

SEMESTER I

U21CSG01	PROBLEM SOLVING AND C PROGRAMMING (Common for AD,BM,CE,CH,CS,EC,EE & ME)	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To provide exposure to problem-solving through programming
- To develop computational thinking perspective of one's own discipline
- To write, compile and debug programs using C language

COURSE OUTCOMES:

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

- CO1:** Identify and abstract the programming task involved for a given a computational problem
CO2: Describe modularization, structures and pointers in C language
CO3: Design and implement algorithms for a given problem using C control structures
CO4: Apply the C programming constructs for searching and sorting techniques
CO5: Solve real time problems using suitable non-primitive data structures in C

CO-PO MAPPING:

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1	-	-	-	-	-	-	-	1	-	-
CO2	2	2	3	1	-	-	-	-	-	-	-	1	-	-
CO3	3	3	3	2	2	-	-	-	-	-	-	1	-	-
CO4	3	3	3	2	2	-	-	-	-	-	-	1	-	-
CO5	3	3	3	2	2	-	-	-	3	-	-	1	-	-
CO	3	3	3	2	2	-	-	-	3	-	-	1	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SYLLABUS:**UNIT I COMPUTATIONAL THINKING**

6

Computational Thinking – Modern Computer - Information based Problem solving – Real world information and Computable Data – Data types and data encoding – Number Systems – Introduction to programming languages – Basics of C programming – variables- data types – keywords – C program structure - simple programs in C

UNIT II ALGORITHMIC APPROACH**6**

Logic – Boolean Logic – Applications of Propositional logic – Problem Definition – Logical Reasoning and Algorithmic thinking – Pseudo code and Flow chart – Constituents of algorithms – Sequence, Selection and Repetition – Problem understanding and analysis – Control structures in C – Algorithm design and implementation using control structures

UNIT III SEARCHING, SORTING AND MODULARIZATION**6**

Data Organization – Arrays – Introduction to Searching and Sorting – Linear Search, Binary Search – Basic sorting techniques – Two dimensional arrays – Matrix manipulation – Modularization – Functions – Function prototype – function definition – function call – Built-in functions (string functions and math functions) – Recursion

UNIT IV STRUCTURES AND POINTERS**6**

Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program – Sorting of names – Parameter passing – Pass by value – Pass by reference – Structure – Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Unions

UNIT V FILES**6**

Files – Types of file processing – Sequential access – Random access – Sequential access file – Example Program – Finding average of numbers stored in sequential access file – Random access file – Example Program – Transaction processing using random access files – Command line arguments

LIST OF EXPERIMENTS**A. Lab Programs**

1. Using IO Statements, get higher secondary marks of a student. Calculate and display the medical and engineering cut off marks. [Assume the calculation formula]
2. Develop a C program to emulate the operations of an ATM using control structures. Authentication, Deposit, Withdrawal, and Balance check and pin change operations are to be supported.
3. Develop a calculator to perform the operations including addition, subtraction, multiplication, division and square of a number.
4. Given different prices of a vegetable which is varying through the day (from morning to evening), find out the best buy price and sell price for the maximum profit. Eg. For the prices [33, 35, 28, 36, 39, 25, 22, 31], best buy is at 28 and best sell is at 39.
5. Collect height and weight of 4 of your friends and calculate their body mass index. Use 2 dimensional array to store the values
6. Weights of 10 students of your class who are standing in a line is given in a random order. Find out if there is a heavy person whose weight is the sum of previous two persons.
7. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
8. From a given paragraph perform the following using built-in functions:
 - a) Find the total number of words.
 - b) Capitalize the first word of each sentence.
9. Solve Towers of Hanoi using recursion.

10. Develop an expense manager which reads date, product, price and product category. The program should display the total expense amount based on product category or date as per user's selection. Use structures
11. Develop a banking application to store details of accounts in a file. Count the number of account holders based on a search condition such as - whose balance is less than the minimum balance.

B. Mini Project (SAMPLE)

Create a Railway Reservation system with the following modules of Booking,

- Availability checking
- Cancellation
- Prepare chart

Contact Periods:

Lecture: 30 Periods	Tutorial: – Periods	Practical: 30 Periods	Project – Periods
Total 60 Periods			

TEXT BOOKS:

1. David D. Railey and Kenny A.Hunt , "Computational Thinking for Modern problem Solver", 1st edition, CRC Press, 2014
2. Brian W. Kernighan and Dennis Ritchie, " The C Programming Language" , 2nd edition, Pearson, 2015

REFERENCES:

1. Paolo Ferragina and Fabrizio Luccio, "Computational Thinking First Algorithms", Then Code" ,1st edition, Springer International Publishing, 2018
2. Reema Thareja, "Programming in C", 2nd edition, Oxford University Press, 2016
3. Paul Deitel and Harvey Deitel, "C How to Program", 7th edition, Pearson Publication
4. Juneja, B. L and Anita Seth, "Programming in C",1st edition, Cengage Learning India Pvt. Ltd., 2011
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st edition, Oxford University Press, 2009

EVALUATION PATTERN:

Continuous Internal Assessments				Total Internal Assessments	End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)			
*Individual Assignment / / MCQ	Written Test	Mini Project	Lab Test	200	100
40	60	75	25	40	60
Total				100	

*Roll Play / Group Discussions / Debates / Oral Presentations / Poster Presentations / Technical presentations can also be provided.



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