Introduction, initializing strings, accessing string elements, Array of strings, Passing strings to functions, String functions like Strcat, strcmp, strcpy and any other functions	R1, R3, R4 Chalk & Duster/PPT/ Labs	2+3	Use of Arrays both Single and Multi-Dimensional.	**CO3**
Unit-4 : **Structure & Union**	Module 4.1: Structure	Introduction, Initializing, defining and declaring structure, accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure	T1, T2, R1, R2 Chalk & Duster/PPT/ Labs	2+2	Program Based on structure implementation	**CO4**
	Module 4.2: Union	Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on Union, Difference between Structure and Union	T1, T2, R1, R2 Chalk & Duster/PPT/ Labs	1+1		**CO4**
	Moule 4.3 Dynamic Memory Allocation	Introduction, Library functions– malloc, calloc, realloc and free.	T1, T2, R1, R2 Chalk & Duster/PPT/ Labs	1+1	Programs allocating memory during run time and manipulations	**CO4**
Unit-5 : **File Handling & Embedded Programming Concepts**	Module 5.1: File Handling	Basics, File Types, File operations, File pointer, File opening modes, File handling functions, Command Line Arguments, File handling through command line argument, Record I/O in files	T1, T2, R1, R2 Chalk & Duster/PPT/ Labs	2+4	Implementation of Data Files and Command Line Arguments	**CO5**
	Module 5.2: Introduction to Embedded Programming	Introduction to Embedded System, Factors for Selecting the Embedded Programming Language, Difference Between C and Embedded C, Keyword, Datatypes, Components of Embedded Program, Program Structure, Basic concepts of Embedded Programming, Defining Macros, Types & File Inclusion, Pre-processor directives implementation	T1, T2, R1, R2 Chalk & Duster/PPT/ Labs	2+4	Example on Embedded Programs	**CO**5
Total				**60**		

Lab Experiments

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List of Practical

Sr. No.	**Program Title**	**CO Mapping**
1	Half pyramid of *	CO1
2	Half pyramid of numbers	CO1
3	Half pyramid of alphabets	CO1
4	Inverted half pyramid of *	CO1
5	Inverted half pyramid of numbers	CO1
6	Full pyramid of *	CO1
7	Full pyramid of numbers	CO1
8	Inverted full pyramid of *	CO1
9	Pascal's triangle	CO1

10	Floyd's triangle	CO1
11	Half pyramid of *	CO1
12	C Program to Print Diamond Pattern	CO1
13	C Program to Print Floyd's Triangle	CO1
14	C Program to Print Pascal Triangle	CO1
15	Star Pattern Programs in C	CO1
16	Pyramid Patterns in C	CO1
17	Write a C program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows: – There are 21 matchsticks. – The computer asks the player to pick 1, 2, 3 or 4 matchsticks. – After the person picks, the computer does its picking. Whoever is forced to pick up the last matchstick loses the game.	CO1
18	Write a program that plays tic-tac-toe. The tic-tac-toe game is played on a 3x3 grid the game is played by two players, who take turns. The first player marks move with a circle, the second with a cross. The player who has formed a horizontal, vertical, or diagonal sequence of three marks wins. Your program should draw the game_board, ask the user for the coordinates of the next mark, change the players after every successful move, and pronounce the winner.	CO1
19	Design a Calculator which performs Number system conversion	CO1
20	C Program to Simulate a Simple arithmetic Calculator	CO1
21	C Program to Evaluate the Given Polynomial Equation	CO1
22	C Program to Find Mean, Variance and Standard Deviation	CO1
23	C Program to Add Two Complex Numbers	CO1
24	C Program to Find Power of a Number	CO1

