Program	Bachelor of Technology (B.Tech.)	**Semester - 1**
Type of Course	Engineering Science	
Prerequisite	Basic Knowledge of Computer	
Course Objective	This course aims to impart knowledge of the basic programming principles. The course provides the exposure necessary to apply C language constructs in program development.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Practical	Credit	SEE	CIA	SEE	CIA	Total Marks
4	0	4	6	70	30	25	25	150

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours

Sr.	Topics	T
1	**Overview of C** Introduction - History of C, Importance of C, Algorithm & Flowcharts, Structure of C Programs, Header Files, Execution of C programs, Input & Output Operations.	5
2	**Constants, Variables and Data Types** Introduction - Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variable Declaration, Variable as Constants, Symbolic Constants, Variable as volatile.	5
3	**Operators and Expressions** Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Computational Problems, Type Conversions, Operator Precedence and Associativity and Storage Classes (Auto, Register, Static, Extern). Use of Math Functions.	6
4	**Decision Making** Introduction, Decision making with IF Statements, If, If-else, nested if-else, if-else if ladder, switch – case Statements, Conditional Operator.	6
5	**Branching & Looping** While Loop, Do – While Loop, For Loop, Jump in Loops, Nested Loops, Break & Continue Statements.	8
6	**Arrays** 1-D Array, 2-D array, Array Operations, Multidimensional Array.	5
7	**Strings** Declaration & Initialization of String variables, Arithmetic Operations with Characters, String Comparison, String Handling Functions.	4

8	**Functions** Types of Function, Library Functions, Need for User-defined Functions, Elements of User-defined Functions, Return Values and their Types, Categories of functions, Call by value and Call by reference, Recursion, Scope, Visibility and Lifetime of Variables.	5
9	**Pointers** Understanding of Pointers, Accessing the Address of a Variables, Declaring Pointer Variables, Usage & Advantages of Pointer, Pointers and Arrays, Array of Pointer, Pointer with functions.	5
10	**Structure and Unions** Declaring a Structure, Declaring Structure Variables, Accessing Structure Members, Arrays of Structures, Structure within Structure, Structures and Functions, Unions.	5
11	**File Management in C** File Modes, File Functions, Opening File in C, Closing a File, I/O Operations.	3
12	**Dynamic Memory Allocation** Calculating Memory, Allocation of Memory, MALLOC, CALLOC, REALLOC, Free Allocated Space.	3
	Total	**60**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	20	30	50	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course students will be able to:	
CO1	Formulate algorithm/flowchart for different arithmetic and logical problems.
CO2	Interpret the basic principles of C Programming.
CO3	Acquire decision making and looping concepts.
CO4	Explore the usage of strings, arrays and structures.
CO5	Learn effective utilization of pointers and functions.

Reference Books

1.	**Programming in ANSI C** By Balagurusamy,E | Tata Mac-Graw Hill Education Private Limited
2.	**Let Us C** By Kanetkar,Yashavant P | BPB Publications
3.	**Programming with C** By Byron Gottfried, Jitender Chhabra | McGraw Hill Education

List of Practical

1.	**Lab - 1** 1. Visit www.gtu.ac.in, www.darshan.ac.in 2. Surf websites related to C Programming
2.	**Lab - 2** 1. Introduction to GNU GCC C Editor & Environment 2. Basic commands & shortcuts of Editor 3. Motivational Videos related to Programming
3.	**Lab-3** 1. WAP to print “Hello World” 2. WAP to print your address i) using single printf ii) using multiple printf 3. WAP to print addition of 2 numbers (without scanf) 4. WAP to calculate and print average of 2 numbers (without scanf) 5. WAP to print addition of 2 numbers (with scanf) 6. WAP to calculate and print average of 2 numbers (with scanf) 7. WAP to calculate Area of Circle 8. WAP to calculate Area of Triangle (hint: a = h*b*0.5) 9. WAP to calculate Simple Interest
4.	**Lab-4** 1. WAP to convert temperature from Fahrenheit to Celsius (Formula: f = 1.8 * c + 32) 2. WAP to convert temperature from Celsius to Fahrenheit 3. WAP to find out distance travelled by the equation d = ut + at^2 4. WAP to find percentage of 5 subjects 5. WAP to convert seconds into hours, minutes & seconds and print in HH:MM:SS [e.g. 10000 seconds mean 2:46:40 (2 Hours, 46 Minutes, 40 Seconds)] 6. WAP to enter distance into kilometer and convert it into meter, feet, inches, and centimeter 7. WAP to convert number of days into year, week & days [e.g. 375 days mean 1 year, 1 week and 3 days]
5.	**Using simple if** 1. WAP to check whether the given number is positive or negative 2. WAP to check whether the given number is odd or even 3. WAP to find out largest number from given two numbers 4. WAP to find out largest number from given three numbers using Logical Operator (&&) 5. WAP to perform Addition, Subtraction, Multiplication and Division of 2 numbers as per user’s choice 6. WAP to enter basic salary of an employee and calculate Gross salary according to given conditions:Basic Salary >= 10000 : HRA = 20% of basic, DA = 80% of basic, Basic Salary >= 20000 : HRA = 25% of basic, DA = 90% of basic, Basic Salary >= 30000 : HRA = 30% of basic, DA = 95% of basic 7. WAP to determine the roots of the equation ax2+bx+c=0
6.	**Using if…else…** 1. WAP to check whether the given number is positive or negative 2. WAP to check whether the given number is odd or even 3. WAP to find out largest number from given two numbers **Using nested if** 1. WAP to find out largest number from given three numbers without using Logical Operator (&&) 2. WAP to enter basic salary of an employee and calculate Gross salary according to given conditions Basic Salary >= 10000 : DA = 80% of basic salary, HRA = 20% of basic salary+ DA Basic Salary >= 20000 : DA = 90% of basic salary, HRA = 25% of basic salary+ DA Basic Salary >= 30000 : DA = 95% of basic salary, HRA = 30% of basic salary+ DA
7.	**Using if…else if… else** 1. WAP to check whether the given year is leap year or not. [If a year can be divisible by 4 but not divisible by 100 then it is leap

