SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

I SEMESTER

1912101–ADVANCED DATASTRUCTURES & ALGORITHM

Academic Year 2019 – 20 ODD

Prepared by

Dr.Karthikeyan.L,AP(sel.Gr)/CSE

SRM VALLIAMMAI ENGINEERING COLLEGE

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QUESTION BANK

SUBJECT : 1912101-ADVANCED DATASTRUCTURES & ALGORITHM

SEM/YEAR: I-M.E/I

UNIT I DESIGN OF EFFICIENT ALGORITHMS			
Data structures: lists, queues, and stacks - Set representations - Graphs-Trees - Recursion -Divide-and-conquer - Balancing -Dynamic programming -Sorting and Order Statistics - The sorting problem - Radix sorting -Sorting by comparisons – Heap sort-an O(n log n) comparison sort – Quicksort-an O(n log n) expected time sort.			
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	**Express** the term data structures.	BTL 2	Understand
2	**Identify** the types of data structures.	BTL 4	Analyze
3	**List** the advantages of data structures.	BTL 1	Remember
4	**Tabulate** the difference between stack and queue.	BTL 1	Remember
5	**Distinguish** graph and tree.	BTL 2	Understand
6	**Interpret** the various applications of stack.	BTL 2	Understand
7	**Differentiate** Recursion from normal function.	BTL 4	Analyze
8	**Give** the various sorting techniques.	BTL 2	Understand
9	**What** is meant by Recursion?	BTL 1	Remember
10	**Apply** any of the implementation strategy of stack.	BTL 3	Apply
11	**Compose** on the term set representation.	BTL 6	Create
12	**Measure** O (n log n) comparison strategy.	BTL 5	Evaluate
13	**Formulat**e the equation to calculate running time of a program.	BTL 6	Create
14	**State** the various set representations.	BTL 1	Remember

15	**Show** the narration of dynamic programing.	BTL 3	Apply
16	**Define** graph.	BTL 1	Remember
17	**Name** the different types sorting techniques.	BTL 1	Remember
18	**Compare** heap sort and merge sort.	BTL 4	Analyze
19	**Illustrate** on comparison sort.	BTL 3	Apply
20	**Evaluate** an algorithm to perform any of the traversal.	BTL 5	Evaluate
	PART B		
1	i).Summarize on different types of data structures (7) ii). **Explain** the various ADTs. (6)	BTL 5	Evaluate
2	**List** the various set representations in data structures. (13)	BTL 1	Remember
3	i).Define deterministic data structures. (4) ii).**Describe** ADT elaborate stack using it. (9)	BTL 1	Remember
4.	i). Identify the various operations in set representation. (6) ii). **Examine** the applications of stack. (7)	BTL 1	Remember
5	i).**Discuss** the Queue ADT. (7) ii). Explain the concept of Recursion (6)	BTL 2	Understand
6	Differentiate the various operations in stack and Queue	BTL 4	Analyze
7	Implement Tree traversal using an algorithm.	BTL 3	Apply
8	**Recall** the different types of trees along with example (13)	BTL 2	Understand
9	i).**Formulate** the Graph Traversal Techniques. (9) ii).Compose any application of graph. (4)	BTL 6	Create
10	Implement the Divide and Conquer strategy using an algorithm.	BTL 3	Apply
11	**Find** the various sorting techniques write an elaboration for Radix sort (13)	BTL 1	Remember
12	Compare and Contrast Heap sort and Quick sort	BTL 4	Analyze
13	**Analyze** theO(n log n) for any of the sorting techniques. (13)	BTL 4	Analyze
14	With suitable examples, **Summarize** on time sort on a quick sort. (13)	BTL 2	Understand

PART C			
1	**Evaluate** Heap sort with your own example.	BTL 5	Evaluate
2	**Integrate** the sorting problems and analyze radix sort.	BTL 6	Create
3	Analyze on the applications of stacks and queues.	BTL 6	Create
4	Explain the dynamic programing with a suitable implementation.	BTL5	Analyze

UNIT II DATA STRUCTURES FOR SET MANIPULATION PROBLEMS

Fundamental operations on sets - Hashing - Binary search - Binary search trees - Optimal binary search trees - A simple disjoint-set union algorithm. - Tree structures for the UNION-FIND problem - Balanced tree schemes - Dictionaries and priority queues - Merge able heaps – Concatenable queues. - Partitioning