25	C Program to Calculate Pow (x,n)	CO1
26	C program to Find the Sum of Arithmetic Progression Series	CO1
27	C program to Find the Sum of Geometric Progression Series	CO1
28	C program to Find the Sum of Harmonic Progression Series	CO1
29	C Program to Find Sum of Series 1 + 1/2 + 1/3 + 1/4 + ……. + 1/N	CO1
30	C Program to Find Sum of Series 1^2 + 2^2 + …. + n^2	CO1
31	C Program to Find Sum of Series 1^3 + 2^3 + 3^3 +… + n^3	CO1
32	C Program to Find Sum of the Series 1/1! + 2/2! +3/3! + ……1/N!	CO1
33	Accept five subject marks of the student. Calculate his percentage. If his percentage is below 35 mark him "fail". If between 35to 45 "Third Div", 45-60 Second and above 60 then first.Do this process till the user wishes. No field should be left blank.	CO1
34	Design a program which displays following options on screen 1. Figure 2. Exit 3. Enter Choice Once valid choice is entered it executes further. If choice one is entered, then it should display 1. TRAINGLE 2. SQUARE 3. RHOMBUS 4. TRAPEZIUM 5. RETURN TO PREVIOUS MENU ENTER CHOICE Once valid choice is entered it executes further. After that it ask for specific data and prints the area and volume and perimeter/circumference of the respective figure. After that a choice is to be asked for Do you wish to continue (Y/N)? And should work accordingly. Before Every Menu the screen should be cleared,	CO1
35	C Program to Find the Largest Number Among Three Numbers.	CO1
36	C Program to Find the Roots of a Quadratic Equation.	CO1
37	C Program to Check Leap Year. Evaluate all the cases.	CO1

38	C Program to Check Whether a Number is Positive or Negative	CO1
39	C Program to Check Whether a Character is an Alphabet or not	CO1
40	C Program to Calculate the Sum of Natural Numbers	CO1
41	C Program to Find Factorial of a Number	CO1
42	C Program to Generate Multiplication Table	CO1
43	C Program to Display Fibonacci Sequence	CO1
44	C Program to Find GCD of two Numbers	CO1
45	C Program to Find LCM of two Numbers	CO1
46	C Program to Display Characters from A to Z Using Loop	CO1
47	C Program to Reverse a Number using looping concepts	CO1
48	C Program to Check Whether a Number is Palindrome or Not	CO1
49	C Program to Check Whether a Number is Prime or Not	CO1
50	C Program to Check Armstrong Number	CO1
51	C Program to Display Armstrong Number Between Two Intervals	CO1
52	C Program to Display Factors of a Number	CO1
53	C Program to Make a Simple Calculator Using switch...case	CO1
54	C Program to Check Whether a Number is Even or Odd	CO1
55	C Program to Check Whether a Character is a Vowel or Consonant	CO1
56	C Program to Find the Largest Number Among Three Numbers	CO1
57	C Program to Check Whether a Number is Positive or Negative	CO1
58	C Program to Calculate the Sum of Natural Numbers	CO1
59	C Program to Find Factorial of a Number	CO1
60	C Program to Generate Multiplication Table	CO1

61	C Program to Display Fibonacci Sequence	CO1
62	C Program to Display Prime Numbers Between Intervals Using Function	CO1
63	C Program to Check Prime or Armstrong Number Using User- defined Function	CO1
64	C Program to Check Whether a Number can be Expressed as Sum of Two Prime Numbers	CO1
65	C Program to Find the Sum of Natural Numbers using Recursion	CO1
66	C Program to Find Factorial of a Number Using Recursion	CO2
67	C Program to Find G.C.D Using Recursion	CO2
68	C Program to Convert Binary Number to Decimal and vice-versa	CO2
69	C program to calculate the power using recursion	CO2
70	C Program to Check Prime or Armstrong Number Using User- defined Function	CO2
71	C Program to Find the Sum of Natural Numbers using Recursion	CO2
72	Design a calculator	CO2
73	Design a Menu Driven program which performs the functions as per the menu 1. Add Details of students 2. Search the student data 3. Display the records 4. Exit Enter the Choice: Note: Choice must be between 1-4 Only. Other than that, an error message must be displayed and entry should be done again.Name must not be blank, and first letter should be alphabet Student details should contain Name. Age, Class, Roll-No	
74	C Program to add two number using recursion.	CO2
75	C Program to find sum of digit of number using recursion.	CO2

76	Write a method in C which will remove any given character from a String.	CO2
77	C Program to Calculate Average Using Arrays	CO3
78	C Program to Find Largest Element in an Array	CO3
79	C Program to search an element	CO3
80	C Program to Add Two Matrices Using Multi-dimensional Arrays	CO3
81	C Program to Multiply Two Matrices Using Multi-dimensional Arrays	CO3
82	C Program to Find Transpose of a Matrix	CO3
83	C program to illustrate Point Arithmetic	CO3
84	C Program to Access Array Elements Using Pointer	CO3
85	C Program to Find Largest Number Using Dynamic Memory Allocation	CO3
86	C Program to Calculate Average Using Arrays	CO3
87	C Program to Find Largest Element in an Array	CO3
88	C Program to Calculate Standard Deviation	CO3
89	C Program to Find the Frequency of Characters in a String	CO3
90	C Program to Count the Number of Vowels, Consonants and so on	CO3
91	C Program to Remove all Characters in a String Except Alphabets	CO3
92	C Program to Find the Length of a String	CO3
93	C Program to Concatenate Two Strings	CO3
94	C Program to Copy String Without Using strcpy()	CO3
95	C Program to Sort Elements in Lexicographical Order (Dictionary Order)	CO3
96	C Program to Find the Frequency of Characters in a String	CO3
97	Write a method in C which will remove any given character from a String.	CO3
98	Write a program in C to count occurrence of a given character in a String.	CO3

