Unit 1 Short Answers

Q.No.	Question
1	Define Big oh notation
2	Compute upper bound of running time of a linear function f(n) = 6n + 3
3	List the searching and sorting techniques under divide and conquer technique
4	List the time complexity for merge sort for all three cases.

Long Answers

Q.No.	Question
1	Explain in detail about time complexity.
2	Explain in detail about binary search and analyze its time complexity
3	Illustrate quick sort algorithm and discuss its time complexity
4	Explain in detail about asymptotic notations
5	Using Starassan matrix multiplication calculate the following matrices A= 2 3 B= 1 3 4 2 4 2

MCQ

I. Choose Correct Alternative:

1.	A measure of amount of memory needed to execute for an algorithm[CO1, K1]			[ ]
A. Time efficiency	B.Amorized	C. Space efficiency	D. None	
2.	Time complexity O(1) is called as _____ [CO1, K1]			[ ]
A. Linear complexity	B. log linear complexity	C. Constant Complexity	D. None	
3.	A notation which is used for analyzing average case of complexity. [CO1 K1]			[ ]
A. Theta	B. Big Oh	C. Big Omega	D. Both B and C	
4.	Notation which represent the upper bound of the function. [CO1, K2]			[ ]
A. Theta	B. Big Oh	C. Big Omega	D. None	
5.	Which of the following is not related to divide and conquer technique? [CO1, K2]			[ ]
A. Merge sort	B. Quick sort	C. Binary Search	D. Linear Search	
6.	Which of the following is irrelevant to binary search technique? [CO1, K2]			[ ]
A. Elements in sorted	B. Search sequentially	C. Search based on divide and conquer	D. None	
7.	In quick sort elements are sorted with help of an element called as? [CO1, K1]			[ ]
A. Random	B. Pivot	C. Sequential	D. None	
8.	Merge sort will follows which technique from the following for sorting [CO1, K1]			[ ]
A. Sequential	B. Divide and Conquer	C. Ordered	D. None	
9.	Strassan Matrix multiplication follows which technique for solving problem [CO1, K1]			[ ]
A. Comparison based	B. Inplace Comparison	C. Divide and Conquer	D. None	
10.	How many recursive calls that strassan matrix multiplication takes? [CO1, K1]			[ ]
A.Six	B. Seven	C. Eight	D. Five	

II. Fill in the Blanks:

1.	Time complexity of an algorithm with three nested loops in big oh notation is ------- [CO1, K1]
2.	A procedure for solving problem in finite number of steps is called as _____ [CO1, K2]
3.	Big Oh notation is represented by symbol_____ [CO1, K1]
4.	Time complexity of log linear is represented by _____ [CO1, K1]
5.	An explicit stack may overuse the space is drawback of _____ [CO1, K2]
6.	Time complexity of binary search is _____ [CO1, K1]
7.	Average case time complexity of quick sort is_____ [CO1, K1]
8.	Worst case time complexity of merge sort is _____ [CO1, K1]
9.	Strassan matrix multiplication reduced the time complexity from ____ to _____ [CO1, K1]
10.	In strassan matrix multiplication the formula for C11 is _____ [CO1, K1]

Unit 2
Short Answers

Q.No.	Question
1	Infer pseudocode for find operation.
2	List the applications of backtracking.
3	Prove that 2 queen and 3queens problem are not giving solution
4	Define chromatic number in graph coloring with some example

Long Answers

Q.No.	Question
1	Explain about disjoint set operations with example
2	Apply backtracking technique for queens problem technique on 8*8 board and find solution.
3	Construct state space tree and solve the following problem using sum of subset where set S={10, 12, 13, 15, 18} and M=30
4	Analyze the solution to the m=3 coloring of a graph using backtracking.
5	Explain in detail about working procedure of backtracking with example.

