C.V. Raman Global University

Bhubaneswar - 752 054 (Odisha)

Computer Science and Engineering

Subject Name: Programming for Problem Solving

Regulation Year: 2023-24

Course Code: **Credit:** 03

Course Category: Core **Theory** **Contact hours:** 3 Hrs/Week

Recommended Pre-requisite: Knowledge of computer fundamentals. Knowledge of basic mathematics.

COURSE OUTCOMES:

CO1: Develops simple algorithms for arithmetic and logical problems and translate it to programs & execution (in C language).
CO2: To implement conditional branching, iteration to solve problems and use of array.
CO3: To solve problems using strings, structures, and pointers.
CO4: To decompose a problem into functions and synthesize solutions for problems using modular approach, structures, and dynamic memory allocation.
CO5: Develop programs to solve real world problems using preprocessors and files.

Course Details:

Unit 1: Introduction to Programming: **(8 Hrs)**

Programming Basics: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming, Role of assemblers, compilers, linker, loader, interpreter in program execution.

Introduction to C: Basic structure of C program, C compilation process with different stages, standard library and header files, Syntax and Semantics. Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr, variables (with data types and space requirements), datatypes, literals, operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, command line arguments.

Unit 2: Flow of Control and Arrays **(8 Hrs)**

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while and do-while loops, use of break & continue statements, common programming errors.

Arrays: one- and two-dimensional arrays, creating, accessing, and manipulating elements of arrays, solving logical problems using array.

Unit 3: Strings, Structures and Pointers: (8 Hrs)

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings, solving logical problems using string.

Structures: Defining structures, initializing structures, unions, array of structures, nested structures.

Pointers: Idea of pointers, Defining pointers, Pointer to pointer, Pointers to Arrays and Structures, Pointers and strings, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type

Unit 4: Functions: (8 Hrs)

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

Unit 5: Preprocessor and File handling in C (8 Hrs)

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing, and reading structures using binary files, Random access using fseek, ftell and rewind functions. File Handling in C: file types, file opening modes, file handling I/O – fprintf, fscanf, fwrite, fread, fseek. File pointers. Implementing basic file operations in C.

Text Books (minimum 3):

1. Brian W. Kernighan and Dennis M. Ritchie. 1988. “The C Programming Language” (2nd. ed.). Prentice Hall Professional Technical Reference.
2. Herbert Schildt. 2000. “C: The Complete Reference” (4th. ed.). McGraw-Hill, Inc., USA.
3. E. Balagurusamy.2019.” Programming in ANSI C” (8th ed.). Tata McGraw-Hill, Inc

Reference Books (minimum 2)

1. S. K. Srivastava & Deepali Srivastava. 2009. “C in Depth” (3rd ed.). BPB Publications
2. Reema Thareja. 2023. “Computer fundamentals and Programming in C” (2nd ed.). Oxford University Press
3. Y. Kanetkar . 2016. “Let us C” (15th ed.). BPB Publication.

Open Sources:

1. https://nptel.ac.in/courses/106/104/106104128/ (Introduction to Programming in C)
2. https://nptel.ac.in/courses/106/105/106105171/ (Problem solving through Programming in C)

Course Designed by:

Course Approved by: