SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur-603203

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

SUBJECT : EC8393 FUNDAMENTALS OF DATA STRUCTURE IN C

YEAR/SEM: II/III

UNIT I C PROGRAMMING BASICS			
Structure of a C Program-compilation and linking processes-Constants, variables-Data Types-Expressions using operators in C-Managing input and output operations-Decision making and branching-Looping statements. Arrays-Initialization-Declaration-One dimensional and two dimensional arrays-Strings-String operations-String Arrays-Simple programs-sorting-searching-matrix operation			
PART-A			
Q.No	**Questions**	**BT level**	**Competence**
1	**Distinguish** between high level language and low level language.	BTL -4	Analyzing
2	**Compare** the Compiler and Interpreter.	BTL -2	Understanding
3	**Define** static variable. Give an example.	BTL -1	Remembering
4	**Tell** the use of return type of printf() & scanf().	BTL -1	Remembering
5	**Assess** what operation is performed when the %f, %e and %g format specifies are used to display the value.	BTL -5	Evaluating
6	**What** are the string operations defined in C.	BTL -1	Remembering
7	**Compare and contrast** the prefix and postfix forms of the ++ operator.	BTL -2	Understanding
8	**Distinguish** the terms Break and Continue.	BTL -4	Analyzing
9	**Name** the primary data types in C.	BTL -1	Remembering
10	**Explain** the various form of looping statement.	BTL -5	Evaluating
11	**Create** a C code to print the text “Data Structures” using the arrays.	BTL -6	Creating
12	**Write** the syntax of array declaration **with** an example.	BTL -3	Applying
13	**Identify** the purpose null character at the end of string.	BTL -3	Applying
14	**Analyze** the use of decision making statements.	BTL -4	Analyzing
15	**Discuss** the types of I/O statements available in C.	BTL -6	Creating
16	**How** would you initialize the size of an array?	BTL -1	Remembering
17	**Illustrate** the declaration of a string with an example.	BTL -2	Understanding
18	**Identify** the features of array.	BTL -3	Applying
19	**Compare** do-while and while loop.	BTL -2	Understanding
20	**Show** the basic structure of C programs.	BTL -1	Remembering

PART-B			
Q.No	**Questions**	**BT Level**	**Competence**
1	**Explain** the constants, expressions and statements in C. (13)	BTL -2	Understanding
2	i) **Compare** various types of operators in C. (6) ii) **List and** explain the various data types in C. (7)	BTL -4	Analyzing
3	**Describe** the structure of a C program with an example. (8) **Write** a program to find the sum of first 100 integers. (5)	BTL -1	Remembering
4	**Show** the decision making statements in C with examples. (13)	BTL -1	Remembering
5	i)Write a C program to **find** whether the given year is leap year or not. (7) ii) Write a C program to **find** whether the given number is palindrome or not using C. (6)	BTL -1	Remembering
6	**Compose** a program to narrate about 'for', 'while' and 'do while' looping statements. (13)	BTL -6	Creating
7	i) **Assess** C code to get a 4 digit number and display the reverse of same number. (7) ii) Write a C program to **determine** the roots of quadratic equation. (6)	BTL -5	Evaluating
8	i) **Summarize** the need of array variables. Describe the declaration & initialization of array. (6) ii) **Demonstrate** a program to reorder a one dimensional array. (7)	BTL- 2	Understanding
9	i)How two dimensional arrays are created in C? (5) ii)**Write** a C program to generate a population survey having citizen's records stored as a collection of year-wise population (8)	BTL -1	Remembering
10	**Develop** a C program to find the following, where A, B and C are the matrices whose orders are M*N, M*N and N*N respectively.A=A+B*C (13)	BTL- 3	Applying
11	**Distinguish** Two dimensional and one dimensional array and explain it with example. (13)	BTL- 4	Analyzing
12	i) **Explain** in detail about selection sort algorithm. (6) ii)**Demonstrate** a program for matrix addition using C. (7)	BTL-2	Understanding
13	Write Short note on the following **with** examples i) String and character array. (6) ii) String input & output. (7)	BTL -3	Applying
14	**Analyze** the various string functions and write C code to get two strings and display the result of at least 5 possible string operations. (13)	BTL -4	Analyzing