MCQ

I. Choose Correct Alternative:

1.	A set S1 = {1,3,4,5} from the following which is said to be subset? [CO2, K1]			[ ]
A. {1,6}	B. {1,3,5}	C. {1,3,6}	D. None	
2.	Disjoint set is also called as? [CO2, K1]			[ ]
A. Union find	B. Merge find	C. Union Merge	D. Both A and B	
3.	In array representation the value -1 indicates? [CO2, K1]			[ ]
A. Vertex is child	B. Vertex is parent of another	C. Vertex is parent of itself	D. None	
4.	Technique used in backtracking for solve the problem. [CO2, K1]			[ ]
A. Brute Force Search	B. Comparison based	C. Sequential	D. Random	
5.	A node that provides feasible solution in backtracking [CO2, K1]			[ ]
A. Live node	B. E node	C. Success node	D. None	
6.	Which of the following is not an application of backtracking? [CO2, K1]			[ ]
A. Graph Coloring	B. Queens Problem	C. Sum of Subset	D. None	
7.	In 4 queens problem if the first queen is placed in first row and first column the queen2 will be placed in? [CO2, K1]			[ ]
A. Second row first column	B. Second row second column	C. Second row third column	D. None	
8.	Graph coloring is also called as _____ [CO2, K1]			[ ]
A. Vertex Coloring	B. Edge Coloring	C. Weight Coloring	D. None	
9.	Which of the following are the applications for graph coloring? [CO2, K1]			[ ]
A. Map Coloring	B. Sudoku	C. Scheduling the tasks	D. All the above	
10.	Chromatic number for a graph with one vertices is ? [CO2, K1]			[ ]
A. 0	B. 1	C. 2	D. 3	

II. Fill in the Blanks:

1.	_____ is called a collection of elements [CO2, K1]
2.	The set S1={1,2,4} and S2 ={5,3,6}, intersection of this two sets form _____ set [CO2, K1]
3.	In find operation pseudocode if (parent(node)==node) returns _____ [CO2, K1]
4.	In backtracking the node which further generated is called as _____ node [CO2, K1]
5.	A rule that restricts each element to be chosen from the set is _____ constraint in backtracking. [CO2, K1]
6.	Whether the three queens problem will give solution _____(Yes/No) [CO2, K1]
7.	In 4 queens problem if Q1 is in first row second column , Q2 is in second row fourth column then Q3 will be in _____ [CO2, K1]
8.	The technique that assigning colors to the vertices of graph is called as _____ [CO2, K1]
9.	In graph coloring whether the adjacent nodes have same color _____- (Yes/No) [CO2, K1]
10.	Time complexity of graph coloring is _____ [CO2, K1]

Unit 3:
Short answers:

Q.No.	Question
1	Compare bottom up and top down approach in dynamic programming.
2	Construct the optimal binary tree for elements {10, 20, 30}
3	Compare 0/1 and fractional knapsack problem (any two points)
4	Define reliability design? Why we are copying the devices.

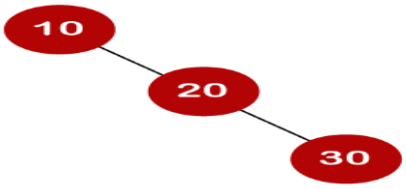
Long Answers:

Q.No.	Question
1	Apply dynamic programming technique for optimal binary search tree where the keys are {10,20,30,40} and its frequency is{4,2,6,3} respectively.
2	Explain about knapsack problem types.
3	Illustrate the algorithm for floyd warshall.
4	Construct a state space tree for travelling salesman problem using dynamic programming technique with its relevant formula.
5	Calculate the floor value for each and every device whose cost and reliability is mentioned below where the cost of overall system is 105$.

Device	Cost	Reliablity
D1	30	0.9
D2	15	0.8
D3	20	0.5

MCQ

I. Choose Correct Alternative:

1.	Dynamic Programming follows which technique to solve the problem? [CO3, K1]			[ ]
A. Divide and Conquer	B. Liner order	C. Sequential	D. None	
2.	Top down approach in dynamic programming follows which technique?[CO3, K1]			[ ]
A. Tabulation	B. Memorization	C. Union Merge	D. None	
3.	The average number of comparisons for below optimal binary tree is  [CO3, K1]			[ ]
A. 2	B. 3	C. 5/3	D. None	
4.	Knapsack problem is an example of _____ [CO3, K1]			[ ]
A. Greedy method	B. Dynamic Programaming	C. Divide and Conquer	D. Random	
5.	Method used to solve knapsack problem is? [CO3, K1]			[ ]
A. Dynamic programming	B. Recursion	C. Brute force	D. All the above	
6.	Floyd Warshall's Algorithm can be applied on _____ [CO3, K1]			[ ]
A. Undirected Graph	B. Directed Graph	C. Acyclic graph	D. None	
7.	What approach is being followed in Floyd Warshall Algorithm? [CO3, K1]			[ ]
A. Dynamic Programming	B. Greedy method	C. Linear Programming	D. Backtracking	
8.	The reliability of the entire system is called _____ [CO3, K1]			[ ]
A. Partial reliability	B. Closed reliability	C. System reliability	D. None	
9.	In series configuration of five components, the entire system will fail if _____ [CO3, K1]			[ ]

