

CHAPTER

6

Applications of Data Structures

Syllabus Topics

Applications of Linked Lists : Addition of 2 Polynomials and Multiplication of 2 polynomials.

Applications of Stacks : Reversal of a String, Checking validity of an expression containing nested parenthesis, Function calls, Polish Notation: Introduction to infix, prefix and postfix expressions and their evaluation and conversions.

Application of Queues : Scheduling, Round Robin Scheduling Applications of Trees: Huffman Tree and Heap Sort.

Applications of Graphs : Dijkstra's Algorithm, Minimum Spanning Tree: Prim's Algorithm, Kruskal's Algorithm.

Self-learning Topics : Implementation of Applications for Stack, Queues, Linked List, Trees and Graph.

6.1	APPLICATIONS OF LINKED LIST : IMPLEMENTATION	6-4
UQ. 6.1.1	Write applications of Linked List. (MU - Dec. 15, May 16, 3 Marks).....	6-4
6.1.1	Representation and Manipulations of Polynomials using Linked List.....	6-4
6.1.1(A)	Addition of 2 Polynomials	6-4
6.1.1(B)	Multiplication of 2 Polynomials using Linked List	6-7
6.2	APPLICATIONS OF STACK : IMPLEMENTATION.....	6-10
UQ. 6.2.1	Give applications of stack. (MU - May 14, Dec. 17, 2 Marks)	6-10
6.2.1	Reversal of a String	6-10
6.2.1(A)	Algorithm of Program to Reverse a String using Stack	6-11
6.2.1(B)	Program to Reverse a String using Stack	6-11
6.2.2	Checking Validity of an Expression Containing Nested Parenthesis, Function calls	6-12
6.2.2(A)	Algorithm to Check Well form-ness of an Expression	6-12
6.2.2(B)	Program to Check Well form-ness of an Expression.....	6-12
6.3	POLISH NOTATIONS : INTRODUCTION TO INFIX, PREFIX AND POSTFIX EXPRESSIONS.....	6-14
6.3.1	Conversion of Infix to Postfix Expression	6-15
6.3.1(A)	Algorithm of Infix to Postfix Conversion.....	6-15
6.3.1(B)	Program of Infix to Postfix Conversion	6-16
UQ. 6.3.3	Write program to convert INFIX expression into POSTFIX expression. (MU - Dec. 13, May 15, Dec. 15, Dec. 16, 10 Marks)	6-16
6.3.1(C)	Examples of Infix to Postfix Conversion	6-17



6.3.2	Evaluation of Postfix Expression	6-18
6.3.2(A)	Algorithm to Evaluate Postfix Expression.....	6-19
6.3.2(B)	Program to Evaluate Postfix Expression	6-19
6.3.2(C)	Examples of Evaluation of Postfix Expression	6-21
6.3.3	Converting an Infix into Prefix Expression.....	6-22
6.3.3(A)	Algorithm of Infix to Prefix Conversion	6-22
6.3.3(B)	Program of Infix to Prefix Conversion.....	6-23
6.3.4	Evaluation of Prefix Expression.....	6-24
6.3.4(A)	Algorithm for Evaluating a Prefix Expression	6-24
6.3.4(B)	Program to Evaluate Prefix Expression.....	6-24
6.3.4(C)	Examples of Evaluations of Prefix Expressions	6-25
6.4	APPLICATIONS OF QUEUE : IMPLEMENTATION.....	6-26
UQ. 6.4.1	List applications of queue. (MU - Dec. 14, 4 Marks).....	6-26
6.4.1	Scheduling, Round Robin Scheduling.....	6-26
6.5	APPLICATIONS OF TREES : IMPLEMENTATION.....	6-27
6.5.1	Huffman Tree.....	6-27
UQ. 6.5.1	Write short note on : Huffman Tree. (MU - Dec. 17, 5 Marks).....	6-27
UQ. 6.5.2	Explain Huffman Algorithm with an example. (MU - May 15, 5 Marks).....	6-28
6.5.2	Heap Sort	6-30
UQ. 6.5.3	Explain Heap sort using an example. Write algorithm for it and comment on its complexity. (MU - May 19, 10 Marks).....	6-30
UQ. 6.5.4	Define Max Heap Tree. (MU - April 12 , 1 Mark)	6-30
6.6	APPLICATIONS OF GRAPH : IMPLEMENTATION	
UQ. 6.6.1	Give applications of graphs (MU - May 14, 2 Marks)	6-35
6.6.1	Dijkstra's Algorithm / Shortest Path Algorithm.....	6-35
UQ. 6.6.2	Short notes on : Dijkstra's algorithm (MU - May 18, 5 Marks).....	6-35
6.6.1(A)	Examples on Dijkstra's Algorithm	6-37
UQ. 6.6.3	Find the shortest path using Dijkstra's algorithm (MU - May 14, 10 Marks).....	6-37
UQ. 6.6.4	Find the shortest path using Dijkstra's Algorithm (MU - May 17, 10 Marks.).....	6-37
6.6.2	Minimum Spanning Tree	6-38
UQ. 6.6.5	Explain in brief : Minimum Spanning Tree. (MU - Dec. 13, 1 Mark)	6-38
UQ. 6.6.6	Define minimum spanning tree. State the techniques to compute minimum spanning tree. (MU - Dec. 14, Dec. 15, May 18, 2 Marks).....	6-38
UQ. 6.6.7	Define minimum spanning trees with examples. (MU - Dec. 16, May 17, 3 Marks).....	6-38
UQ. 6.6.8	What is minimum spanning tree ? (MU - Dec. 17, Dec.18, May 19, Dec. 19, 3 Marks)	6-38
UQ. 6.6.9	Define minimum spanning tree. List the techniques to compute minimum spanning tree. (MU - Dec. 18, 3 Marks)	6-38
6.6.3	Prim's Algorithm	6-38



