PROGRAMMING AND PROBLEM SOLVING THROUGH 'C' LANGUAGE

Objective of the Course

The objectives of this course are to make the student understand programming language, programming, concepts of Loops, reading a set of Data, stepwise refinement, Functions, Control structure, Arrays. After completion of this course the student is expected to analyze the real life problem and write a program in 'C' language to solve the problem. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.

After completion of the course the student will be able to
- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in "C" language.
- ☐ Use simple data structures like arrays, stacks and linked list in solving problems.
- Handling File in "C".

Outline of Course

S. No.	Topic	Minimum number of hours
1.	Introduction to Programming	04
2.	Algorithms for Problem Solving	10
3.	Introduction to 'C' Language	04
4.	Conditional Statements and Loops	07
5.	Arrays	06
6.	Functions	06
7.	Storage Classes	03
8.	Structures and Unions	06
9.	Pointers	06
10.	Self Referential Structures and Linked Lists	04
11.	File Processing	04

Lectures	**=**	**60**
Practical/tutorials	**=**	**60**
Total	**=**	**120**

Detailed Syllabus

1. Introduction to Programming   04 Hrs.
The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation

2. Algorithms for Problem Solving   10 Hrs.
Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of

two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate 'sin x' as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial

3. Introduction to 'C' Language   04 Hrs.

Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple 'C' programs.

4. Conditional Statements and Loops   07 Hrs.
Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming .

5. Arrays   06 Hrs.
One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix; Null terminated strings as array of characters, Standard library string functions

6. Functions   06 Hrs.
Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.

7. Storage Classes   03 Hrs.
Scope and extent, Storage Classes in a single source file: auto, extern and static, register, Storage Classes in a multiple source files: extern and static

8. Structures and Unions   06 Hrs.
Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions

9. Pointers   06 Hrs.
Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation.

10. Self Referential Structures and Linked Lists   04 Hrs.
Creation of a singly connected linked list, Traversing a linked list, Insertion into a linked list, Deletion from a linked list

11. File Processing   04 Hrs.
Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file

RECOMMENDED BOOKS

MAIN READING

Byron S Gottfried "Programming with C" Second edition, Tata McGrawhill, 2007 (Paper back)

R.G. Dromey, "How to solve it by Computer", Pearson Education, 2008.

Kanetkar Y, "Let us C", BPB Publications, 2007.

Hanly J R & Koffman E.B, "Problem Solving and Programm design in C", Pearson Education, 2009.

SUPPLEMENTARY READING

E. Balagurusamy, "Programming with ANSI-C", Fourth Edition,2008, Tata McGraw Hill.

Venugopal K. R and Prasad S. R, "Mastering 'C'", Third Edition, 2008, Tata McGraw Hill.

B.W. Kernighan & D. M. Ritchie, "The C Programming Language", Second Edition, 2001, Pearson Education

ISRD Group, "Programming and Problem Solving Using C", Tata McGraw Hill,2008.

Pradip Dey , Manas Ghosh, "Programming in C", Oxford University Press, 2007.