A. One component fail	B. Two component fail	C. All component fail	D. None
10.	In travelling salesman problem the number of times the vertices visited is? [CO3, K1]		[ ]
A. 0	B. 1	C. 2	D. 3

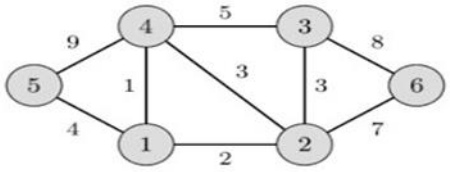
II. Fill in the Blanks:

1.	Tabulation method is also called as _____ [CO3, K1]
2.	Bottom up approach in dynamic programming follows _____ technique [CO3, K1]
3.	Binary Search tree is also called as _____ binary tree. [CO3, K1]
4.	Formula for calculating number of trees in optimal binary tree is _____ [CO3, K1]
5.	General formula for calculating the minimum cost in optimal binary search tree is__[CO3, K1]
6.	In binary search tree all the elements in left sub tree is always _____ than root node [CO3, K1]
7.	0/1 knapsack problem is solved using greedy method _____(True/False) [CO3, K1]
8.	Floyd Warshall's Algorithm is used for solving _____ [CO3, K1]
9.	Time complexity of dynamic programming with memoization technique is _____ [CO3, K1]
10.	Which algorithm is used to solve 0/1 knapsack problem optimally is _____ [CO3, K1]

Unit 4:
Short Answers

Q.No.	Question
1	Outline the algorithm for greedy method
2	Compare 0/1 and fractional knapsack
3	Infer the time complexity of prims algorithm
4	Illustrate the conditions of dijkstra algorithm

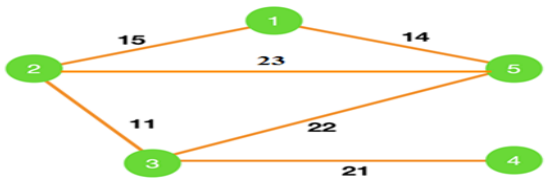
Long answers:

<table>
<tr><th>Q.No.</th><th>Question</th></tr>
<tr><td>1</td><td>Identify the optimal schedule that gives maximum profit and also identify whether all the jobs completed in optimal schedule.
<table>
<tr><td>Jobs</td><td>J1</td><td>J2</td><td>J3</td><td>J4</td><td>J5</td><td>J6</td></tr>
<tr><td>Deadline</td><td>5</td><td>3</td><td>3</td><td>2</td><td>4</td><td>2</td></tr>
<tr><td>Profit</td><td>200</td><td>180</td><td>190</td><td>300</td><td>120</td><td>100</td></tr>
</table></td></tr>
<tr><td>2</td><td>Construct minimum spanning tree using kruskal algorithm
 
</td></tr>
<tr><td>3</td><td>Explain the merits and demerits of greedy method</td></tr>
</table>

4	Distinguish between kruskal and prims algorithm for finding minimum spanning tree.
5	Implement Dijkstra algorithm.

MCQ

I. Choose Correct Alternative:

1.	Kruskal algorithm is a_____ [CO4, K1]			[ ]
A. Divide and conquer	B. Dynamic programming	C. Greedy method	D. None	
2.	Which of the following is true? [CO4, K1]			[ ]
A. Prim's algorithm initialises with a vertex	B. Prim's algorithm initialises with an edge	C. Prim's algorithm initialises with a vertex which have smallest edge	D. None	
3.	What is the time complexity of Kruskal algorithm? [CO4, K1]			[ ]
A. O(log V)	B. O(E log V)	C. O(V log E)	D. None	
4.	Which of the following algorithm is best suited for sparse graph? [CO4, K1]			[ ]
A. Kruskal	B. Prims	C. Dijkstra	D. None	
5.	Prims algorithm is also called as _____ [CO4, K1]			[ ]
A. Dijkstra Scholten	B. Flyod warshall	C. DJP algorithm	D. None	
6.	Which of the following edge form MST using prim algorithm starting vertex is 4  [CO4, K1]			[ ]
A.(4-3)(5-3)(2-3)(1-2)	B. (4-3)(3-5)(5-1)(1-2)	C. (4-3)(3-5)(5-2)(1-5)	D. (4-3)(3-2)(2-1)(1-5)	
7.	How many priority queue operations are involved in Dijkstra's Algorithm? [CO4, K1]			[ ]

