GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Electronics and Communication Engineering

Course / Subject Code : DI03011011

Course / Subject Name : Programming in C

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	ESC

Prerequisite:	1. Basic computer literacy: Students should be familiar with how to use a computer, create and manage files, and use a web browser. 2. Basic problem-solving skills: Programming involves breaking down complex problems into smaller, more manageable ones. 3. Logical thin king: Programming requires you to be able to think logically and follow instructions carefully.
Rationale:	C language is a basic programming language for enhancing the student's logical and problem-solving ability of students. It is one of the most used middle level programming languages in industry. It is widely used to develop system programming, operating systems, embedded systems. Also, C is used for creating computer applications that are used in writing embedded software/firmware for various micro-controller-based products in electronics, industrial and communications. C language is also used in developing verification software, test code and simulators for various applications and hardware products. This course enhances and builds confidence in the programming skills of diploma students. This course will enable students to inculcate programming concepts and methodology to solve engineering problems.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Analyze problem statements to develop algorithmic & flowchart solutions and write basic C programs using proper syntax, variables and data types to solve simple computational problems.	R,U,A
02	Implement input/output operations and various Operators to write basic C programs	R,U,A
03	Apply control structures such as conditionals and loops to implement logical flow in C programs.	R,U,A
04	Use array and pointers to efficiently store and process data in C	R,U,A
05	Apply various string manipulation functions, basics of Structure, various library functions and file function in C programs.	R,U,A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Basics of C Programming** 1.1 Algorithms and Flow Charts: 1.1.1 Definition and Steps for writing Algorithm 1.1.2 Definition and Symbols of Flowchart. 1.1.3 Write Algorithm and Draw Flowchart for various Programs. 1.2 Structure of C program. 1.3 Character set, C tokens, Keywords, Identifiers, Constants, Variables, Rules for naming Variables. 1.4 Data Types: 1.4.1 Predefined Data types: integer-unsigned, signed, long, float, double, character, single, octal, hexadecimal 1.4.2 User defined Data Types: Arrays, Structures.	05	20%
2.	**Operator & Expressions and input/output Functions** 2.1 Types of Operators: Arithmetic, logical, relational, assignment, conditional, increment and decrement. 2.2 Operator Precedence, Associativity of Operators 2.3 Programming exercise based on operators 2.4 Evaluation of Arithmetic and Logical Expression 2.5 Input and Output Functions: getch(), gets(), scanf(), putch(), puts(), printf() function	05	15%
3.	**Decision Control & Looping** 3.1 Introduction to decision control 3.2 Decision Control statements: 3.2.1 if Statement 3.2.2 if-else Statement 3.2.3 if-else-if ladder statement 3.2.4 nested if-else statement	08	30%

	3.2.5 switch case statement 3..3 Introduction to branching and looping Statement 3.4.1 while Loop, 3.4.2 Do-While Loop 3.4.3 For Loop, 3.4.4 nested for loop 3.4.5 break, continue Statement 3.4.6 goto statement		
4.	**Array and Pointer** Introduction to an Array 4.1 One dimensional array of int, float & characters: Declaration, initialization, Storing Array Elements in Memory, Displaying Array Elements. 4.2 Two-dimensional array of int: Declaration, initialization, Storing Array Elements in Memory, Displaying Array Elements. 4.3 Programming exercises based on One Dimensional array 4.4 Concept of Pointer; Pointer variables, Declaration of pointer, Initialization of Pointer	06	15%
5.	**Introduction to String, Structures, Function and File Operations** **5.1 Introduction to String** 5.1.1 Declaration, Initialization and Display of string 5.1.2 Standard Library String Functions: strlen(), strcpy( ), strcat( ), strcmp( ) **5.2 Introduction to structures**: 5.2.1 Declaring a Structure 5.2.2 Initialization of Structure elements 5.2.3 Accessing Structure elements **5.3 Introduction to Function** 5.3.1 Types of Function: Library Function and User Defined Function 5.3.2 Library Function: 5.3.2.1 math functions like: mod (), sqrt(),pow(),exp( ),sum( ), round( ) 5.3.2.2.2 Character Functions like islower(),isupper(),isdigit(),tolower( ), toupper( ). 5.4 **Introduction to File Operations** fopen() in r and w mode only, fclose() function	06	20%
	Total	**30**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**35**	**40**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Programming in C, By Balaguruswamy, (Eight Edition), Tata McGraw Hill New Delhi ISBN: 978-1 25-900461-2
2. Let Us 'C' By Yashwant Kanetkar, BPB Publication, ISBN: 978818331630
3. Programming in C, By Brian W. Kernighan / Dennis Ritchie, Pearson Publication ISBN: 10. 0131103628
4. Programming In C, By Reema Thareja, Oxford University Press, ISBN: 978- 0199492282

