GOVERNMENT COLLEGE FOR MEN

(Autonomous), Kadapa

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Revised UG Syllabus under CBCS

with effect from 2022–2023 Academic Year

Structure for 1st Year B.Sc. Computer Science

Year	Semester	Paper Code	Title	Hrs per week	Credits	Marks	
						IA	EA
First Year	I	1307	Problem Solving in C	4	3	40	60
		P1307	Problem Solving in C Lab	2	2	--	50
	II	2307	Data Structures using C	4	3	40	60
		P2307	Data Structures using C Lab	2	2	--	50

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Semester	Paper Code	Paper Title	Hrs/Week	Credits
I	1307	Problem Solving in C	4	3

Objectives:

- This course introduces the concepts of the C Programming language.
- This course aims to provide exposure to problem-solving through programming.

Course Learning Outcomes:

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

- Understand the functionality and usability of a Digital Computer.
- Apply logical skills to analyze a given problem
- Develop an algorithm for solving a given problem.
- Understand, C language constructs like statements, Array, functions, etc.
- Apply C language constructs to write source code based on the algorithms and test for requirements in problem definition.

UNIT – I

Fundamentals: Computer – definition, characteristics and limitations, applications, generations. Block diagram of a computer – memory, CPU, I/O Device, system software, application software. Software Development Method. Algorithm – key features, flow charts, pseudo codes, examples. Computer programming languages, C Language: Introduction, Structure of C program – Writing the first C program, File used in C Program, Compiling and Executing C Programs

UNIT – II

C Language Constructs: Comments, Keywords, Identifiers, Basic Data Types, Variables, Constants, Operators, I/O Statements. Expression Evaluation – precedence, associativity, type conversion, examples. Control Statements: selection statements, conditional operator, switch statement, loops–while, do-while, for, nested loops, break, continue.

UNIT – III

Arrays: Introduction, One-dimensional & Two-dimensional arrays – declaration, initializing, assigning, accessing elements, other allowed operations. Strings: declaration, initializing, input, output, string, and character functions.

UNIT – IV

Functions: Introduction, using functions – function declaration/prototype, function definition, function call, return statement, passing parameters (call-by-value, call-by-reference), Scope of variables, Storage Classes, Recursive functions,

Pointers: understanding computer memory, declaring and initializing pointer variables, null pointers, passing arguments to functions using pointer, pointer vs Arrays. Dynamic Memory Allocation – malloc, calloc, free, realloc, usage and drawbacks of pointers

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I	**1307**	**Problem Solving in C**	**4**	**3**

UNIT – V

Structure, Union, and Enums: introduction, nested structures, arrays of structures, structures and functions, Union, arrays of unions variables, enumerated data types.

Files: Introduction, using files in C, read data from files, writing data to files, random accessing to file, accepting command line arguments (CLA).

BOOKS

1. Jeri R Hanly & Elliot B Koffman, "Problem Solving and Program design in C", 7th Edition, Pearson Education.
2. Brain W Kernighan and Dennis M Ritchie, "The C Programming language", 2nd Edition, PHI Learning Private Limited.
3. Reema Thareja, "Introduction to C Programming", 2nd Edition, Oxford University Press.
4. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, Oxford University Press.

Recommended Co-Curricular Activities:

(Co-curricular activities shall encourage self/independent and group learning)

A. Measurable

1. Assignments
2. Student seminars
3. Quiz (Individuals or groups as teams)
4. Study projects (on local real-time problems pertaining to syllabus)

B. General

1. Group Discussion
2. Try to solve MCQ's available online
3. Problem-solving exercise
4. Practical assignments and laboratory reports
5. Viva voce interviews

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Semester	Paper Code	Paper Title	Hrs/Week	Credits
I	**P1307**	**Problem Solving in C Lab**	**2**	**2**

1. Write a program using all basic operators.
2. Write a program to find largest of two numbers and largest of three numbers.
3. Write a program to find the sum of individual digits of a positive integer.
4. Write a program to check whether the given positive integer is prime or composite.
5. Write a program to find both the largest and smallest number in a list of integer values
6. Write a program that uses functions to add two matrices.
7. Write a program for multiplication of two N X N matrices.
8. Write a program to perform various string operations.
9. Write a program to find factorial of given integer value using iterative and recursion.
10. Write a program to demonstrate the Call-by-Value & Call-by-Address.
11. Write a program to calculate the salaries of all employees using Employee (ID, Name, Designation, Basic Pay, DA, HRA, Gross Salary, Deduction, Net Salary) 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
12. Write a program to read the data character by character from a file.
13. 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

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DEPARTMENT OF COMPUTER SCIENCE/APPLICATIONS

Model Question Paper

I B.Sc. (CS) I Semester

Paper Title: **Problem Solving in C**

Time: 3 hours **Max. Marks: 60 Marks**

SECTION – A

Answer any Five of the following questions. **5 x 4 = 20 M**

1. Write different applications of computer systems.
2. Describe the software develop method.
3. When do we use break? Give an example.
4. What are the rules for writing an identifier?
5. Write any five-string functions with example.
6. Explain function declaration and definition.
7. Describe about storage class.
8. Write about command line arguments.

