PROGRAMMING FOR PROBLEM SOLVING USING C
(Common to all branches)

Course Code: 22CT1101

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Course Outcomes: At the end of the Course the student shall be able to

CO1: choose appropriate algorithms for problem solving. (L3)

CO2: demonstrate modular programs involving input output operations, decision making and looping constructs by choosing the appropriate data types for writing programs in C language. (L3)

CO3: applythe concept of arrays and string handling in problem solving. (L3)

CO4: apply the conceptof pointers for dynamic memory management. (L3)

CO5: demonstrate programs to store data in structures and files. (L3)

UNIT-I   (10 Lectures)

PROBLEM SOLVING: Introduction to computer based problem solving, Program design and implementation issues, Algorithms for problem solving: Simple problems based on number theory, Operations on ordered set of elements, Solving quadratic equations, Operations on matrices. (Scope: Chapter 2 of text book 2)

Learning Outcomes:

At the end of the module the student will be able to
1. identify the requirements to solve a problem (L2).
2. choose appropriate design to solve the problem (L3).
3. classify different programming environments (L2).

UNIT-II   (10 Lectures)

OVERVIEW OF C: Basic Data types, Modifying the Basic DataTypes, Identifier-Names, Variables, Type Qualifiers, Constants, Operators, Expressions, Selection, Iteration and Jump Statements.

FUNCTIONS: Designing Structured Programs, Functions Basics, Standard Library Functions, User Defined Functions, Categories of Functions, Parameter Passing Techniques, Scope, Scope Rules, Storage Classes and Type Qualifiers, Recursion: Recursive Functions, Preprocessor Directives.

Learning Outcomes:

At the end of the module the student will be able to
1. choose appropriate conditional and unconditional control statements in solving a problem. (L3).
2. demonstrate the usage of the functions. (L3).
3. understand the scope and lifetime of a variable. (L2).
4. understand the concepts of preprocessor directives. (L2)

UNIT-III   (10 Lectures)

ARRAYS: Concepts, Using Arrays in C, Inter-Function Communication using Arrays, Array Applications, Two-Dimensional Arrays, Introduction to Multidimensional Arrays.

STRINGS: Concepts, C Strings, String Input / Output Functions, Arrays of Strings, String Manipulation Functions.

Learning Outcomes:

At the end of the module the student will be able to
1. apply the basic concepts of arrays in solving problems. (L3).

2. demonstrate programs of various operations on arrays. (L3).
3. demonstrate programs that mimics string functions in solving problems.(L3).

UNIT-IV   **(10 Lectures)**
POINTERS: Introduction, Pointer Arithmetic, Pointers for Inter-Function Communication, Pointers to Pointers, Arrays and Pointers- Array of Pointers, Pointer to Array, Pointers to void, Pointers to Functions, Command Line Arguments. Dynamic Memory Allocation Functions, Programming Applications.

Learning Outcomes:
At the end of the module the student will be able to
1. apply the concepts of pointers with respect to arrays and functions. (L3).
2. demonstrate programs that run through command line arguments. (L3).
3. demonstrate the usage of dynamic memory allocation functions to solve problems. (L3).

UNIT-V   **(10 Lectures)**
STRUCTURES, UNIONS AND ENUMERATED TYPES: Type Definition (typedef), Enumerated Types. Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions.
FILES: Introduction to Files, Modes of File operations, Text and Binary Files, file I/O Operations.

Learning Outcomes:
At the end of the module the student will be able to
1. demonstrate programs using user defined data types. (L3)
2. demonstrate the usage of pre-defined file I/O functions to perform operations on files. (L3)
3. demonstrate programs that solve real time problems using structures. (L3)

Text Books:
1. Herbert Schildt, *The Complete Reference C*, 4th Edition,Tata McGraw-Hill, 2017.
2. HarshaPriya, R. Ranjeet, *Programming and Problem Solving Through "C" Language*, 1st Edition, Fire Wall Media, 2015. (For Unit 1).
3. Ashok N Kamthane, Amit Ashok Kamthane, *Programming in C*, 3rd Edition, Pearson Publication 2015.

Reference Books:
1. R G Dromey, *How to Solve it by Computer*, 1st Edition, Pearson Education, 2006.
2. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, 2nd Edition, Pearson Education, 2015.
3. Rajaraman V, *The Fundamentals of Computer*, 6th Edition, Prentice-Hall of India, 2014.
4. Steve Oualline, *Practical C Programming*, 3rd Edition, O'Reilly Press, 2006.
5. Jeri R. Hanly, Elliot B. Koffman, *Problem Solving and Program Design in C*, 7th Edition, Pearson Education, 2012.
6. Balagurusamy E, *Programming in ANSI C*, 8th Edition, Tata McGraw-Hill,2019.
7. Gottfried, *Programming with C*, 3rd Edition, Tata McGraw-Hill, 2018.

Web References:
1. https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2. https://www.programiz.com/c-programming