20ES1103
Programming for Problem Solving

Course Category:	Engineering Science	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practice:	3-0-0
Prerequisites:	--	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

CO1	Understand the different types of problem solving approaches
CO2	Apply the selections, loops, arrays, and string concepts in C to solve problems.
CO3	Apply functions and pointer concepts in C to solve problems.
CO4	Solve problems using enum, structures, unions, and file handling functions.

Contribution of Course Outcomes towards achievement of Program Outcomes
(L – Low, M - Medium, H – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	L												
CO2		M	H										M	
CO3		M	H										H	
CO4		M	H										H	

COURSE CONTENT

UNIT I

Introduction to computer-based problem solving: Requirement of problem solving by computers, problem definition, Use of examples for problem solving, similarities between problems, Problem solving strategies, steps involved in problem solving.

Program design and implementation issues: programs and algorithms, top-down design and step-wise refinement, construction of loops-basic programming constructs, Implementation, programming environment.

Algorithms for problem solving: Exchanging values of two variables, Summation of a set of numbers, decimal to binary base conversion, reversing the digit of an integer, to find greatest common divisor (GCD) of two numbers, to verify whether an integer is prime or not, organize a given set of numbers in ascending order, find the square root of an integer, factorial of a given number, generate the Fibonacci sequence for n terms, evaluate sin(x) as sum of series, to find the value of the power of a number raised by another integer, reverse order elements of an array, find largest number in an array, print elements of upper triangular matrix, multiplication of two matrices, to compute to roots of a quadratic equation $ax^2+bx+c=0$.

NIT II

Introduction to the C Language: Background of C program, Identifiers, Types, Variables, Constants, Memory Layout, Input/Output, Programming Examples.

Structure of a C Program: Logical Data and Operators, Expressions, Precedence and Associatively, Evaluating Expressions, Type Conversion, Statements, Storage Class.

Selection: Two-way Selection, Multiway Selection, More Standard Functions.

Repetition: Concept of a Loop Loops In C, Loop Examples, Recursion, The Calculator Program.

Arrays: Array Concepts in C, Inter-Function Communication, Array Applications, Two Dimensional Arrays, Multidimensional Arrays.

UNIT III

Strings: String Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions, String- Data Conversion.

Functions: Functions in C, User Defined Functions, Call by Value, Call Value Reference, Inter-FunctionCommunication, Standard Functions, Scope.

Pointers: Introduction to Pointer, Pointers for Inter-Function Communications, Pointers to Pointers, Compatibility, Lvalue and Rvlaue.

Pointer Applications: Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocations Functions, Array of Pointers.

UNIT IV

Enumerations: The Type Definition(Typedef), Enumerated Types: Declaring an Enumerated Type , Operations on Enumerated Types, Enumeration Type Conversion, Initializing Enumerated Constants, Anonymous Enumeration: Constants, Input/Output Operators.

Structures: Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures through Pointers.

Unions: Referencing Unions, Initializers, Unions and Structures, Internet Address, Programming Applications.

File Handling: Files, Streams, Standard Library Input/Output Functions, Formatting Input/output Functions and Character Input/Output Functions, Command-Line Arguments.

TEXT BOOKS

[1]. Programming and Problem Solving Through "C" Language By HarshaPriya, R. Ranjeet · Firewall media 2006

[2]. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science A Structured Programming Approach Using C", CENGAGE Learning, Third Edition

REFERENCE BOOKS

[1]. Anil B. Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020.

[2]. R.G. Dromey, "How to Solve it By Computer", Prentice-Hall International Series in Computer Science,1982.

[3]. YashwantKanetkar , "Let us C" , BPB Publications, 16th Edition 2017.

[4]. Kernighan and Ritchie,"The C programming language", The (Ansi C Version), PHI, second edition.

[5]. Paul J. Dietel and Harvey M. Deitel, "C: How to Program", Prentice Hall, 8th edition (Jan 19 ,2021).

[6]. K.R.Venugopal, Sundeep R. Prasad, "Mastering C", McGraw Hill, 2nd Edition, 2015.

E-RESOURCES AND OTHER DIGITAL MATERIAL

[1] Computer Science and Engineering - Noc:problem Solving Through Programming in C. [online] https://nptel.ac.in/courses/106/105/106105171/

[2] Computer Science and Engineering - Noc:introduction To Programming in C. [online] https://-nptel.ac.in/courses/106/104/106104128/

[3] C For Everyone: Structured Programming. [online]https://www.coursera.org/learn/c-structured-programming

[4] Advanced C Programming CourseTim Academy-Jason Fedin. [online] https://www.udemy.com/-course/advanced-c-programming-course/

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