PART-A

Q.No	Questions	BT Level	Competence
1	Apply the hashing technique to implement.	BTL 3	Apply
2	**Analyze** the fundamental operations of set.	BTL 4	Analyze
3	**Construct** the Binary Tree.	BTL 3	Apply
4	**List** the features of Binary search Tree.	BTL 1	Remember
5	**What** is optimal binary search?	BTL 1	Remember
6	Compare and Contrast Binary Tree and Binary search Tree.	BTL 2	Understand
7	**Illustrate** a simple disjoint-set union algorithm.	BTL 3	Apply
8	Perform traversal in Binary tree	BTL 4	Analyze
9	**Contrast** heaps and queues with examples.	BTL 2	Understand
10	**Develop** set union algorithm.	BTL 6	Create
11	**Name** the dictionaries.	BTL 1	Remember
12	**Formulate** the steps of merge able heaps.	BTL 6	Create
13	**Evaluate** priority Queues.	BTL 5	Evaluate
14	**Define** concatenable queues.	BTL 1	Remember
15	**Express** the term partitioning.	BTL 2	Understand

16	**State** UNION-FIND problem.	BTL 1	Remember
17	**Interpret** merge able heaps and concatenable queues.	BTL 2	Understand
18	Analyze on priority Queues.	BTL 4	Analyze
19	**Label** the algorithm for disjoint-set.	BTL 1	Remember
20	Create a binary search tree.	BTL 5	Evaluate
	PART-B		
1	i).**Discuss** fundamental operations of sets. (6) ii).Express an example for the operations on set. (7)	BTL 2	Understand
2	**Illustrate** Hashing technique? Give algorithm and example. (13)	BTL 3	Apply
3	**Describe** about basic concepts of Binary Tree (13)	BTL 1	Remember
4	**Develop** algorithm to implement Binary Search Tree (13)	BTL 6	Create
5	i) .**State** the optimal binary search tree. (6) ii).Develop an algorithm for the same. (7)	BTL 1	Remember
6	i).**Express** the features of Binary Search Tree. (8) ii).Differentiate Binary Tree and Binary Search Tree (7)	BTL 2	Understand
7	**Point out** the steps in disjoint-set union algorithm. (13)	BTL 4	Analyze
8	i).**Examine** tree structure for UNION -FIND problem (8) ii).Give an example for the same. (5)	BTL 1	Remember
9	**Tabulate** various balanced Tree schemes.	BTL 1	Remember
10	i).Design an algorithm for balanced tree schemes (7) ii).**Discuss** on priority queues. (6)	BTL 2	Understand
11	i).**Explain** the algorithm for priority queues. (6) ii).Explain about Merge able heaps (7)	BTL 5	Evaluate
12	**Analyze on the following**. i). Concatenable queues (6) ii).Partitioning. (7)	BTL 4	Analyze
13	**Arrange** the following G,P,K,L,A,B,M,O,Z,C using. i). Binary Tree. (6) ii).Binary Search Tree. (7)	BTL 4	Analyze

14	**Construct a tree structure for** UNION-FIND problem.	BTL 3	Apply
	PART C		
1	**Create**a tree that support the features of Binary search Tree (15)	BTL 6	Create
2.	**Evaluat**e the hashing techniques with example. (15)	BTL 5	Evaluate
3	**Summarize** on any of the sorting techniques. (15)	BTL 5	Evaluate
4	Design an example for implementing radix sort (15)	BTL 6	Create
	UNIT III-ALGORITHM DESIGN TECHNIQUES		
Divide-and-Conquer Algorithms - The Problem of Multiplying Long Integers-Balancing Sub problems-Dynamic Programming-The Triangulation Problem -Greedy Algorithms-Backtracking-Implementing Backtrack Search-Branch-and-Bound Search-Local Search Algorithms – Introduction to String Algorithms – Introduction to Randomized and approximation algorithms- Introduction to Parallel Algorithms			
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	**Express** the term dynamic programming	BTL 2	Understand
2	**Define backtracking**.	BTL 2	Understand
3	**Recall** the algorithm for divide and conquer.	BTL 1	Remember
4	**List** the problem of multiplying long integers.	BTL 1	Remember
5	Distinguish long integers and short integers.	BTL 2	Understand
6	**Distinguish dynamic programing from others**.	BTL 2	Understand
7	**Name** the techniques for balancing sub problems.	BTL 1	Remember
8	**Evaluate** triangulation problem.	BTL 5	Evaluate
9	**State** the triangulation problems.	BTL 1	Remember
10	**Design** the triangulation problem.	BTL 6	Create
11	**Classify** the Greedy algorithms.	BTL 4	Analyze
12	**Illustrate** Backtrack search.	BTL 3	Apply
13	**Assess** the methods to implement backtrack search.	BTL 5	Evaluate
14	**Tabulate** the parallel algorithms.	BTL 1	Remember