PART-C			
Q.No	**Questions**	**BT Level**	**Competence**
1	**Explain** the terms keywords, identifiers, character set, constants and variables along with examples. (15)	BTL -5	Evaluating
2	**Develop** a C program for the following: i) To find the area and circumference of the circle. (7) ii) To find the given number is Armstrong or not. (8)	BTL-6	Creating

3	**Determine** the working of various string functions such as strlen(),strcpy(),strcat(),strcmp(). (15)	BTL - 5	Evaluating
4	**Formulate** a C program to search an element 35 from an array of 10 numbers(10,15,8,22,56,35,48,28,75,20). Sort these elements in ascending order. (15)	BTL-6	Creating

UNIT II FUNCTIONS,POINTERS,STRUCTURES AND UNIONS			
Functions-Pass by value-Pass by reference-Recursion-Pointers-Definition-Initialization-Pointers Arithmetic-Structures and unions-definition-Structure within a structure-Union-Programs using structures and unions-Storage class-Preprocessor directives.			
PART-A			
Q.No	**Questions**	**BT Level**	**Competence**
1	**Define** the term user-defined function.	BTL -1	Remembering
2	**Support** your views on a function call with example.	BTL -5	Evaluating
3	**Invent** the meaning of default arguments and command line arguments.	BTL -6	Creating
4	Write a function that **makes use of** "Call by Value "with example.	BTL -3	Applying
5	**List** out the use of library function.	BTL -1	Remembering
6	**Show** the declaration of pointer along with definition.	BTL -2	Understanding
7	**What** is pointer arithmetic?	BTL -1	Remembering
8	**Define** void pointer and null pointer.	BTL -1	Remembering
9	**Examine** the term recursive function.	BTL -4	Analyzing
10	**Evaluate** preprocessor directives and list out few examples.	BTL -5	Evaluating
11	**What** is term structure?	BTL -1	Remembering
12	Perform various operations that **make use of** structure.	BTL -3	Applying
13	**Find** the use of operator on structure.	BTL -1	Remembering
14	**Distinguish** Structure and array.	BTL-4	Analyzing
15	**Illustrate** the need of typedef.	BTL -2	Understanding
16	**Apply** your view on the term Union in C.	BTL -3	Applying
17	**Discuss** the operators used to access the structure members.	BTL -6	Creating
18	**Extend** your views about malloc and calloc.	BTL -2	Understanding
19	**Compare** structures and Union.	BTL -4	Analyzing
20	**Summarize** on initializing Unions.	BTL -2	Understanding

PART-B

Q.No	Questions	BT Level	Competence
1	i) **Interpret** function declaration and function definition. (6) ii)**Summarize** examples for the above. (7)	BTL -2	Understanding
2	i)**Compose** a C program on computation of Sine series. (6) ii)**Formulate** the applications of recursive function. (7)	BTL -6	Creating
3	**Analyze** and write a C program to demonstrate the scientific calculator using built-in functions. (13)	BTL -4	Analyzing
4	**List out** the operations performed by pointers with example. (13)	BTL -1	Remembering

5	**Explain** in detail about i) Array of pointers. (6) ii) Passing arrays to functions. (7)	BTL -2	Understanding
6	i) **What** is fixed argument functions? Explain. (6) ii) **What** is a variable argument function? Explain. (7)	BTL -1	Remembering
7	i) **Criticize** pass by value and pass by reference (3) ii) **Evaluate** the program to get two numbers and exchange these numbers using pass by value and pass by reference. (10)	BTL-5	Evaluating
8	i) **Develop** the code to get 10 student details using structures from user and display the details on the screen (8) ii) **Build** your understanding about functions and structures. (5)	BTL- 3	Applying
9	**Explain** the structure with data member of various types and declare two structure variable. Write a program to read data into these and print the same. Define structure. (13)	BTL -2	Understanding
10	**Examine** about structures and its operations. (13)	BTL -4	Analyzing
11	i) **Tell** about Storage classes in C with example. (8) ii) **Define** the process of accessing the structure member through pointer using dynamic memory allocation. (5)	BTL -1	Remembering
12	i) **When** is array of pointers used in structure? Narrate it. (6) ii) **Show** how to use Union inside structure with example. (7)	BTL- 1	Remembering
13	**Apply** the representation of structures and unions for an employee record having empid, emp-name, DOB, basicpay, allowances, deductions, grosspay and netpay. Examine their memory allocation. (13)	BTL- 3	Applying
14	Distinguish Unions and structures along with programming examples. (13)	BTL- 4	Analyzing

