

I B.Sc. – Computer Science / Semester- I (W.E.F. 2020-2021)

COURSE: PROBLEM SOLVING IN C

COURSE CODE: C1

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 03

Objective: This course aims to provide exposure to problem-solving through programming.

It introduces the concepts of the C Programming language.

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

1. Understand the evolution and functionality of a Digital Computer.
2. Apply logical skills to analyse a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

MODULE--I:

12hr

- a) **General Fundamentals:** Introduction to computers: Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.
- b) **Introduction to Algorithms and Programming Languages:** Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages – Structured Programming Language- Design and Implementation of Correct, Efficient and Maintainable Programs.

MODULE--II:

10hr

- a) **Introduction to C:** Introduction – Structure of C Program – Writing the first C Program File used in C Program – Compiling and Executing C Programs – Using Comments Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples.
- b) **Decision Control and Looping Statements:** Introduction to Decision Control Statements– Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement

MODULE –III:

12hr

- a) **Arrays:** Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array– Operations on Arrays – one dimensional, two dimensional and multi- dimensional arrays, character handling and strings.

MODULE—IV:

18hr

- a) **Functions:** Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.
- b) **Structure, Union, and Enumerated Data Types:** Introduction – Nested Structures – Arrays of Structures – Structures and Functions– Union – Arrays of Unions Variables – Unions inside Structures – Enumerated Data Types.

MODULE—V:

18hr

- a) **Pointers:** Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Memory Allocation in C Programs – Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers
- b) **Files:** Introduction to Files – Using Files in C – Reading Data from Files – Writing Data to Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.

Reference Books:

1. E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications.
2. Brain W Kernighan and Dennis M Ritchie - The ‘C’ Programming language” - Pearson publications.
3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.
4. YashavantKanetkar - Let Us ‘C’ – BPB Publications.
- 5.

RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

1. Group Discussion
2. Others

RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Programming exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports.
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs form individual and collaborative work

I B.Sc. – Computer Science / Semesters- I / Paper-I Syllabus
Practical Paper - I:
COURSE NAME:PROBLEM SOLVING IN C Lab
Course Code: C1

Practical/Laboratory-I

DATA STRUCTURE USING IN C

Marks:50

1. Write a program to check whether the given number is Armstrong or not.
2. Write a program to find the sum of individual digits of a positive integer.
3. Write a program to generate the first n term of the Fibonacci sequence.
4. Write a program to find both the largest and smallest number in a list of integer values.
5. Write a program to demonstrate reflection of parameters in swapping of two integer values using **Call by Value & Call by Address**
6. Write a program that uses functions to add two matrices.
7. Write a program to calculate factorial of given integer value using recursive functions
8. Write a program for multiplication of two NXN matrices.
9. Write a program to perform various string operations.
10. Write a program to search an element in a given list of values.
11. Write a program to sort a given list of integer in ascending order.
12. Write a program to calculate the salaries of all employees using *Employee(ID,Name,Designation,BasicPay,DA,HRA,GrossSalary,Deduction,NetSalary)* structure.
 - a. DA is 30% of Basic Pay
 - b. HRA is 15% of Basic Pay
 - c. Deduction is 10% of (Basic Pay+DA)
 - d. Gross Salary = Basic Pay+DA+HRA
 - e. Net Salary = Gross Salary - Deduction
13. Write a program to illustrate pointer arithmetic.

14. Write a program to read the data character by character from a file.
15. Write a program to create **Book(ISBN, Title, Author, Price, Pages, Publisher)** structure and store book details in a file and perform the following operations
 - a. Add book details
 - b. Search a book details for a given ISBN and display book details, if available
 - c. Update a book details using ISBN
 - d. Delete book details for a given ISBN and display list of remaining Books

P. R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA
MODEL BLUE PRINT FOR THE YEAR 2020-2021
I B.SC (CS) 2020-2023 BATCH
COMPUTER SCIENCE COURSE: PROBLEM SOLVING IN C

COURSE CODE:C1

Time : 2.30 Hrs.