15	**Show** the advantages of branch and bound strategy.	BTL 3	Apply
16	**Point out** the local search algorithms	BTL 4	Analyze
17	**What** is randomized algorithm?	BTL 1	Remember
18	**Illustrate** the approximation algorithm.	BTL 3	Apply
19	**Classify** the types of local search algorithms.	BTL 4	Analyze
20	**Generalize** the string algorithms.	BTL6	Create
	PART-B		
1	**Discuss** the Divide and Conquer algorithms. (13)	BTL 2	Understand
2	**State** the problems of multiplying long integers. (13)	BTL 1	Remember
3	i).List the steps for Balancing of sub problems. (3) ii).**Describe** the divide and conquer algorithm. (10)	BTL 1	Remember
4	**Design** and develop the Triangulation problem with an algorithm. (13)	BTL 6	Create
5	i).**What** is Greedy Technique? (5) ii).Design and implement an algorithm for Greedy method. (8)	BTL 1	Remember
6	Summarize on Backtracking along with an example.	BTL 2	Understand
7	i).**Differentiate** backtrack search from the other searching methods. (7) ii).Select the example to narrate the backtrack search. (6)	BTL 4	Analyze
8	**Recommend** the techniques i).Dynamic programming (7) ii).Balancing the sub problems. (6)	BTL 5	Evaluate
9	**Examine** the Branch and Bound technologies with an example. (13)	BTL 3	Apply
10	i).**Analyze** the Local search algorithms. (7) ii).Demonstrate string algorithm along with an example. (6)	BTL 4	Analyze
11	**Express** the local search algorithm along with an example. (13)	BTL 2	Understand
12	i**).Explain** the String algorithm. (7) ii).Point out the advantages of parallel algorithm. (6)	BTL 4	Analyze
13	**Tabulate** the difference between local search algorithms	BTL	Remember

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14	Show the advantages of Randomized algorithm along with the apllications (13)	BTL 3	Apply
	PART C		
1	Create an example that supports divide and conquer algorithm.	BTL6	Create
2	Explain in detail about backtracking with your example. (15)	BTL 5	Evaluate
3	Evaluate greedy technique with a suitable example.	BTL5	Evaluate
4	**Plan** the algorithm for branch and bound strategy. (15)	BTL 6	Creating
	UNIT IV ALGORITHMS ON TREES		
Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion- Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion -B- Trees: Definition of B- trees – Basic operations on B-Trees – Deleting a key from a B-Tree- Fibonacci Heaps: structure – Mergeable-heap operations- Decreasing a key and deleting a node-Bounding the maximum degree.			
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	**Describe** Binary search Tree.	BTL 2	Understand
2	**Illustrate** on insertion and deletion of Red Black Tree.	BTL 3	Apply
3	**List** the properties of Red Black Tree.	BTL 1	Remember
4	**Analyze** the term rotation.	BTL 4	Analyze
5	**Quote** the importance of Red Black Tree.	BTL 1	Remember
6	Define B Tree	BTL 1	Remember
7	**Express** the insertion operation in B Tree	BTL 2	Understand
8	**State** deletion key in B Tree.	BTL 1	Remember
9	**Differentiate Binary search tree and B Tree**.	BTL 2	Understand
10	**Show** the operations of B Tree.	BTL 3	Apply
11	**Compare** Red Black tree and B Tree.	BTL 5	Evaluate
12	**Define** Fibonacci Heap.	BTL 1	Remember

13	**Integrate** the deletion operation of the B Tree.	BTL 6	Create
14	**Discriminate** Binary Search Tree and Red Black tree.	BTL 5	Evaluate
15	**Quote** rotation process in trees.	BTL 1	Remember
16	**Express** the deletion mechanism of binary search tree.	BTL 2	Understand
17	**Formulate** the operation of merge able heaps.	BTL 6	Create
18	**Categorize** the process of decreasing the key value and deleting a node.	BTL 4	Analyze
19	**Differentiate** Fibonacci heap and merge able heap.	BTL 4	Analyze
20	Classify on bounding on maximum degree.	BTL 3	Apply
	PART-B		
1	i**).Define** Binary Search Tree. (4) ii).List the features of binary search tree with an example. (9)	BTL 1	Remember
2	i).Give an example for insertion in B Tree. (4) ii).**Summarize** the features of B Tree. (9)	BTL 2	Understand
3	**Express** in detail about querying Binary search tree.. (13)	BTL 2	Understand
4	**Solve** the insertion and deletion logic in W,R,G,P,F,U,K,C,A,Z for B Tree (13)	BTL 3	Apply
5	**Demonstrate** the basic operations with an example. i) B tree. (6) ii) Binary search tree. (7)	BTL 1	Remember
6	i).**Point out** the basic operations of Binary search tree ii).Compare and contrast B Tree and Binary search tree (7) (8)	BTL 4	Analyze
7	**Evaluate** the features of Red Black Tree with an example. (13)	BTL 5	Evaluate
8	i).**Classify** the insertion process of Red Black tree (9) ii).Analyze on rotation of a node. (4)	BTL 4	Analyze
9	**Formulate** the basic operations of B Tree... (13)	BTL 6	Create
10	**Elaborate** in detail about the following i).Deletion operation of B Tree (8) ii).Give your example for the above (5)	BTL 1	Remember
11	**Explain** Fibonacci Heap by constructing its structure. (13)	BTL 4	Analyze