SECTION – B

Answer any Five of the following questions. **5 x 8 = 40 M**

9. Define an algorithm. Explain algorithm representation with example.
10. Explain structure of C program with example program and file used.
11. Describe about the use of operator precedence, operator associativity, and type conversion in arithmetic expression evaluation.
12. Explain while and for loops with syntax and example programs.
13. Explain one dimensional array declaration, initialization, accessing elements.
14. Differentiate between call-by-value and call-by-reference with examples.
15. Describe the structures need, declaration and accessing elements.
16. Explain different operations performed on file with example.

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Semester	Paper Code	Paper Title	Hrs/Week	Credits
II	2307	Data Structures using C	4	3

Course Objectives:

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

Course Learning Outcomes:

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

- Understand Data Structures for data storage and processing.
- Comprehend Data Structures – Stack, Queue, Linked List, Trees, Graphs
- Develop ability to implement different sorting and search methods
- Have knowledge on basic operations like insert, delete, search, update and traversal
- Design and develop programs using various data structures
- Choose a suitable Data Structure for implement the applications of algorithms.

UNIT – I:

Introduction: need of a data structures, elementary data structure organization, classification of data structures, operations on data structures, abstract data type, advantages of ADT, algorithms, different approaches to design an algorithm, different structures used in algorithms. Time and space complexity, Big O notation, examples.

UNIT – II:

Arrays: representation, and operations on one-dimensional arrays, application of arrays. Linked Lists: representation, and operations on singly linked lists, circular linked lists, doubly linked lists, applications of linked lists – polynomial representation.

UNIT – III:

Stacks: Introduction, array representation of stack, operations on a stack, linked representation of stack, operations on a linked stack, Applications of Stacks.

Queues: Introduction, array representation of queue, operations on queue, linked representation of queue, operations on linked queue, circular queue, double ended queue, application of queues.

UNIT – IV:

Binary Trees: terminology, types of trees, binary trees, representation of binary trees, binary search trees, creating a binary search tree, traversing a binary tree – pre-order, in-order, post-order, inserting a new node, deleting node, applications of binary trees.

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Semester	Paper Code	Paper Title	Hrs/Week	Credits
II	2307	Data Structures using C	4	3

UNIT – V:

Graphs: Introduction, graph terminology, directed graphs, representation of graphs, graph traversals – DFS, BFS. minimum spanning trees – Prim's algorithms, Kruskal's algorithms, shortest path algorithm, application of graphs.

Searching: linear search, binary search.

Sorting: bubble sort, insertion sort, merge sort, quick sort.

BOOKS:

1. Reema Thareja, "Data Structures using C", 2nd Edition, Oxford University Press
2. ISRD group, "Data Structures using C", 2nd Edition, TMH
3. D S Malik, "C++ Programming – program design including data structures", 8th Edition, Cengage Learning
4. Yonghui Wu, Jiande Wang, "Data Structure Practice for Collegiate Programming Contests and Education", CRC Press

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Semester	Paper Code	Paper Title	Hrs/Week	Credits
II	**P2307**	**Data Structures using C Lab**	**4**	**3**

1. Write a program to perform different operations on one-dimensional array.
2. Write a program to perform different operations on singly linked list.
3. Write a program to perform different operations on circular linked list.
4. Write a program to perform different operations on doubly linked list.
5. Write Programs to implement the Stack operations using an array
6. Write Programs to implement the Stack operations using Liked List.
7. Write Programs to implement the Queue operations using an array.
8. Write Programs to implement the Queue operations using Liked List.
9. Write a program for parenthesis checking in an expression.
10. Write a program for arithmetic expression evaluation.
11. Write a program for Binary Search Tree Traversals
12. Write a program to search an item in a given list using the following Searching Algorithms
    a. Linear Search b. Binary Search
13. Write a program for implementation of the following Sorting Algorithms
    a. Bubble Sort b. Insertion Sort
14. Write a program for implementation of the following Sorting Algorithms
    a. Merge Sort b. Quick Sort

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DEPARTMENT OF COMPUTER SCIENCE/APPLICATIONS

Model Question Paper

I B.Sc. (CS) II Semester

Paper Title: **Data Structures using C**

Time: 3 hours **Max. Marks: 60 Marks**

SECTION – A

Answer any Five of the following questions. **5 x 4 = 20 M**

1. What is abstract data type. Describe with example.
2. Define a data structure. Why do we need data structures?
3. What are the applications of arrays?
4. Describe any one of the applications of stacks with example.
5. Describe about double ended queue.
6. What are the applications of binary trees?
7. What are minimal spanning trees? Describe.
8. What are the uses of sorting?

SECTION – B

Answer any Five of the following questions. **5 x 8 = 40 M**

9. Discuss the classification of data structures in detail.
10. Declare one dimensional array and perform various operations.
11. Explain the inserting of a node in a singly linked list at various positions.
12. Describe the array representation of stack and various stack operations.
13. How to implement a linked representation of a Queue? Explain.
14. Explain binary tree traversals with examples.
15. Explain binary searching with example.
16. Draw a graph and perform any one type of traversal.

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