	year but if it is divisible by 400 then it is leap year] 2. WAP to find out the Maximum and Minimum number from given 10 numbers. 3. WAP to check whether the entered character is capital, small letter, digit or any special character. 4. WAP to perform Addition, Subtraction, Multiplication and Division of 2 numbers as per user's choice 5. WAP to find out largest number from given 3 numbers 6. WAP to input an integer number and check the last digit of number is even or odd. 7. WAP to read marks of five subjects. Calculate percentage and print class accordingly. Fail below 35, Pass Class between 35 to 45, Second Class between 45 to 60, First Class between 60 to 70, Distinction if more than 70 8. WAP to enter basic salary of an employee and calculate Gross salary according to given conditions: Basic Salary >= 10000 : DA = 80% of basic salary, HRA = 20% of basic salary+ DA Basic Salary >= 20000 : DA = 90% of basic salary, HRA = 25% of basic salary+ DA Basic Salary >= 30000 : DA = 95% of basic salary, HRA = 30% of basic salary+ DA 1. Three sides of a triangle are entered through the keyboard, WAP to check whether the triangle is isosceles, equilateral, scalene or right angled triangle 2. WAP to determine the roots of the equation ax2+bx+c=0
8.	**Using Conditional operator (expr1?expr2:expr3)** 1. WAP to find out largest number from given 2 numbers 2. WAP to find out largest number from given 3 numbers 3. WAP to read 3 numbers, multiply largest number from first two numbers to third one **Using Switch statement** 1. WAP to print day name based on day number 2. WAP to print number of days in the given month
9.	**Discuss while loop** 1. WAP to print 1 to 10 2. WAP to print 1 to n 3. WAP to print odd numbers between 1 to n 4. WAP to print numbers between two given numbers which is divisible by 2 but not divisible by 3
10.	**Discuss while loop** 1. WAP to print sum of 1 to n numbers 2. WAP to print sum of series 1 + 4 + 9 + 16 + 25 + 36 + …n 3. WAP to print sum of series 1 – 2 + 3 – 4 + 5 – 6 + 7 … n 4. WAP to print sum of series 1+1/2+1/3+1/4+ +1/n
11.	**Discuss while loop** 1. WAP to calculate without using power function 2. WAP to find factorial of the given number 3. WAP to find factors of the given number 4. WAP to find out sum of first and last digit of a given number 5. WAP to find the sum and average of different numbers which are accepted by user as many as user wants 6. WAP to check whether the given number is perfect or not. [Sum of factors including 1 excluding number itself] 7. WAP to find whether the given number is prime or not using break 8. WAP to find whether the given number is prime or not using flag
12.	**Discuss while loop** 1. WAP to print digits of given number 2. WAP to print sum of digits of given number 3. WAP to print given number in reverse order 4. WAP to check whether the given number is palindrome or not 5. WAP to check whether the given number is Armstrong or not
13.	**Discuss for loop**

