Subject Code: R23xxxx

R23

KALLAM HARANADHAREDDY INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

II B. Tech I Semester (R23)

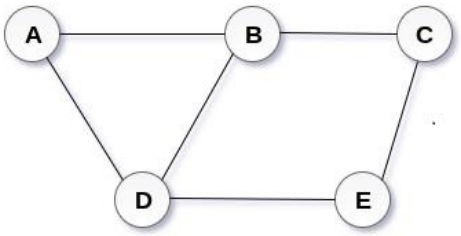
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

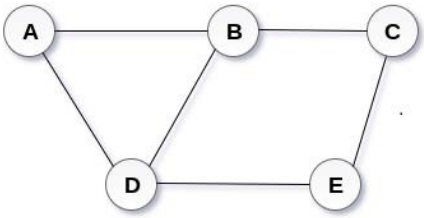
(Common to CSE, CSE-AIML, DS, AIDS)

QUESTION BANK

Course Advisor/Moderator: Ch Samsonu

Q. No.			CO	BTL	Total Marks
UNIT-I Short Answer Questions					
1		Define an Algorithm and its properties	CO1	1	2M
2		Define Big-Oh Notation	CO1	1	2M
3		Find the time complexity for recursive factorial function	CO1	1	2M
4		Explain Big-Oh notation order of growths	CO1	1	2M
5		Explain AVL tree LL rotation	CO1	2	2M
6		Write time complexities of AVL tree operation	CO1	2	2M
7		Write AVL tree application	CO1	1	2M
8		Define B-Tree.	CO1	1	2M
9		Write B-Tree application.	CO1	1	2M
10		Explain advantages of AVL tree.	CO1	1	2M
UNIT-I Long Answer Questions					
1	i	Explain how to calculate time complexity of an algorithm with an example.	CO1	2	5M
	ii	Explain AVL tree rotations	CO1	2	5M
2.	i	Explain asymptotic notations used for specifying time complexities	CO1	3	5M
	ii	Construct order m=5, B-tree with the values 10, 50, 30, 90, 70, 100, 5, 20, 160, 200, 55, 25, 35	CO1	3	5M
3	i	Construct AVL tree with the values 10, 50, 30, 80, 90, 70, 100, 5, 20,	CO1	3	5M
	ii	Explain AVL tree delete operations	CO1	2	5M
4	i	Explain different cases to insert a new element in AVL tree	CO1	2	5M
	ii	Explain how to traverse B-tree with an example.	CO1	2	5M
5	i	Construct order m=3,B-tree with the values 50,40,90,20,10, 60,90,100,20	CO1	3	5M
	ii	Explain B-Tree Delete operation with an example.	CO1	2	5M

Q. No.			CO	BTL	Total Marks
UNIT-II Short Answer Questions					
1		Define Max Heap tree	CO2	1	2M
2		What is the time complexity of Quick sort for Best, average and worst cases?	CO2	1	2M
3		Explain how heap tree is represented as an array	CO2	2	2M
4		List out Heap tree applications	CO2	1	2M
5		Explain weighted graph	CO2	1	2M
6		Define Graph and types of Graphs.	CO2	1	2M
7		Define adjacency vertices	CO2	1	2M
8		Explain Biconnected graph	CO2	1	2M
9		Write Control Abstraction of Divide – and – Conquer.	CO2	2	2M
10		Define Convex Hull with an example.	CO2	2	2M
UNIT-II Long Answer Questions					
1	i	Explain Heap tree insert operation	CO2	2	5M
	ii	Construct Max heap tree with the values 20,60,90,100,30, 80,70	CO2	3	5M
2.	i	Explain Heap tree delete Min operation with an example	CO2	2	5M
	ii	Find the DFT for the graph 	CO2	2	5M
3	i	Explain graph representations	CO2	2	5M
	ii	Find the BFS for the graph	CO2	2	5M

					
4	i	Explain the merge sort for the given set : 35,25,15,10,45,75,85,65,55,5,20,18.	CO2	3	5M
	ii	Explain the General method of Divide and conquer technique.	CO2	2	5M
5	i	Describe Stressen's matrix multiplication concept with an example and also find its time complexity.	CO2	2	5M
	ii	Define sorting?find the time complexity of best and avg case of quicksort for the following elements, let n=10, the elements are 26,5,37,3,61,11,59,15,48,19	CO2	3	5M

Q. No.			CO	BTL	Total Marks
UNIT-III Short Answer Questions					
1	Write Control Abstraction of Greedy method.		CO3	1	2M
2	State the Job – Sequencing Deadline Problem.		CO3	2	2M
3	Define Spanning tree		CO3	1	2M
4	What is knapsack problem?		CO3	1	2M
5	Write any two differences between dynamic programming and divide and conquer.		CO3	1	2M
6	Draw all possible Optimal Binary Search Trees for the identifier set (do, if, stop).		CO3	2	2M
7	Define Principles of optimality		CO3	1	2M
8	Distinguish between Dynamic Programming and Greedy method.		CO3	1	2M

