COURSE CONTENT

C PROGRAMMING AND DATA STRUCTURES								
I Semester: CE / ME								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
2510502	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisites: Nil								

Course Overview:

The course provides a comprehensive introduction to C programming and fundamental data structures. It begins with basic concepts of computer systems, software development, and the structure of C programs, including data types, operators, and expressions. Control structures, functions, recursion, and arrays are emphasized to develop structured and modular programming skills. The course further covers pointers, strings, dynamic memory management, and derived data types such as structures and unions. Fundamental sorting and searching techniques are introduced to enhance problem-solving abilities. Finally, core data structures like linked lists, stacks, and queues are studied to enable efficient data organization and manipulation.

Course Objectives:

Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes: After completion of the course, student should be able to

1. Illustrate the fundamental elements as variables, control structures, loops, and functions to interpret program flow in solving engineering problem statements.
2. Develop programs using arrays, strings, and modular programming, recursive functions, structures concepts to implement data processing tasks in business applications.
3. Summarize the concepts of pointers, scope of variables, and parameter passing mechanisms in the role of system-level programming.
4. Make use of linear data structures lists, stacks, and queues in algorithmic problem formulation.
5. Implement singly, circular, and doubly linked lists to solve dynamic memory management and data manipulation problems.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Statements.

UNIT - II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** – Passing an array to a function, Memory allocation functions, array of pointers **Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Sorting- selection sort, bubble sort, insertion sort,

Searching-linear and binary search methods.

UNIT – V

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie,PHI/Pearson Education

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

ELECTRONIC RESOURCES:

1. **https://www.geeksforgeeks.org/c/c-programming-language/**
2. **https://www.programiz.com/c-programming**
3. **https://www.w3schools.com/c/**
4. **https://www.codechef.com/learn/course/c**

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)