99	Write a program in C to check if two Strings are Anagram.	CO3
100	Write a program in C to check a String is palindrome or not.	CO3
101	C program to check given character is vowel or consonant.	CO3
102	C program to check given character is digit or not.	CO3
103	C program to replace the string space with a given character.	CO3
104	C program to convert lowercase char to uppercase of string.	CO3
105	C program to convert lowercase vowel to uppercase in string.	CO3
106	C program to delete vowels in a given string.	CO3
107	C program to count Occurrence of Vowels & Consonants in a String.	CO3
108	C program to print the highest frequency character in a String.	CO3
109	C program to Replace First Occurrence Of Vowel With '-' in String.	CO3
110	C program to count alphabets, digits and special characters.	CO3
111	C program to separate characters in a given string.	CO3
112	C program to remove blank space from string.	CO3
113	C program to count blank space from string.	CO3
114	C program to concatenate two strings.	CO3
115	C program to remove repeated character from string.	CO3
116	C program to calculate sum of integers in string.	CO3
117	C program to print all non-repeating character in string.	CO3
118	C program to copy one string to another string.	CO3
119	C Program to sort characters of string.	CO3
120	C Program to sort character of string in descending order.	CO3

121	Write a program in C for, In array 1-100 numbers are stored, one number is missing how do you find it.	CO3
122	Write a program in C for, In a array 1-100 multiple numbers are duplicates, how do you find it.	CO3
123	Write a program in C to find first duplicate number in a given array.	CO3
124	Write a program in C to remove duplicate elements form array in C.	CO3
125	Write a program in C for, Given two arrays 1,2,3,4,5 and 2,3,1,0,5 find which number is not present in the second array.	CO3
126	Write a program in C for, How to compare two array is equal in size or not.	CO3
127	Write a program in C to find largest and smallest number in array.	CO3
128	Write a program in C to find second highest number in an integer array.	CO3
129	Write a program in C to find top two maximum number in array?	CO3
130	C program to print array in reverse Order.	CO3
131	C program to reverse an Array in two ways.	CO3
132	C Program to calculate length of an array.	CO3
133	C program to insert an element at end of an Array.	CO3
134	C program to insert element at a given location in Array.	CO3
135	C Program to delete element at end of Array.	CO3
136	C Program to delete given element from Array.	CO3
137	C Program to delete element from array at given index.	CO3
138	C Program to find sum of array elements.	CO3
139	C Program to print all even numbers in array.	CO3
140	C Program to print all odd numbers in array.	CO3
141	C program to perform left rotation of array elements by two positions.	CO3
142	C program to perform right rotation in array by 2 positions.	CO3
143	C Program to merge two arrays.	CO3

144	C Program to find highest frequency element in array.	CO3
145	C Program to Store Information of a Student Using Structure	CO4
146	C Program to Store Information of Students Using Structure	CO4
147	C Program to Store Data in Structures Dynamically	CO4
148	C Program to Store Information of a Student Using Structure	CO4
149	C Program to Add Two Distances (in inch-feet system) using Structures	CO4
150	Snake Game Mini Project in C is a basic console program with no graphics. You may play the famous "Snake Game" in this project exactly as you would anywhere else. To move the snake, use the up, down, right, and left arrows. Food is placed at various co-ordinates on the screen for the snake to consume. The snake's length and score will both rise by one element each time it consumes the food.	CO4
151	C Program to Write a Sentence to a File	CO5
152	C Program to Read the First Line From a File	CO5
153	C Program to showcase use of DMA	CO5
154	C Program to Write a record to a File	CO5
155	C Program to Read the last Line From a File	CO5
156	Program to create a file using command line argument	CO5
157	Program to copy one file into another	CO5
158	Implement macro handling	CO5
159	Program to write a structure into a file and display its content	CO5
160	Program to search a record in a file	CO5
161	Program to implement multi line macro and Conditional Macros	CO5
162	Program to draw Circle/Rectangle/Triangle/ A Hut/with colors in it	CO5
163	Program to shut down/ sleep a system if not component is being Touched	CO5
164	Write a program in C to create and store information in a text file.	CO5