PART-C

Q.No	Questions	BT Level	Competence
1	**Explain** a C program to calculate the grades and display the results of the students using structure along with explanation. (15)	BTL -5	Evaluating
2	**Develop** a C program for the following: i) To sort the given N names. (8) ii) To show the recursive function. (7)	BTL-6	Creating
3	**Assess** nested structures with a sample C program of your own example. (15)	BTL -5	Evaluating
4	**Formulate** a C program to read the details of the book name, author name and price of 200 books in a library and display the total cost in your own terms. (15)	BTL-6	Creating

UNIT III LINEAR DATA STRUCTURES

Arrays and its representation-Stacks and Queues-Linked list-Linked list based implementation of Stacks and queues-Evaluation of Expression-Linked list based polynomial addition.

PART-A

Q.No	Questions	BT Level	Competence
1	**Where** do we use data structures how it is classified?	BTL -1	Remembering
2	**Name** ADT operations.	BTL -1	Remembering
3	**Summarize** linear data structures and Nonlinear data structures.	BTL -2	Understanding
4	**List** the different types of linked list.	BTL -1	Remembering
5	**Contrast** between array and linked list	BTL -2	Understanding
6	**Analyze** the term single linked list.	BTL -4	Analyzing
7	How to create a new node, give **with** an example?	BTL -3	Applying
8	**Discuss** the use of header pointer and null pointer.	BTL -6	Creating
9	**Apply** your understanding about dummy header.	BTL -3	Applying
10	**Develop** the circular linked list.	BTL -3	Applying
11	**Define** stack. List its operations.	BTL -1	Remembering
12	**When** did you use the stack in computer system?	BTL -1	Remembering
13	**Compare** stack and queue.	BTL -5	Evaluating
14	**Examine** the conditions that are followed in the array implementation of queue.	BTL -4	Analyzing
15	**Show** the applications of stack and queue.	BTL -2	Understanding
16	**Infer** any two data structures used in operating system.	BTL -4	Analyzing
17	**Write** about prefix, infix and postfix notations.	BTL -1	Remembering
18	**Compose** the following expressions into postfix and prefix forms. A+B*(C-D)(P-R).	BTL -6	Creating
19	**Evaluate** the value of the expression ab+c*d using stack.	BTL -5	Evaluating
20	**Show** how ADT representation is used to evaluate arithmetic expression?	BTL -2	Understanding
	PART-B		
Q. No	**Questions**	**BT Level**	**Competence**
1	**Explain** array based implementation of list with example. (13)	BTL -2	Understanding
2	**Discuss** in detail about linked list ADT with example. (13)	BTL -6	Creating
3	**List** and explain the Queue ADT operation for insertion and deletion routine in linked list. (13)	BTL -4	Analyzing
4	i) Describe different kinds of linked list with neat diagram. (6) ii) Write a procedure to perform polynomial addition using linked list. (7)	BTL -1	Remembering
5	i) Give the **outline** about the application of stack. (6) ii) **Explain** in detail about Circular linked list. (7)	BTL -2	Understanding
6	**Describe** about the implementation of stack using linked list. (13)	BTL -1	Remembering
7	**Access** the ADT operation for insertion and deletion routine in stack using array implementation. (13)	BTL-5	Evaluating
8	**Develop** the array implementation of queue with its operation. (13)	BTL- 3	Applying
9	i) **Outline** the applications of queue. (6) ii) **Compare** stack and queue. (7)	BTL -2	Understanding

10	**Analyze** and evaluate the postfix expression 2 4 + 3 * 1 5 - 8 3 + *- (13)	BTL -4	Analyzing
11	Write a procedure to convert an infix expression a+b*c+(d*e+f)*g postfix notation. (13)	BTL -1	Remembering
12	i) **List** the process of postfix valuation with an example. (6) ii) **Define** the balancing symbols with example. (7)	BTL- 1	Remembering
13	**Identify** the process of expression evaluation using stack. Elaborate with an example. (13)	BTL- 3	Applying
14	**Examine** an algorithm to add and subtract two polynomials P1 and P2. (13)	BTL- 4	Analyzing