A.3		B. 2	C. 1	D. None
8.	How many times the insert and extract min operations are invoked per vertex in Dijkstra algorithm? [CO4, K1]			[ ]
A.1		B. 2	C. 3	D. 0
9.	Dijkstra's Algorithm cannot be applied on _____ [CO4, K1]			[ ]
A. Directed and weighted graphs		B. Graphs having negative weight function	C. Unweighted Graph	D. None
10.	Dijkstra's Algorithm is the prime example for _____ [CO4, K1]			[ ]
A.Greedy method		B. Dynamic programming	C. Branch and Bound	D. None

II. Fill in the Blanks:

1.	Kruskal algorithm also run on disconnected graphs_____(True/False) [CO4, K1]
2.	Kruskal's algorithm is best suited for the dense graphs than the prim's algorithm __(True/False) [CO4, K1]
3.	Prims algorithm reassembles _____ algorithm [CO4, K1]
4.	Prims algorithm is implemented using _____ heap [CO4, K1]
5.	Space complexity of dijkstra algorithm is _____ [CO4, K1]
6.	_____ algorithm is simpler than prims algorithm[CO4, K1]
7.	Dijkstra's Algorithm is used to solve _____ problems [CO4, K1]
8.	What is the time complexity of Dijikstra's algorithm _____ [CO4, K1]

9.	What is the space complexity of Dijikstra's algorithm _____ [CO4, K1]
10.	The maximum number of times the decrease key operation performed in Dijkstra's algorithm will be equal to _____ [CO4, K1]

Unit 5:
Short answer

Q.No.	Question
1	Define Branch and Bound technique
2	List the possible paths in a graph having vertices{A,B,C,D} where A is the starting place
3	Define NP complete and what its condition?
4	When a problem is said to be NP-hard?

Long questions:

Q.No.	Question
1	Illustrate algorithm for LC Search
2	Explain in detail about FIFO Branch and Bound technique
3	Illustrate algorithm for knapsack using Branch and Bound technique
4	Prove travelling salesman problem is NP Complete
5	Make use of cooks theorem discuss three types of SATs.

MCQ

I. Choose Correct Alternative:

1.	Branch and Bound is _____ [CO5, K1]			[ ]
A.Problem Solving technique	B. Data Structure	C. Sorting technique	D. Type of tree	
2.	Which data structure is used for implementing a FIFO branch and bound strategy? [CO5, K1]			[ ]
A. Stack	B. Queue	C. Linked List	D. Array	
3.	Branch and Bound technique support which searching algorithm? [CO5, K1]			[ ]
A. Depth first search	B. Breadth first search	C. Brute force search	D. None	
4.	How many conditions have to be met if an NP- complete problem is polynomially reducible? [CO5, K1]			[ ]
A.1	B. 2	C. 4	D. 3	
5.	To which of the following class does a CNF-satisfiability problem belong? [CO5, K1]			[ ]
A. NP class	B. NP hard	C. NP Complete	D. P Class	
6.	How many stages of procedure does a non-deterministic algorithm consist of__ [CO5, K1]			[ ]
A. 1	B. 2	C. 3	D. 4	
7.	Cooks theorem proved that SAT problem is? [CO5, K1]			[ ]
A. NP hard	B. NP Complete	C. NP	D. P class	
8.	A variable that have two values true or false is called as?[CO5, K1]			[ ]
A.Boolean	B. Literal	C. Clause	D. None	
9.	An expression with conjunctive normal form an three literals is called as? [CO5, K1]			[ ]
A. 3 SAT	B. 3 CNF	C. Both a and b	D. None	
10.	SAT is also called as? [CO5, K1]			[ ]
A. Formula SAT	B. CNF	C. SAT- CNF	D. None	

II. Fill in the Blanks:

1.	Branch and Bound technique is similar to _____ as it uses state space tree. [CO5, K1]
2.	Branch and Bound technique is used for solving _____ and _____ problem [CO5, K1]
3.	Problems that can be solved in polynomial time are known as_____ [CO5, K1]
4.	The worst-case efficiency of solving a problem in polynomial time is_____ [CO5, K1]
5.	Full form of NP is _____ [CO5, K1]
6.	Full form of SAT is _____ [CO5, K1]
7.	In cooks theorem the circuit SAT and _____ are hard as SAT [CO5, K1]
8.	A sequence of variables that are separated by logical OR is called as_____ [CO5, K1]
9.	Cooks theorem proved SAT is _____ [CO5, K1]
10.	In Circuit SAT if we have n input for a circuit the possible output is _____ [CO5, K1]