SEMESTER-I

Max. Marks: 60

Model blue print for the model paper and choice

S.NO	Type of Question	To be given in the Question Paper			To be answered		
		No. of Questions	Marks allotted to each question	Total Marks	No. of Questions	Marks allotted to each question	Total Marks
1	Section-A Very Short Questions	5	1	5	5	1	5
2	Section-B Short Questions	6	5	30	3	5	15
3	Section-C Essay Questions	8	10	80	4	10	40
TOTAL		19		115	TOTAL MARKS		60

$$\text{Percentage of choice given} = \frac{115 - 60}{115} \times 100 = \frac{55}{115} \times 100 = 47.82\%$$

P.R.GOV.T.COLLEGE (AUTONOMOUS), KAKINADA
MODEL PAPERS FOR THE YEAR 2020-2021
I B.Sc (CS) 2020-2023 BATCH
COMPUTER SCIENCE COURSE: PROBLEM SOLVING IN C
COURSE CODE:C1

Time : 2.30 Hrs.

SEMESTER-I

Max. Marks: 50

SECTION-I

Answer any Three Questions(Short answer questions)

(4x5=20M)

1. Write the characteristics of computers
2. Explain the generations of computers.
3. Explain various data types in C.
4. Explain about Array?
5. Distinguish between Structures and Unions.
6. Write about File operations in C?

SECTION-II

Answer All Questions

(3x10=30M)

7. a) Explain the Logical Organization of a Digital Computer with the help of Block Diagram?
(or)
b) Write about the classification of computer in detail?
13. a) Explain various Conditional Control Statements in 'C' with examples?
(or)
b) Explain various Conditional Looping Statements in 'C' with examples?
14. a) Explain the difference different types Array?
(or)
b) Explain various String handling Functions in C?
15. a) Explain different types of Functions in C?
(or)
b) Explain about different types of Pointers in C?

P. R.GOV'T. COLLEGE (AUTONOMOUS), KAKINADA
MODEL BLUE PRINT FOR THE YEAR 2020-2021
I B.SC (CS) 2020-2023 BATCH
Computer Science Course: PROBLEM SOLVING IN C

COURSE CODE:C1

Time : 2.30 Hrs.

SEMESTER-I

Max. Marks: 50

Model Blue print for the question paper setter

Chapter Name	Essay Questions 10 Marks	Short Questions 5 Marks	Very Short Questions 1 Marks	Marks allotted to the chapter
MODULE -I	2	2	2	32
MODULE -II	2	2	1	31
MODULE -III	2	1	1	26
MODULE – IV,V	2	1	1	26
Total No. of questions	8	8	5	
Total Marks Including choice				115

I B.Sc. – Computer Science / Semester- II (W.E.F. 2020-2021)

Course: DATA STRUCTURES USING C

Course Code:C2

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 03

Objectives – To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

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

1. Understand available Data Structures for data storage and processing.
2. Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph
3. Choose a suitable Data Structures for an application
4. Develop ability to implement different Sorting and Search methods
5. Have knowledge on Data Structures basic operations like insert, delete, search, update and traversal
6. Design and develop programs using various data structures
7. Implement the applications of algorithms for sorting, pattern matching etc

MODULE I:

12Hrs

- a) **Introduction to Data Structures:** Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages
- b) **Principles of Programming and Analysis of Algorithms:** Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big ‘O’ Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in ‘C’

MODULE II:

12Hrs

- a) **Arrays:** Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers
- b) **Linked Lists:** Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays

MODULE -III:

HRS: 10

- a) **Stacks:** Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion
- b) **Queues:** Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues

MODULE -IV:

HRS: 12

- a) **Binary Trees:** Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Counting Number of Binary Trees, Applications of Binary Tree

MODULE -V:**HRS: 12**

- a) **Searching and sorting:** Sorting – An Introduction, Bubble Sort, Insertion Sort, Merge Sort, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search.
- b) **Graphs:** Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

Prescribed Books:

1. “Data Structures using C”, ISRD group Second Edition, TMH
2. “Data Structures through C”, Yashavant Kanetkar, BPB Publications
3. “Data Structures Using C” Balagurusamy E. TMH

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9. Computerized adaptive testing, literature surveys and evaluations,
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MODEL BLUE PRINT FOR THE YEAR 2020-2021
I B.SC (CS) 2020-2023 BATCH

Course: DATA STRUCTURES USING C

Course Code:C2

SEMESTER-II

Time : 2.30 Hrs.