PART-C

Q.No	Questions	BT Level	Competence
1	**Recommend** a suitable c code to swap two adjacent elements by adjusting only the pointers using: a. Singly linked lists. (7) **b.** Doubly linked lists. (8)	BTL -5	Evaluating
2	A deque is a data structure consisting of a list of items, on which the following operations are possible: Push (X,D): Insert item X on the front end of deque D. Pop(D): remove the front item from deque D and return it. Inject(x,D): Insert item X on the rear end of deque D. Eject(D): Remove the rear item from deque that take O(1) time per operation. Combine the above mentioned operations and write a C code to **formulate** deque operations. (15)	BTL-6	Creating
3	**Explain** an algorithm to implement Queue ADT. Give relevant examples and diagrammatic representation. (15)	BTL -5	Evaluating
4	**Design** an algorithm to convert an infix expression to postfix expression using stacks and apply to the expression (a+b-d*e+(f*g+h)*i). (15)	BTL-6	Creating

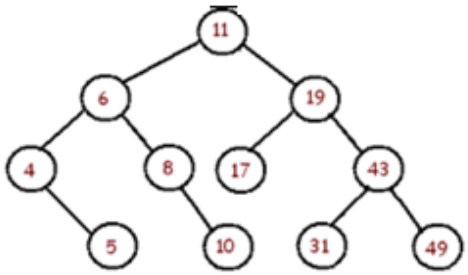
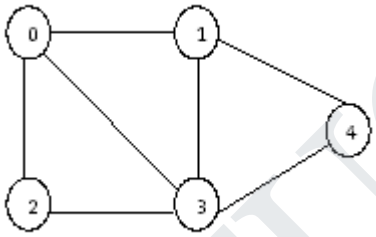
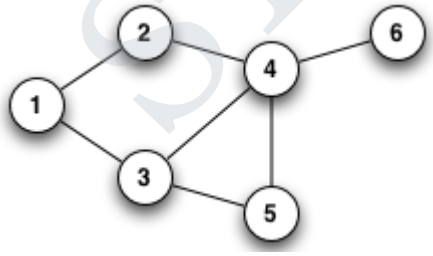
UNIT IV NON- LINEAR DATA STRUCTURES

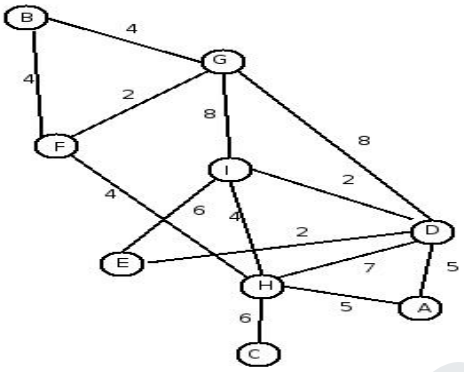
Trees-Binary Tree-Binary tree representation and traversal-Binary search tree-Application of trees-Set representations-Union Find operation-Graph and its representation-Graph Traversal

PART-A

Q.No	Questions	BT Level	Competence
1	**Compose** the term height and depth of the tree.	BTL -6	Creating
2	**Build** the number of trees possible with 3 nodes.	BTL -3	Applying
3	**Define** Binary tree and list its properties?	BTL -1	Remembering
4	**What** are the two methods of binary tree implementation?	BTL -1	Remembering

