



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Engineering

Level: Diploma

Branch: Computer Engineering / Computer Science and Engineering

/ Cyber System and Information Security

Course / Subject Code : DI01000131

Course / Subject Name : Computer Programming Fundamentals

w. e. f. Academic Year:	2024-2025
Semester:	1 st
Category of the Course:	PCC

Prerequisite:	---
Rationale:	In today's digital era, digitization and automation connect gadgets, home appliances, and even the human body. The key to these connections is programming. Students need to learn the basics of computer programming. This introductory Computer Programming Course focuses on developing logical thinking and programming skills using the C language. These skills can be applied to scientific, research, and business purposes.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Write Simple C programs to input and output data in the prescribed formats.	Understand
02	Create C programs using control structures.	Apply
03	Design C programs using arrays and pointers.	Apply
04	Implement user-defined functions.	Apply
05	Execute file and I/O operations in C.	Apply

**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
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Flowchart and Algorithm: Flowchart : Definition, Symbols of flowchart, Advantages and Disadvantages and Examples Algorithm: Developing and writing algorithm using pseudo codes, Advantages and Disadvantages and Examples Overview of C: History and importance of C, Basic structure of C program, executing a C program Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants Managing Input and Output Operations: Reading a Character, Writing a Character, Formatted Input, Formatted Output, Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation Of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Evaluation of Expressions. Program Solving practice on the above concepts	08	20
2.	Decision Making and Branching: Introduction, Decision Making with IF Statement, Simple IF Statement, The IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, The goto statement. Decision Making and Looping: Introduction, The while Statement, The do statement, The for statement, Break and continue statements Program Solving practice on the above concepts	10	22



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3.	Arrays: One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays Pointer: Introduction to Pointers, Characteristics of Pointers, Address of Operator and Indirection operator, Declaration and initialization of Pointers, Types of Pointers: void and null Program Solving practice on the above concepts	08	20
4.	User-defined Functions: Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions, Recursion, The Scope, Visibility and Lifetime of variables. Program Solving practice on the above concepts	10	24
5	Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, String-handling Functions, Command Line Arguments Files: Introduction to text Files, Opening & Closing Files in text mode, Reading From and writing into Files in text mode only Program Solving practice on the above concepts	09	14
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	5	10	15

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



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References/Suggested Learning Resources:

(a) Books:

1. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education, Latest Edition
2. E. Balagurusamy, "Programming in ANSI C", McGraw Hills Education, New Delhi; Latest Edition
3. Yashavant Kanetkar, "Let us 'C'", BPB Publication, New Delhi; Latest Edition
4. Reema Thareja, "Introduction to C Programming", Oxford University Press, New Delhi; Latest Edition

(b) Open source software and website:

1. C Compiler for windows/linux
2. <https://www.programiz.com/c-programming>
3. Online DB : GDB online Debugger | Compiler - Code, Compile, Run, Debug online C, C++ (onlinegdb.com)
4. Compiler Explorer (Godbolt): Compiler Explorer (godbolt.org)
5. JDoodle: JDoodle - Free online cloud coding platform IDE to practice, teach and learn programming
6. <https://pll.harvard.edu/course/cs50-introduction-computer-science> , refer part Programming in C
7. <https://www.youtube.com/watch?v=ywg7cW0Txs4>

Suggested Course Practical List: (30 Hours)

1. Practice using scratch programming/snap programming.
2. Design and develop various problem statement using flowchart and Algorithm.
3. Design and test C programs using constants, variables, data types and different operators.
4. Design and test C programs to show formatted and unformatted input and output.
5. Design and test at least one C programs using below given decision making statements: (1) Simple if (2) if...else (3) Nested if (4) if...else ladder (5) switch (6) goto
6. Design and test C programs using the for, while and do. While loop.
7. Design and test a C program using break and continue statements.
8. Design and test C programs using one dimensional array and two dimensional arrays.
9. Design and test C programs using pointers.
10. Design and C programs using user defined Functions.
11. Design and test recursion function.
12. Design and test a C program to test various inbuilt string functions.
13. Design and test C programs using file operations.



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14. Design and test C programs using Command line arguments.

List of Laboratory/Learning Resources Required:

1. Computer with basic configuration with windows or unix os
2. C Compilers

Suggested Project List:

1. Develop a C program to represent a bank account. Create a structure Customer having fields name of the depositor, account number, type of account and balance amount in the account. Perform different operations:
 - (1) To assign initial values
 - (2) To deposit an amount
 - (3) To withdraw an amount after checking the balance
 - (4) To display name and balance. Write a menu driven program to handle N number of customers.
2. Develop a menu driven C program to perform basic arithmetic operations/mathematical operations like calculators on user inputted data.
3. Develop a C program to generate results for students. Admin enters component wise marks for each subject. After entering the marks, students will know his/her SPI as well as total backlogs.
4. Develop a C program to display a minimum number of currency notes required based on the entered amount. Output will also display the total number of notes required for each currency note. Valid currency notes are 1, 2, 5, 10, 20, 50, 100, 200, 500, and 2000. E.g. if the user enters 140 then the output will be “3 currency notes are required. $1*100 + 2*20 = 140$ ”.
5. Develop a C program that allows the names of 100 candidates in a local election and the number of votes received by each candidate. The program should then output each candidate's name, the number of votes received, and the percentage of the total votes received by the candidate. Your program should also display the winner of the election.



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6. Develop a C program to find and replace all occurrences of a word in file. For example:
Suppose file contains: "I like programming. I am learning programming and programming with files is fun. Learning programming is simple and easy." Find occurrences of "programming" and replace it with "C language".
7. Please refer some problem set of CS 50 course of Harvard and practice it.

Suggested Activities for Students:

- a) Design algorithm and construct a flowchart for at least 6 problems
- b) Students are encouraged to learn Visual Language programming like scratch, snap etc.
- c) Undertake micro-projects in teams.
- d) Prepare charts to explain use/process of the identified topic.
- e) <https://www.codechef.com/> , in this website very elementary programs are available, students are expected to solve those programs
- f) <https://code.org/>, an hour of coding event may be organized and students are encouraged to participate.
- g) Students are encouraged to register themselves in various MOOCs such as: Swayam, edx, Coursera, Udemy etc to further enhance their learning.
- h) Encourage students to participate in different coding competitions like Hackathon, online competitions on code chef etc.
- i) Encourage students to form a coding club at institute level.

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