12	**List** and explain the various operations of merge able heap with an example. (13)	BTL 1	Remember
13	**Illustrate** the following in detail i).Fibonacci Heap structure (8) ii).Merge able Heap operations (7)	BTL 3	Apply
14	**Discuss** the following in detail i). Decreasing the key and deletion. (7) ii).Bonding on maximum degree. (6)	BTL 2	Understand
	PART C		
1	Explain in detail about the B Tree (15)	BTL 6	Create
2	Evaluate an example for heap sort (15)	BTL 5	Evaluate
3	Create a tree that satisfies the features of red black tree. (15)	BTL 6	Create
4	Analyze the importance of Fibonacci and merge able heaps. (15)	BTL 6	Create
	UNIT V-ALGORITHMS ON GRAPHS		
	Minimum-cost spanning trees- Depth-first search - Biconnectivity-Depth-first search of a directed graph - Strong connectivity- Path-finding problems -A transitive closure algorithm - A shortest- path algorithm - Path problems and matrix multiplication - Single-source problems - Dominators in a directed acyclic graph: putting the concepts together		
	PART-A		
Q.No	**Questions**	**BT Level**	**Competence**
1	**Distinguish** strong connectivity and weak connectivity.	BTL 2	Understand
2	**Define** the term minimum cost spanning tree	BTL 1	Remember
3	**Give** an example for minimum cost spanning tree	BTL 2	Understand
4	**Compare** depth first and breadth first.	BTL 4	Analyze
5	**What** is biconnectivity?	BTL 1	Remember
6	**Define directed graph**.	BTL 1	Remember
7	**State** strong connectivity.	BTL 1	Remember
8	**Evaluate** the path finding problems.	BTL 5	Evaluate
9	**Formulate** a transitive closure algorithm.	BTL 6	Create

10	**Analyze** the shortest path algorithm.	BTL 4	Analyze
11	**Integrate** the list of path problems.	BTL 6	Create
12	**State** an example for matrix multiplication	BTL 1	Remember
13	**Summarize** the path algorithm for matrix operation.	BTL 2	Understand
14	**Quote** the term single source problem.	BTL 1	Remember
15	**Point out** the path finding algorithms	BTL 4	Analyze
16	**Show** the difference in directed and undirected graph.	BTL 3	Apply
17	**Illustrate** the dominators in directed graph.	BTL 3	Apply
18	**Assess** the difference between cyclic and acyclic graph	BTL 5	Evaluate
19	**Differentiate** directed and undirected graph	BTL 2	Understand
20	**Demonstrate** the term biconnectivity.	BTL 3	Apply
	PART-B		
1	i).**List** the features of spanning tree (8) ii). Identify the characteristics of minimum cost spanning tree. (5)	BTL 1	Remember
2	**Elaborate** in detail the minimum cost spanning tree (13)	BTL 1	Remember
3	i).Give the briefing of biconnectivity. (7) ii).**Identify** the algorithm for depth first search. (9)	BTL 2	Understand
4	**Express** the steps for depth first search with an example,	BTL 2	Understand
5	i). **Analyze** the steps for depth first search ii).What do you understand by biconnectivity	BTL 4	Analyze
6	i).**Define** strong connectivity. (5) ii).Examine depth first search with an example (8)	BTL 1	Remember
7	i).Demonstrate path finding algorithms (7) ii).**Illustrate transitive closure algorithm** (6)	BTL 3	Apply
8	i).**Evaluate** the advantages of path finding algorithm. (7) ii).Summarize the concept of strong connectivity. (6)	BTL 5	Evaluate
9	**Design** a shortest path algorithm with an example (13)	BTL 6	Create
10	**Classify the term transitive closure algorithm.** (13)	BTL 4	Analyze

11	Point out the following in detail i).Path finding algorithm (7) ii).Shortest path algorithm. (6)	BTL 4	Analyze
12	**Describe** in detail about the depth first search with own example. (13)	BTL 1	Remember
13	**Discuss** on single source problem and path problems in matrix multiplication (13)	BTL 2	Understand
14	**Calculate** the performance of dominators in directed acyclic graph (13)	BTL 3	Apply
	PART C		
1	Create a minimum cost spanning tree.	BTL 6	Create
2	Design and **explain** path problems in matrix multiplication (15)	BTL 6	Evaluate
3	Evaluate breath first search.	BTL 5	Evaluate
4	**Summarize** on the term biconnectivity. (15)	BTL 5	Evaluate