5	**Identify** the differences between binary tree and binary search tree.	BTL -3	Applying
6	**List** the applications of binary tree.	BTL -4	Analyzing
7	**Assess** the different type of tree traversal.	BTL -5	Evaluating
8	**Name** trees and subtrees.	BTL -1	Remembering
9	**Compose** the term equivalence relation.	BTL -6	Creating
10	**Explain** about union operation.	BTL -2	Understanding
11	**Label** the different types of union.	BTL -1	Remembering
12	**Define** Graph and Acyclic graph.	BTL -1	Remembering
13	**Compare and contrast** in-degree and out degree of the graph.	BTL -4	Analyzing
14	**Construct** an acyclic graph.	BTL -3	Applying
15	**Show** the different ways of representing graph.	BTL -1	Remembering
16	**Analyze** the two traversal strategies used in traversing graph.	BTL -4	Analyzing
17	**Illustrate** the Differences between path and Cycle of the graph.	BTL -2	Understanding
18	**Compare** DFS and BFS.	BTL -2	Understanding
19	**Explain** the tree and graph.	BTL -2	Understanding
20	**Access** about connected components.	BTL -5	Evaluating
	PART-B		
Q.No	**Questions**	**BT Level**	**Competence**
1	**Write s**hort note on the following terms related to tree: i) Path (2) ii) Degree (3) iii) Level (2) iv) Leaves (2) v) Child (2) vi) Height (2)	BTL -1	Remembering
2	**Apply** your understanding to explain about binary search tree and draw the binary search tree for the following input list 60, 25,75,15,50,66,33,44. Trace an algorithm to delete the nodes 25, 75, 44 from the tree. (13)	BTL -3	Applying
3	**Examine** the various tree traversal and predict a binary tree with Preorder:ABCDEFGHI and Inorder:BCAEDGHF . (13)	BTL -4	Analyzing
4	Describe the two applications of tree with a neat example. (13)	BTL -2	Understanding
5	**Conclude** the types of tree traversal methods? Explain it with example and deduce a routine for each of them. (13)	BTL -5	Evaluating
6	**i)Illustrate** your understanding by finding the inorder, preorder and postorder form for the following tree: (7)	BTL - 2	Understanding

	 ii) **Show** some applications of trees. (6)		
7	**Analyze** in detail the implementation of Binary Search Tree and perform its operations. (13)	BTL - 4	Analyzing
8	i) Explain the **motive** behind the dynamic equivalence problem. (6) **ii) Examine** the path compression algorithm and analyze the Union/Find algorithm used. (7)	BTL -4	Analyzing
9	**Describe** –set representations and Union-Find operations with suitable examples. (13)	BTL -1	Remembering
10	**Define** graph. List out the different ways for representing the graph and explain them with example. (13)	BTL -1	Remembering
11	i) **Relate** the following graph using breadth first search. (7)  **ii. Write** about Breadth First Search algorithm. (6)	BTL - 1	Remembering
12	i)**Develop** the following graph using depth first search. (7)  ii) **Construct** a C routine for Depth First Search algorithm. (6)	BTL - 3	Applying
13	**Interpret** in detail about the graph traversal algorithms with example. (13)	BTL -2	Understanding
14	**Compose** the following graph representations with an example i. Adjacency matrix (7)	BTL -6	Creating

	ii. Adjacency list. (6)		
	PART-C		
Q.No	**Questions**	**BT Level**	**Competence**
1	Consider the following graph: i) **Evaluate** the shortest path from A to all other vertices for the following graph: (8) ii) **Access** the shortest unweighted path from B to all other vertices for the graph. (7) 	BTL -5	Evaluating
2	**Explain** binary search tree and do the following operations. i) Show the result of inserting 3,1,4,6,9,2,5,7 into an initially empty binary search tree. (8) ii) Show the result of deleting the root. (7)	BTL-5	Evaluating
3	Construct a graph by considering five cities (1).New Delhi,(2).Mumbai,(3)Chennai,(4).Bangalore and (5).Kolkata and the list of flights that connects these cities are shown below: (15) **Flight No.** / **Origin** / **Destination** 101 / 2 / 3 102 / 3 / 2 103 / 5 / 3 104 / 3 / 4 105 / 2 / 5 106 / 5 / 2 107 / 5 / 1 108 / 1 / 4 109 / 5 / 4 0 / 4 / 5	BTL -6	Creating
4	**Construct** a directed acyclic graph with nodes A->B, B->C, C->E, E->F,B->D,B->E,D->E,G->D. Traverse the nodes using BFS and DFS. (15)	BTL-6	Creating

