# AKKINENI NAGESWARA RAO COLLEGE:: GUDIVADA

**(An Autonomous college under the jurisdiction of Krishna University, Machilipatnam)**

## B.Sc. Honours in Computer Science MINOR

(For the batch of students admitted from 2023-24)

## I YEAR II SEMESTER
## PROBLEM SOLVING USING C

| Course Code:<br>23CMP2A | Admitted Batch:<br>2023-24 | No. of Teaching<br>Hours/week : 3 | No. of Credits :<br>3 |
|---|---|---|---|
| Year of Introduction:<br>2023-24 | Year of offering:<br>2023-24 | Year of Revision:<br>2023-24 | % of Revision:<br>100% |
| Course Delivery Method:<br>Class Room/Blended Mode/Both | C.I.A:<br>30 Marks | S.E.E:<br>70 Marks | Total:<br>100 Marks |

**Course Objectives:**

1. To explore basic knowledge on computers
2. Learn how to solve common types of computing problems.
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

**Course Learning Outcomes:**

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

1. Understand the working of a digital computer and Fundamental constructs of Programming
2. Analyze and develop a solution to a given problem with suitable control structures
3. Apply the derived data types in program solutions
4. Use the 'C' language constructs in the right way
5. Apply the Dynamic Memory Management for effective memory utilization

**SYLLABUS**

**UNIT-I**

**INTRODUCTION TO COMPUTER AND PROGRAMMING**: Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high-level programming, Flowcharts and Algorithms

**FUNDAMENTALS OF C:** History of C, Features of C, C Tokens-variables and keywords and identifiers, constants and Data types, Rules for constructing variable names, Operators, Structure of C program, Input /output statements in C-Formatted and Unformatted I/O

## UNIT-II CONTROL STATEMENTS:

Decision making statements: if, if else, else if ladder, switch statements. Loop control statements: while loop, for loop and do-while loop. Jump Control statements: break, continue and goto.

## UNIT-III

**DERIVED DATA TYPES IN C: ARRAYS**: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation.

**STRINGS**: Declaring & Initializing string variables; String handling functions, Character handling functions

## UNIT-IV

**FUNCTIONS:** Function Prototype, definition and calling. Return statement. Nesting of functions. Categories of functions. Recursion, Parameter Passing by address & by value. Local and Global variables. **Storage classes**: automatic, external, static and register.

**POINTERS:** Pointer data type, Pointer declaration, initialization, accessing values using pointers. Pointer arithmetic. Pointers and arrays, pointers and functions.

## UNIT-V

**DYNAMIC MEMORY MANAGEMENT:** Introduction, Functions-malloc, calloc, realloc, free

**STRUCTURES:** Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers. **Unions** - Union definition; difference between Structures and Unions.

**TEXT BOOKS:**
1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 6th Edn, ISBN-13: 978- 1- 25- 90046-2
2. Herbert Schildt, ―Complete Reference with C, Tata McGraw Hill, 4th Edn., ISBN- 13: 9780070411838, 2000
3. Computer fundamentals and programming in C, Reema Thareja, Oxford University Press

**REFERENCE BOOKS:**

1. E Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

2. Ashok N Kamthane, Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.

3. Henry Mullish&Huubert L.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.

4. Y kanithkar, let us C BPB, 13 th edition-2013, ISBN:978-8183331630,656 pages.

**SUGGESTED CO-CURRICULAR ACTIVITIES & EVALUATION METHODS:**

**Unit 1: Activity:** Quiz on computer hardware and software concepts

    **Evaluation Method:** Objective-based quiz assessing knowledge and understanding

**Unit 2: Activity:** Problem-solving using Decision-Making Statements

    **Evaluation Method:** Correctness of decision-making logic

**Unit 3: Activity:** Array and String Program Debugging

    **Evaluation Method:** Identification and correction of errors in code

**Unit 4: Activity:** Pair Programming Exercise on Functions

    **Evaluation Method:** Collaboration and Code Quality

**Unit 5: Activity:** Structured Programming Assignment

    **Evaluation Method:** Appropriate use of structures and nested structures

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## BLUE PRINT

**Section A (5 x 4 = 20 marks)**

- ➢ 5 questions to be answered out of 8 questions
- ➢ At least 1 question must be given from each unit.

**Section B (5 x 10 = 50 marks)**

- ➢ Answer ALL questions must be given from each unit.

|          | Section A | Section B | Total Marks |
|----------|-----------|-----------|-------------|
| Unit I   | 2         | 2         | 28          |
| Unit II  | 1         | 2         | 24          |
| Unit III | 1         | 2         | 24          |
| Unit IV  | 2         | 2         | 28          |
| Unit V   | 2         | 2         | 28          |
|          | **8**     | **10**    | **132**     |

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## Model Paper

Time: 3 hrs                                          Total: 70 M

### Section – A

Answer any **FIVE** of the following questions                    **5 X 4 = 20 M**

1. What is an Algorithm? Explain about control structures used in algorithm.
2. Write about variables in C.
3. Explain about break and continue statements with example.
4. Write short notes on Arrays.
5. Write about local and global variables in C.
6. Define Pointer. How to declare and initialize a pointer?
7. Explain about nested structures in C.
8. Write the differences between structures and unions in C.

### Section – B

Answer the following questions                                **5 X 10 = 50 M**

9. a) Explain about the concepts of Hardware and Software
                              (OR)
   b) What is an operator? What are the various operators available in C?

10. a) Explain different types of conditional branching statements in C.
                              (OR)
    b) What is looping? Explain various iterative statements with syntax & flowchart.

11. a) Explain about one and two dimensional arrays in C.
                              (OR)
    b) Explain about various string handling functions in C.

12. a) Explain about Call by value and Call by reference in C with examples.
                              (OR)
    b) Explain about pointers and arrays.
13. a) Explain about dynamic memory allocation in C.
                              (OR)
    b) What is structure? How to declare, initialize and access structure members?

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## Course Code: 23CMP2A (P)

## LAB LIST

**List of Experiments**

1. A. Write a program to calculate simple & compound interest

   B. Write a C program to interchange two numbers.

2. Find the biggest of three numbers using C.

3. Write a c program to find the sum of individual digits of a positive integer.

4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.

5. Write a c program to check whether a number is Armstrong or not.

6. Write a c program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

7. Write a c program that implements searching of given item in given list

8. Write a c program that uses functions to perform the following: Addition of two matrices. Multiplication of two matrices.

9. Write a program for concatenation of two strings.

10. Write a program for length of a string with and without String Handling functions

11. Write a program to demonstrate Call by Value and Call by Reference mechanism

12. Write a Program to find GCD of Two numbers using Recursion

13. Write a c program to perform various operations using pointers.

14. Write a c program to read data of 10 employees with a structure of 1.employee id 2.aadar no, 3.title, 4.joined date, 5.salary, 6.date of birth, 7.gender, 8.department.

15. Write a Program to demonstrate dynamic arrays using Dynamic Memory Management functions