Max. Marks:60

Model blue print for the model paper and choice

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MODEL PAPERS FOR THE YEAR 2020-2021
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Computer Science Course: DATA STRUCTURES USING C

Course Code:C2

Time : 2.30 Hrs.

SEMESTER-II

Max. Marks: 60

SECTION – I

Answer all Questions

5×1 = 5M

1. What is ADT?
2. Define Array.
3. Define Stack.
4. What is BST?
5. What is Graph?

SECTION – II

Answer any THREE Questions

3 x 5 = 15M

6. Explain the Primitive Data Structures.
7. Explain Stack operations.
8. Explain about Tree implementations and applications.
9. Explain Minimal Spanning Trees?
10. Explain about Binary Searching.
11. Explain Insertion Sort.

SECTION – III

Answer all the Questions

4 x 10 = 40 M

12. A. What are the goals of data structure? Write note on linear and Non Linear data structure with examples.

OR

B. What is Array? Explain about types of Arrays with syntax and suitable examples

13. A. What is a stack? Explain the algorithm to create and delete items In stack.

OR

B. What is a queue? Explain the algorithms to create and delete Items in a circular queue.

14. A. Write an algorithm to delete operation in any binary search tree.

OR

B. Explain applications of binary trees?

15. A. Explain Merge sort algorithm with an example?

OR

B. What is a graph? Explain different representations of graph ?

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MODEL BLUE PRINT FOR THE YEAR 2020-2021
I B.SC (CS) 2020-2023 BATCH
Course: DATA STRUCTURES USING C

Course Code:C2
SEMESTER-II

Time : 2.30 Hrs.

Max. Marks: 60

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Total Marks Including choice				115

P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA
I BSC (CS) 2020– 2023 BATCH
COURSE NAME: DATA STRUCTURES USING IN C
Course Code: C2
I B.Sc (CS) SEMESTER-II

SCHEME OF VALUATION (W.E.F. 2020-2021)

Time: 2 Hrs

Marks: 100

Practical/Laboratory – II

- | | |
|------------------------|----------|
| 1. Internal Practicals | 40 Marks |
| 2. External Practicals | 60 Marks |

I B.Sc. – Computer Science / Semesters- II / Paper-II Syllabus
Practical Paper - II:
COURSE NAME:DATA STRUCTURE USING IN C
Course Code: C2

Practical/Laboratory-II

DATA STRUCTURE USING IN C

Marks:50

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - a. Add an element at the beginning of an array
 - b. Insert an element at given index of array
 - c. Update an element using a value and index
 - d. Delete an existing element
2. Write a program using stacks to convert a given
 - a. postfix expression to prefix
 - b. prefix expression to postfix
 - c. infix expression to postfix
3. Write Programs to implement the Stack operations using an array
4. Write Programs to implement the Stack operations using Linked List.
5. Write Programs to implement the Queue operations using an array.
6. Write Programs to implement the Queue operations using Linked List.
7. Write a program for arithmetic expression evaluation.
8. Write a program for Binary Search Tree Traversals
9. Write a program to implement dequeue using a doubly linked list.
10. Write a program to search an item in a given list using the following Searching Algorithms
 - a. Linear Search
 - b. Binary Search.
11. Write a program for implementation of the following Sorting Algorithms
 - a. Bubble Sort

b. Insertion Sort

c. Quick Sort

12. Write a program for polynomial addition using single linked list

13. Write a program to find out shortest path between given Source Node and Destination Node in a given graph using Dijkstra's algorithm.

14. Write a program to implement Depth First Search graph traversals algorithm

15. Write a program to implement Breadth First Search graph traversals algorithm