UNIT V SEARCHING AND SORTING ALGORITHMS			
Linear Search-Binary Search, Bubble Sort, Insertion Sort-Merge sort-Quick sort-Hash tables-Overflow handling			
PART-A			
Q.No	**Questions**	**BT Level**	**Competence**
1	**Explain** internal and external sorting.	BTL -2	Understanding
2	**Label** the two main classifications of sorting based on the source of data.	BTL -1	Remembering
3	**Analyze** the applications of external and internal sorting.	BTL -4	Analyzing
4	**What** is the purpose of quick sort.	BTL -1	Remembering
5	**Assess** the advantage of bubble sort.	BTL -5	Evaluating
6	**Define** median three partitioning.	BTL -1	Remembering
7	**Outline** divide and conquer technique.	BTL -2	Understanding
8	**Show** is the purpose of insertion sort.	BTL -1	Remembering
9	**Summarize** about merge sort.	BTL -2	Understanding
10	**List** the advantages of merge sort.	BTL -1	Remembering
11	**Discover** the key characteristics of binary search.	BTL -4	Analyzing
12	**Compare** the linear search with binary search.	BTL -2	Understanding
13	**Name** the techniques used to choose the pivot element for quick sort.	BTL -1	Remembering
14	**Analyze** the overflow condition in hash table.	BTL -4	Analyzing
15	**Identify** the advantage of Hashing.	BTL -3	Applying
16	**Create** algorithm for insertion sort.	BTL -6	Creating
17	**Support** your views about insertion sort with example.	BTL -5	Evaluating
18	Trace the steps of insertion sort 12, 19, 33, 26, 29, 35, 22. **Construct** the total number of comparisons made during sorting.	BTL -3	Applying
19	**Identify** the time complexity of quick sort and binary search.	BTL -3	Applying
20	**Plan** and rearrange the following numbers 45, 22,6,77,47,8 using bubble sort.	BTL -6	Creating
	PART-B		
Q. No	**Questions**	**BT Level**	**Competence**
1	**Illustrate** the correct sequence 3, 1, 4,7,5,9,2,6,5 using Insertion sort with routine. (13)	BTL -2	Understanding
2	**Elaborate** about insertion sort with example and code. (13)	BTL -6	Creating
3	**Inspect** and explain an algorithm for quick sort with example. (13)	BTL -4	Analyzing
4	Summarize quick sort algorithm and trace the following **list** of numbers:90,77,60,99,55,88,66,10. (13)	BTL -1	Remembering
5	**Explain** Merge sort routine and trace the following numbers 1, 13,	BTL -2	Understanding

	24,26,2, 15, 27, 38. (13)		
6	**Show** an algorithm for merge sort and give its worst case, best case and average case analysis. (13)	BTL -1	Remembering
7	**Evaluate** the linear search & binary search algorithm in detail with an example for each. (13)	BTL-5	Evaluating
8	i) **Identify** the differences between linear search algorithm and binary search algorithm. (7) ii) **Experiment** it with an example. (6)	BTL- 3	Applying
9	**Explain** C Program to implement the linear search technique with an example. (13)	BTL -2	Understanding
10	**Analyze** your view about bubble sort technique with suitable example. (13)	BTL -4	Analyzing
11	Briefly **tell** about on Hashing and overflow handling. (13)	BTL -1	Remembering
12	**Describe** binary search algorithm and search the element 22 from the given list 2,7,14,4,17,5,19,8,22,9,25,12,27,14,28,33. (13)	BTL- 1	Remembering
13	**Develop t**he technique insertion sort for the following 9,7,6,15,16,5,10,25,26,18,11 (13)	BTL- 3	Applying
14	**Examine** the following techniques in hashing i) Linear probing. (6) ii) Quadratic probing. (7)	BTL- 4	Analyzing

PART-C

Q.No	Questions	BT Level	Competence
1	i). **Conclude** how quick sort processes the input 142, 543, 123, 65, 453, 879, 572, 434, 111, 242, 811, 102. (7) ii). For the quick sort implementation, **Estimate** the running time when all keys are equal. (8)	BTL -5	Evaluating
2	Given an array containing only 0s and 1s in sorted order. **Create** a strategy using any of the sorting techniques to do the following: a. Find the first occurrence of 1 in array. (5) b. Find the last occurrence of 0. (5) c. Find number of instances of 0s in sorted array. (5)	BTL-6	Creating
3	Explain C code to implement Insertion sort and selection sort with example. (15)	BTL -5	Evaluating
4	**Create** a hash table of size 10.Using linear probing insert the keys 72,27,36,24,63,81,92,101 into the table. (15)	BTL-6	Creating