Course: BTech **Semester:** 2

Prerequisite: Basic knowledge of Programming

Rationale: To Write programs in C to solve the problems and To provide required knowledge to implement linear data structures such as arrays. To understand the various steps involved in programing development. To understand the Basic concepts of linear and non-linear Data Structures To learn how to learn and write modular and readable c programing

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
					Internal Marks			External Marks		
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	T	CE	P	T	P	
3	-	2	-	4	20	20	20	60	30	150

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**Dynamic Memory Allocation:**malloc, calloc, realloc and free, Array of pointers, Programing Applications, Dangling Pointer	10	6
2	**Preprocessor Directives:**File Inclusion, Macros, Conditional Compilation and Pragmas	10	6
3	**Enumerators, Structures, Unions:** **Enumerators:** Enumerator Types **Structures:** Declaration Initialization Accessing Structures, Complex Structures, Structure and Functions Array of structures Arrays within structures Anonymous structures Nested structures pointers in structures Self-referential structures Structure Padding **Unions:** Bit fields **Typedef**	15	15
4	**Searching and Sorting:**Selection sort, Bubble Sort, ,Insertion sort, Quick sort and Merge Sort Linear and Binary Searching Techniques	30	3
5	**Data Structures: List- Linear List :**Singly Linked List - CRUD operations Double Linked List -CRUD operations Circular Linked List- CRUD operations	35	15

Reference Books

1.	**Fundamentals of Data Structures in C, 2ND eDITION, E.Horowitz, S,.Sahni and Susan Anderson- Freed, Universities Press (TextBook)**
2.	**Computer Programming & Data Structures - E. Balaguruswamy,4th Edition TMH**
3.	**C & Data Structures - P . Padmanabham,Third Edition,B.S Publications**
4.	**Classic Data Structures - D.samanta**

Course Outcome

After Learning the Course the students shall be able to:
After Completion of course students shall be able to : 1. Learn to use data structures concepts for realistic Problems 2. Ability to identify appropriate data structures for Solving computing problems in respective language 3. Ability to solve problems independently and think critically. 4. Understand the concept of File Management

List of Practical

1.	1. Write a c program to increase or decrease the existing size of an 1D array. 2. Write a c program on 2D array to Increase & Decrease i) No of subarrays ii) elements in the subarrays
2.	1. Write a to display present date and time using c language. 2. Write a c program to demonstrate pre-processor directives i) Macros ii) Conditional Compilation
3.	1. Write a C program that uses functions to perform the following Operations. i) Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers iv) Multiplication of two complex numbers 2. Write a c program to store records of n students based on roll_no, name, gender and 5 subject marks i) Calculate percentage each student using 5 subjects. ii) Display the student list according to their percentages.
4.	Write a C program to store n employee records based on EMP_ID,EMP_NAME,EMP_DEPTID,EMP_PHNO,EMP_SALARY and display all the details of employees using EMP_NAME in sorted order.
5.	1. Write a c program to implement selection Sort & Bubble sort 2. Write a C program to reverse the elements within a given range in a sorted list. Example : input : 10 9 1 2 4 3 4 6 7 8 10 3 8 output: 1 2 8 7 6 4 4 3 9 10 the sorted list of given array elements is 1 2 3 4 4 6 7 8 9 10 , after reversing the elements with in the range 3 and 8 is 1 2 8 7 6 4 4 3 9 10
6.	1. Write a c program to implement Insertion sort & Quick sort 2. Write a c program to sort the given n integers and perform following operations i) Find the products of every two odd position elements ii) Find the sum of every two even position elements Explanation: **Input :** 9 1 9 8 3 5 4 7 2 6 **Output:** 3 15 35 63 6 10 14 The sorted list of given input is 1 2 3 4 5 6 7 8 9, the product of alternative odd position elements is 1*3 = 3,3*5=15,5*7=35… and the sum of two even position elements 2+4 =6,4+6=10.
7.	Write a C Program to implement Merge Sort.
8.	1. Write a c program to sort in ascending order and reverse the individual row elements of an mxn matrix

	input : 3 4 1 4 2 3 7 8 10 9 6 3 5 2 output: 4 3 2 1 10 9 8 7 6 5 3 2 2. Write a c program to sort elements in row wise and print the elements of matrix in Column major order Input: 3 4 1 4 2 3 7 8 10 9 6 3 5 2 Output: 1 7 2 2 8 3 3 9 5 4 10 6 Explanation: The sorted matrix according to the conditions is 1 2 3 4 7 8 9 10 2 3 5 6 after sorting matrix the elements as to be printed in column major order 1 7 2 2 8 3 3 9 5 4 10 6
9.	1. Write a c program to perform linear Search. 2. Write a c program to perform binary search.
10.	Write a c program to Create a single Linked list and perform Following Operations A. Insertion At Beginning B. Insertion At End C. Insertion After a particular node D. Insertion Before a particular node E. Insertion at specific position F. Search a particular node G. Return a particular node H. Deletion at the beginning I. Deletion at the end J. Deletion after a particular node K. Deletion before a particular node L. Delete a particular node M. Deletion at a specific position
11.	1. Write a program to Reverse a singly Linked list. 2. Write a c program to check whether the created linked list is palindrome or not.
12.	Write a c program to Create a Circular Linked list and perform Following Operations A. Insertion At Beginning B. Insertion At End C. Insertion After a particular node

	D. Insertion Before a particular node E. Insertion at specific position F. Search a particular node G. Return a particular node H. Deletion at the beginning I. Deletion at the end J. Deletion after a particular node K. Deletion before a particular node L. Delete a particular node M. Deletion at a specific position
13.	Write a c program to Create a Circular single Linked list and perform Following Operations A. Insertion After a particular node B. Insertion Before a particular node C. Search a particular node D. Return a particular node E. Deletion before a particular node F. Delete a particular node
14.	Write a c program to Create a Circular DoubleLinked list and perform Following Operations A. Insertion After a particular node B. Insertion Before a particular node C. Search a particular node D. Return a particular node E. Deletion before a particular node F. Delete a particular node