(b) Open-source software and website:

1. www.tutorialpoint.com Basics of C programming
2. www.cprograming.com Website provides easy to learn study material with an online compiler to learn C programming
3. www.cprogramming.com covers both C in-depth, with both beginner-friendly tutorial and advance
4. Coding C mobile app from google play store
5. www.w3schools.com/c/index.php Theory and Practical concept , Quiz etc
6. Software/tools : Turbo C or Borland C, Visual Studio

Suggested Course Practical List:

Sr. No.	Title	No of Hrs
1	Write an algorithm and draw Flowcharts for minimum 5 Problems	2
2	Write a C program to: - (1) Display the message "Hello World", name. address, date of birth and email id using print() function. (2) Find area and perimeter of square (3) Find area and perimeter of rectangle (4) Find area and volume of cylinder (5) Find area and perimeter of triangle	2

3	Write a C program to: (1) Print ASCII value of character entered by user (2) Print character, whose ASCII value is entered by user (3) Convert temperature Celsius to Fahrenheit. (4) Convert temperature Fahrenheit to Celsius (4) Find area and perimeter of Circle using Symbolic Constant	2
4	Write a C program to (1) Check whether given number is even or odd using conditional operator (2) For simple arithmetic Calculator (3) Print Maximum of two numbers using conditional operator (4) Find Sum and average of three integer numbers	2
5	Write a C program to (1) Print whether given number is even or odd using if-else (2) Print whether the given number is positive or negative using if-else (3) Print minimum of two numbers using if-else (4) check whether a given character is digit or not using if-else	2
6	(1) Write a C program to find maximum of three numbers using nested if-else (2) Write a menu driven program to perform arithmetic operations using Switch-Case (3) Write a program to print sum of 1 to 10 number using goto statement	2
7	Write a program to (1) Print sum of 1 to 10 numbers using while loop (2) Write a program to find the numbers between 100 to 200 and are divisible by 3 using for loop (3) Write a program to find sum of digits of a positive integer number OR write a program to sum all the digits of an unsigned integer number. i.e. for number 5432, 2 + 3 + 4 + 5 = 14. Using do-while loop	2
8	Write a c program to print following patterns using nested loop 1 1 * 5 2 2 1 2 * * 5 4 3 3 3 1 2 3 * * * 5 4 3 4 4 4 4 1 2 3 4 * * * * 5 4 3 2 5 5 5 5 5 1 2 3 4 5 * * * * 5 4 3 2 1 *	2

9	(1) Write a Program to declare one dimensional array named marks for 5 students. Read marks of 5 students and print the marks. (2) Write a program to store 10 numbers in an array and find sum and average of 10 numbers.	2
10	Write a program to implement the following math functions i) mod() ii) sqrt( ) iii) pow( ) iv) exp( ) v) sum( ) vi) round( )	2
11	Write a program to implement the following character function in C. i) islower( ) ii) isupper( ) iii) isdigit( ) iv) tolower( ) v) toupper( )	2
12	Write a program to implement the following Standard Library String Functions. i) strlen( ) ii) strcpy( ) iii) strcat( ) iv) strcmp( ) v) strrev( )	2
13	Declare a structure Student consisting of following members: roll no, name, address, percentage. Write a program to take data of three students and display the same	2
14	Write C program to create, initialize, assign and access a pointer variable	2
15	Mini Project	2

List of Laboratory/Learning Resources Required:

Hardware: Personal Computer, RAM minimum 2 GB onwards.
Operating System: Windows 10 onwards / Linux
Software: Turbo C / GCC / Visual Studio Code or any relevant C compiler

Suggested Project List:

1. Menu Driven Simple Calculator having following functions: Addition, Subtraction, Multiplication, Division, Logarithmic Value, Square root
2. Student's Grade Report having functions such as: Name of Student, Enrollment No., Marks and Grade
3. Student Management System having functions such as: First name of the student, Last name of the student, Roll number, CGPA, courses registered by the student.
4. Menu driven program to convert decimal number system to i) binary ii) Octal iii) Hexadecimal number system
5.Menu driven program to print table of given number
6. E-Library Management System having functionality such as: Book Name, Author Name, No. of Pages, Price

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