Contents

Cilit 1. 1	ntroduction to Data Structure and Algorithm	1-16
1.0	Introduction	1
1.1	Learning Objectives	1
1.2	Primitive and Composite Data Types	2
1.3	Abstract Data Types	2
1.4	Data Structures	3
1.5	Operations on Data Structures	7
1.6	Algorithms	8
1.7	Algorithm Design Techniques	8
1.8	Time and Space Complexity of Algorithms	10
1.9	Big O Notation	12
1.10	Recurrences	13
1.11	Summary	14
1.12	Review Questions	16
1.13	Further Readings	16
Unit 2: I	inear Data Structure	17-100
2.0	Introduction	17
2.1	Learning Objectives	18
2.2	Arrays (Ordered Lists)	19
2.3	Representation of an Array	26
2.4	Stack Related Terms and Operations on Stack	31
2.5	Application and Implementation of Stack	37
2.6	Queues	56
2.7	Representation of Queues	56
2.8	Circular Queue and Deque	61
2.9	Deque (Double-Ended Queue)	65
2.10	Priority Queue	69
2.11	Applications of Queues	71
2.12	Linked List	74
2.13	Singly-Linked Lists	74
2.14	Circular Linked Lists	76

2.15	Doubly-Linked Lists	76
2.16	Merging Lists and Header Linked List	79
2.17	Insertion and Deletion Operations in Linked List	79
2.18	Insertion and Deletion in Circular Linked List	88
2.19	Insertion and Deletion in Doubly Linked Lists	91
2.20	Traversing Linked Lists	96
2.21	Representation of Linked List	97
2.22	Summary	98
2.23	Review Questions	100
2.24	Further Readings	100
Unit 3: N	Non-Linear Data Structure	101-170
3.0	Introduction	101
3.1	Learning Objectives	102
3.2	Binary Trees	102
3.3	Traversing Binary Trees	107
3.4	Binary Search Tree	108
3.5	Traversing a Binary Search Tree	110
3.6	Insertion and Deletion Operations	125
3.7	Hashing Techniques	130
3.8	Heaps	140
3.9	Priority Queue	146
3.10	Heap as Priority Queue	149
3.11	Graph	152
3.12	Minimum Spanning Trees	159
3.13	Prim's Algorithm	163
3.14	Sollin's Algorithm	166
3.15	Summary	168
3.16	Review Questions	169
3.17	Further Readings	170
Unit 4: S	Sorting and Searching Algorithm	171-209
4.0	Introduction	171
4.1	Learning Objectives	171
4.2	Definition	172
4.3	Bubble Sort	172
4.4	Insertion Sort	176

4.5	Radix Sort	179
4.6	Selection Sort	184
4.7	Quick Sort	187
4.8	Tree Sort	193
4.9	Searching	194
4.10	Summary	207
4.11	Review Questions	208
4.12	Further Readings	209