UQ. 6.6.10	Using Prim's algorithm find minimum spanning tree of a graph with example. Write algorithm of it. (MU - May 14, 10 Marks)	6-38
UQ. 6.6.11	Short notes on : Prim's algorithm (MU - May 18, 5 Marks)	6-38
6.6.3(A)	Examples on Prim's Algorithm	6-39
UQ. 6.6.12	Find minimum spanning tree for following graph using Prim's algorithm. Show various steps. (MU - Dec. 13, 5 Marks)	6-39
UQ. 6.6.13	Using Prim's algorithm find minimum spanning tree for the following graph. (MU - Dec. 15, 4 Marks)	6-41
UQ. 6.6.14	Using Prim's algorithm find minimum spanning tree for the following graph. (MU - May 16, 5 Marks)	6-41
UQ. 6.6.15	Draw the MST using prim's Algorithm and find out the cost with all intermediate steps. (MU - May 17, 5 Marks)	6-42
UQ. 6.6.16	Draw the MST using prim's Algorithm and find out the cost with all intermediate steps. (MU - May 17, 5 Marks)	6-42
6.6.4	Kruskal's Algorithm	6-43
UQ. 6.6.17	Explain Kruskal's algorithm with an example. (MU - May 18, 8 Marks)	6-43
6.6.4(A)	Examples on Kruskal's Algorithm	6-44
UQ. 6.6.18	Find minimum spanning tree for following graph using Kruskal's algorithm. Show various steps. (MU - Dec. 13, 5 Marks)	6-44
UQ. 6.6.19	Find the minimum spanning tree for the given graph using Kruskal's algorithm. Also find its cost with all intermediate steps. (MU - May 15, 10 Marks)	6-44
UQ. 6.6.20	Using Kruskal's algorithm find minimum spanning tree for the following graph. (MU - Dec. 15, 4 Marks)	6-45
UQ. 6.6.21	Using Kruskal's algorithm find minimum spanning tree for the following graph (MU - May 16, 5 Marks)	6-46
6.6.5	Difference between Prim's and Kruskal's Algorithm	6-47
UQ. 6.6.22	Compare and contrast Prim's and Kruskal's algorithm with the help of an example. (MU - May 14, 7 Marks)	6-47
6.7	SELF-LEARNING TOPICS: IMPLEMENTATION OF APPLICATIONS FOR STACK, QUEUES, LINKED LIST, TREES AND GRAPH.	6-47
6.7.1	Implementation of applications of Linked List	6-47
6.7.2	Implementation of Applications of Stack	6-47
6.7.3	Implementation of Applications of Queue	6-47
6.7.4	Implementation of Applications of Tree	6-47
6.7.5	Implementation of Applications of Linked Graph	6-47
	Chapter Ends	