9		Define i)Feasible solution ii) Optimal solution.	CO3	1	2M
10		What is travelling sales person problem?	CO3	1	2M
UNIT-III Long Answer Questions					
1	i	Find an optimal solution to the Knapsack Problem for the instance n=3 the Capacity of Knapsack, M=20. The profits and weights of the objects are (P1,P2,P3)= (25,24,15) , (W1, W2, W3)=(18,15,10).	CO3	3	5M
	ii	What is a Spanning tree? Explain Prim's algorithm with suitable example	CO3	2	5M
2.	i	Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) =(20,15,10,5,1) and deadlines (d1,d2,d3,d4,d5) =(2,2,1,3,3).	CO3	3	5M
	ii	Discuss the single – source shortest paths algorithm with suitable example and also find the time complexity.	CO3	2	5M
3		Draw an Optimal Binary Search Tree for n=4 identifiers (a1, a2, a3, a4) = (do, if, read, while) P(1:4)=(3, 3, 1, 1) and Q(0:4)=(2, 3, 1, 1,1).	CO3	3	10M
4	i	Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic Programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3) = (1,2,5), weights are (w1,w2,w3)=(2,3,4).	CO3	3	7M
	ii	Distinguish between Dynamic Programming and Greedy method.	CO3	2	3M
5	i	What is a principle of optimality? Solve the travelling sales person problem uses the dynamic programming technique for the given adjacency matrix. A B C D A 0 12 5 7 B 11 0 13 6 C 4 9 0 18 D 10 3 2 0	CO3	3	7M
	ii	What is All – Pair Shortest Path problem (APSP)? algorithms with suitable example.	CO3	2	3M

Q. No.			CO	BTL	Total Marks
UNIT-IV Short Answer Questions					
1	What is backtracking?		CO4	1	2M
2	Write the Control Abstraction of iterative Backtracking method.		CO4	2	2M
3	Define Chromatic number & Give the state space tree for m-colouring problem.		CO4	2	2M
4	List applications of Backtracking		CO4	1	2M
5	Write short notes on Hamiltonian cycle with example.		CO4	2	2M
6	What is explicit and implicit constraint?		CO4	1	2M
7	Define: i) State Space tree ii) E – Node		CO4	1	2M
8	Construct State space tree for 4-Queen problem		CO4	2	2M
9	Define i) Dead Node. ii) Problem state		CO4	1	2M
10	Difference between backtrack and brute force techniques.		CO4	1	2M
UNIT-IV Long Answer Questions					
1	i	What is a Backtracking and give the 4 – Queens's solution. Draw the portion of the state Space tree for n = 4 queens using backtracking algorithm.	CO4	3	5M
	ii	Write short notes on General method of backtrack technique	CO4	1	5M
2.		Give the statement of sum of subsets problem. Find all sum of subsets for n=4, (w1, w2, w3, w4) = (10, 5, 25, 10) and M=25. Draw the portion of the state space tree using fixed – tuple sized approach.	CO4	3	10M
3	i	Explain the Graph Coloring problem. and draw the state space tree for m= 3 colors, n=4 vertices graph. Discuss the time and space complexity.	CO4	2	7M
	ii	Distinguish between fixed – tuple sized and variable tuple sized state space tree organization.	CO4	2	3M
4	i	Write the Control Abstraction of iterative Backtracking method	CO4	1	3M
	ii	Construct State Space tree for 8-Queen Problems	CO4	3	7M
5		What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using Backtracking algorithm.	CO4		10M

Q. No.			CO	BTL	Total Marks
UNIT-V Short Answer Questions					
1	Write about branch and bound technique.		CO5	1	2M
2	Discuss in brief about principle of FIFO branch and bound.		CO5	1	2M
3	List the Properties of LC-Search.		CO5	1	2M
4	Compare backtracking and branch & bound.		CO5	2	2M
5	Distinguish between fixed – tuple sized and variable tuple sized state space tree organization.		CO5	2	2M
6	Give the statement of 0/1 Knapsack FIFO BB.		CO5	1	2M
7	Define: i) LC – Search ii) FIFO – BB.		CO5	1	2M
8	Define Branch and Bound techniques		CO5	1	2M
9	List out the applications of BB Techniques		CO5	1	2M
10	Draw the Venn Diagram for NP Hard and NP Complete problem		CO5	2	2M
UNIT-V Long Answer Questions					
1		Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for n=4. m=15, (p1,p2,p3,p4)=(10,10,12,18) , (w1,w2,w3,w4) =(2, 4, 6,9). Draw the portion of the state space tree and find optimal solution.	CO5	3	10M
2.		Explain the General Methods of FIFO, LIFO and LC Search Branch-and-Bound Technique	CO5	2	10M
3		Explain Travelling sales person problem LCBB procedure with the following instance and draw the portion of the state space tree and find an optimal tour. ∞ 20 30 10 11 15 ∞ 16 4 2 3 5 ∞ 2 4 19 6 18 ∞ 3 16 4 7 16 ∞	CO5	3	10M
4		Write short notes on i) Classes of NP-hard ii) Classes of NP-complete iii)Distinguish between deterministic and non-deterministic algorithms	CO5	2	10M

5	i	Discuss the Cook’s theorem with an Example	CO5	2	5M
	ii	Explain the satisfiability problem?	CO5	2	5M

Course Advisor BoS Chairman

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