165	Write a program in C to read an existing file.:	CO5
166	Write a program in C to write multiple lines to a text file.:	CO5
167	Write a program in C to read the file and store the lines in an array.	CO5
168	Write a program in C to find the number of lines in a text file.	CO5
169	Write a program in C to find the content of a file and the number of lines in a text file.	CO5
170	Write a program in C to count the number of words and characters in a file.	CO5
171	C Program to list all files and sub-directories in a directory	CO5
172	C Program to count number of lines in a file	CO5
173	C Program to print contents of file	CO5
174	C Program to copy contents of one file to another file	CO5
175	C Program to merge contents of two files into a third file	CO5
176	C Program to read records from a data file	CO5
177	C Program to count number of lines, words, characters, blank space in a file	CO5
178	C Program to Illustrate how User Authentication is Done	CO5
179	C Program to Shutdown Computer in Linux	CO5
180	C Program to Compute First N Fibonacci Numbers using Command Line Arguments	CO5
181	C Program to Generate Fibonacci Series using Command Line Argument	CO5
182	Design an ATM Simulation using C	CO5
183	Manage the information of workers working in a firm or organization using this Employee Management System. The file handling technique is used here to save the data in a particular file, and you get the notion of this project as soon as you hear the name. This project uses the Insert, Edit, and Delete file actions, but the sole constraint is that you can only display the data, not search for any data item in particular. If you have more experience with C, you may alter this program by using the searching strategies. The following modules are included in this project. Add Employee Details • Edit Employee details • Modify Employee	

	• Delete Employee Create a Database using C file structure	
184	A Library in charge is facing problems in handling books and customers. Design a solution using C regarding his problem	CO5
185	Design a Simple Result System in the C programming language. You can keep track of the pupils' grades and update them at any time. Students might be given marks based on their performance in each subject. The project is straightforward and straightforward to use. The system is written entirely in the C programming language. You will be greeted with a "Welcome Screen" when you build and execute the project. Following that, many choices will appear on your computer screen. Select the required project modification function from the drop-down menu. The admin is in charge of the majority of the system. He has the ability to add and remove teachers. He can also add students. Following the addition of instructors, the administrator may finally assign grades to the pupils. All of the data has been preserved.	CO5

Required Software and Tools

C Compiler

Textbooks

Sr. No.	Book Details
1.	"C: The Complete Reference", Herbert Scheldt, McGraw Hill Education,4th Edition 2022
2	E Balagurusamy, “Computing Fundamentals and C Programming”, McGraw-Hill ,2nd Edition, 2018
3	Yashwant P. Kanetkar ,”Let Us C”, BPB publication, 16th Edition, 2018

Reference Books

Sr. No.	Book Details
1	Modern C, Third Edition" by Jens Gustedt,: Manning Publications,3rd Edition ,2023.
2	**Head First C: A Brain-Friendly Guide"** by David Griffiths, Shroff/O’Reilly, 1st Edition ,2022.

3	C Programming in Easy Steps" by Mike McGrath, In Easy Steps Limited, 5th Edition ,2022.
Links	
Unit 1	https://www.youtube.com/watch?v=KnvbUiSxvbM&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&ab_channel=Programiz
Unit 2	https://www.youtube.com/watch?v=JYHpD9huNR4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&index=25&ab_channel=Programiz
Unit 3	https://www.youtube.com/watch?v=MOeGnamlUP4&list=PL98qAXLA6aftD9ZlnjpLhdQAOFI8xIB6e&index=19&ab_channel=Programiz
Unit 4	https://www.youtube.com/watch?v=zmRxC7gYw-g&list=PLBlnK6fEyqRiteqwlMLXYtZ16xXDR7MO0&ab_channel=NesoAcademy
Unit 5	https://www.youtube.com/watch?v=UxifZwjd5xU&ab_channel=GateSmashers https://www.youtube.com/watch?v=VM7s1k0s7kk&list=PLzx1ARJOmyed-PYHMduhZDQ4eKXmWJj_T&ab_channel=SmartLogicAcademy