ADVANCED DATA STRUCTURES

Part A:3 marks each Part B: 6 marks each

MODULE 1

PART A

1. Define binary search tree
2. What is Disjoint Sets? Explain with an example.
3. Distinguish between linear data structure and non-linear data structure
4. Explain any two collision resolution methods in Hashing
5. Differentiate between Stack and Queue.
6. What is Set data structure? How is a Set implemented using Bit String?
7. How to represent a Set Data Structure?
8. What is meant by Hashing?

PART B

1. What is hashing? Explain the different hash functions.
2. Explain amortised analysis using accounting method.
3. How do you perform Amortized analysis using Aggregate method? Illustrate with the example of Incrementing Binary Counter
4. Explain Disjoint Set Data structure. What are the operations performed on Disjoint Set Data structure
5. How do you perform Amortised Analysis using Accounting method? Illustrate with Incrementing Binary Counter example.
6. What are the different collision resolution techniques in hashing? Explain any one of them.
7. How do you perform Amortised Analysis using Accounting method? Illustrate with Multipop Stack example.
8. Explain collision resolution techniques.

MODULE 2

PART A

1. What is Splay Tree? List the Rotations in Splay Tree
2. Explain the concept of suffix tree with suitable example.
3. Explain the characteristics of Balanced Binary Search Tree
4. What is a Splay Tree? What are the advantages of Splay trees?
5. State the properties of a Red Black tree.
6. What is meant by Splay Tree?
7. Illustrate the properties of Red-Black Tree with example.
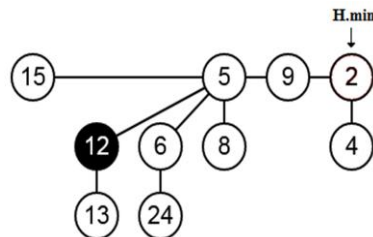8. What is meant by Suffix Tree?

PART B

1. Explain Red-Black tree insertion operations with examples.
2. What is B tree? Explain B tree operations.
3. Construct a red-black tree by inserting the keys in the following sequence into an initially empty red-black tree: 13, 10, 8, 3, 4 and 9. Show each step
4. Describe BTree. How can we insert a key into a BTree?
5. Explain different cases of inserting nodes into a Red-Black Tree with an illustration.
6. How a full node is splitted in B Tree Insertion procedure? Explain with a diagram.
7. Explain how deletion is done in a Red Black Tree.
8. Explain B-Tree insertion and Deletion operations with example.

MODULE 3

PART A

1. What is the difference between min heap and max heap?
2. What is mergeable heap?
3. A binomial heap has four binomial trees. Their degrees are 0,1,2 and 4. After you add an entry how many binomial trees will the heap have? What are the degrees of the trees?
4. Explain the characteristics of Fibonacci Heap
5. List out any three operations supported by a Mergeable Heap.
6. Find the Potential of the Fibonacci Heap given below.

7. Write note on Fibonacci Heap.
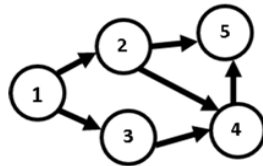8. Explain Find-Min () operation of Binomial heap with example.

PART B

1. Describe Binomial heap with example
2. Explain Fibonacci Heap operations with example.
3. a) Draw a binomial heap whose keys are 6,3,5,18,1,10,7,9,16,10,20
   b) Explain how union operation is performed in a Binomial heap
4. Describe the Extract Min Operation in Fibonacci Heap with the help of an example. What is the amortized cost of the operation?
5. Explain how the Decrease-Key operation is performed on Binomial Heaps. What is the Amortised Cost of this operation?
6. Describe how Extract-Min operation is performed in a Fibonacci Heap? Illustrate with an example.
7. Explain how the Union operation is performed on Binomial Heaps
8. Describe how the Delete-Key operation is performed in a Fibonacci heap? Illustrate with an example.
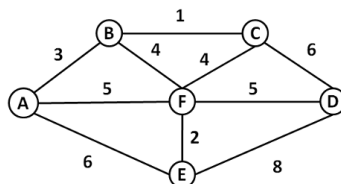
MODULE 4

PART A

1. Describe adjacency matrix representation of a graph.
2. What are strongly connected components in a graph? Explain with an example.
3. Compare and Contrast Breadth First Search and Depth First Search
4. What is topological sort in a graph?
5. What is meant by Bi-Connected Components? Illustrate with an example.
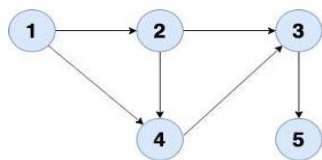6. Write any one of the Topological Ordering of the graph.

7. What is meant by Strongly Connected Components? Illustrate with an example
8. What do you mean by Minimum Costs Spanning Tree?

PART B

1. Explain the Prim's algorithm with an example.
2. Describe Dijikstra's single source shortest paths algorithm with an example
3. What is a Minimum Spanning tree? Explain Kruskal's algorithm to find Minimum Spanning tree with an example
4. Explain Strongly Connected Components. How can you find Strongly connected components of a graph?
5. Explain Depth First Search algorithm with a suitable example.

6. Apply Kruskal's algorithm to find a minimum spanning tree of the following graph.

7. What do you mean by Topological Sorting? Apply Topological Sorting to the given graph

8. Explain the Dijkstra's Shortest path algorithm with an example.

MODULE 5

PART A

1. What is blockchain data structure?
2. What is smart contract in Block chain?
3. What is smart contract?
4. Explain Transaction model in Block Chain Technology.
5. Explain block chaining with an example.
6. What is Merkle tree? Give example.
7. What is meant by Block Chaining?
8. What is Contract Data?

PART B

1. Explain about Blockchain architecture in detail. *
2. What are the advantages and disadvantages of Blockchain?
3. Describe Block Chain Architecture. *
4. Explain Data Structure and Data types in Block Chain Technology
5. Explain Blockchain Architecture in detail. *
6. Describe the data types in Blockchain.
7. Explain the Blockchain architecture in detail. *
8. Explain the problems to be solved in Blockchain Data Analysis.