	Do all programs of while loop using for loop **[practical number 9 to 12]**
14.	**Discuss nested for loop** 1. WAP to find the sum of 1 + (1+2) + (1+2+3) + (1+2+3+4)+ …+(1+2+3+4+….+n) 2. WAP to estimate the value of the mathematical constant e by using the formula e=1+ 1/1!+1/2!+1/3!+1/4!+ 3. WAP to compute the value of by using the formula e^x=1+ x/1!+x^2/2!+x^3/3!+x^4/4! 4. WAP to evaluate the series by using the formula sum=1-x+ x^2/2!-x^3/3!+x^4/4!+ -x^9/9! 5. WAP to find out prime numbers between given two numbers 6. WAP to print Multiplication Table up to n 1 2 3 4 5 6 7 . . 2 4 6 8 10 12 14 . . 3 6 9 12 15 18 21 . . 4 8 12 16 20 24 28 . . 5 10 15 20 25 30 35 . . . . .
15.	**Pattern programs** 1. WAP to display following patterns 1 1 2 1 2 3 1 2 3 4 1 2 3 3 4 5 4 5 6 7 1 2 3 4 5 6 7 8 9 10 1 0 1 1 0 1 0 1 0 1 1 2 2 3 3 3 4 4 4 4 1 A B 2 3 4 C D E F 1 2 3 4 5 1 2 3 4 1 2 3 1 2 1 *

	***** ******* * * * * * * * * ** ** *** ****5 5 5 5 5 4 4 4 4 3 3 3 2 2 1 AAAAA BBBB CCC DD E ABCDE ABCD ABC AB A 1. WAP to draw Pascal's triangle
16.	**Discuss an Array** 1. WAP to count number of positive or negative number from an array of n numbers 2. WAP to count number of even or odd number from an array of n numbers 3. WAP to read n numbers in an array and print them in reverse order 4. WAP to find Max, Min, Sum, Avg of given numbers from an array 5. WAP to calculate average and total of 5 students for 3 subjects 6. WAP to read five person height and weight and count the number of person having height greater than 170 and weight less than 50 7. WAP to count numbers higher than the average of an array 8. WAP to calculate the average, geometric and harmonic mean of n elements in an array 9. WAP to sort elements of an array in an ascending order (Use Insertion Sort, Bubble Sort, Selection Sort, Merge Sort, Quick Sort, Heap Sort)
17.	**Discuss an Array** 1. WAP to read values in two-dimensional array and print them in matrix form 2. WAP to count number of positive, negative and zero elements from 3 X 3 matrix 3. WAP to read and store the roll no and marks of 20 students using array. 4. WAP to print Transpose of a matrix 5. WAP to perform Addition of two matrices 6. WAP to perform Multiplication of two matrices
18.	**String Functions** 1. WAP to use all string handling functions (strlen, strcmp, strcpy, strcat, strchr, strstr, strrev, strlwr, strupr, strncpy, strncat, strncmp, strrchr) 2. WAP to find a character from given string 3. WAP to replace a character in given string 4. WAP to delete a character in given string 5. WAP to reverse a string 6. WAP to convert string to upper case
19.	**Functions** 1. WAP to count simple interest using function

	2. WAP that defines a function to add first n numbers 3. WAP to find maximum number from given two numbers using function 4. WAP using global variable, static variable 5. WAP that defines a function which returns 1 if the number is prime otherwise return 0 6. WAP that defines a function exchange to interchange the values of two variables, say x and y 7. WAP that will scan a character string passed as an argument and convert all lowercase character into their uppercase equivalents 8. WAP to generate Fibonacci series of N given number using function name fibbo. (e.g. 0 1 1 2 3 5 8…) 9. WAP to find the factorial of a given number using recursion 10. WAP to convert decimal number into binary using recursion 11. WAP to use recursive calls to evaluate F(x) = x – x3/3! + x5/5! – x7/7! + … + xn/n!
20.	**Discuss Structure** 1. WAP to create structure of book with book title, author name, publication, and price. Read data of n books and display them 2. Define a structure Person that would contain person name, date of joining, and salary using this structure to read this information of 5 people and print the same on screen 3. Define a structure time_struct containing three member's integer hour, integer minute and integer second. WAP that would assign values to the individual number and display the time in the following format: 16: 40: 51 4. Define a structure cricket that will describe the following information:Player name, Team name, Batting average Using cricket, declare an array player with 50 elements and WAP to read the information about all the 50 players and print team wise list containing names of players with their batting average. 5. Define a structure student_record to contain name, branch, and total marks obtained. WAP to read data for 10 students in a class and print them.
21.	**Discuss Pointer** 1. WAP to print value and address of a variable 2. WAP to calculate sum of two numbers using pointer 3. WAP to swap value of two numbers using pointer 4. WAP to calculate sum of elements of an array using pointer 5. WAP to swap value of two variables using function 6. WAP to print the address of character and the character of string using pointer 7. WAP for sorting using pointer
22.	**Discuss File handling operation** 1. WAP to display content of a file 2. WAP to copy source file to destination file 3. WAP to count number of spaces, tabs & newlines in a file 4. WAP to write a string in file 5. A file named data contains series of integer numbers. WAP to read all numbers from file and then write all the odd numbers into file named "odd" and write all even numbers into file named "even". Display all the contents of these file on screen
Laboratory work will be based on above syllabus with minimum required experiments/exercises to be incorporated.	