

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Subject Code: ITDLC5054
 Performance Analysis

Subject Name: Advanced Data Structures and Algorithmic
 Date: 12/12/2022

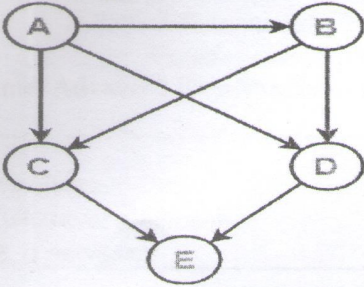
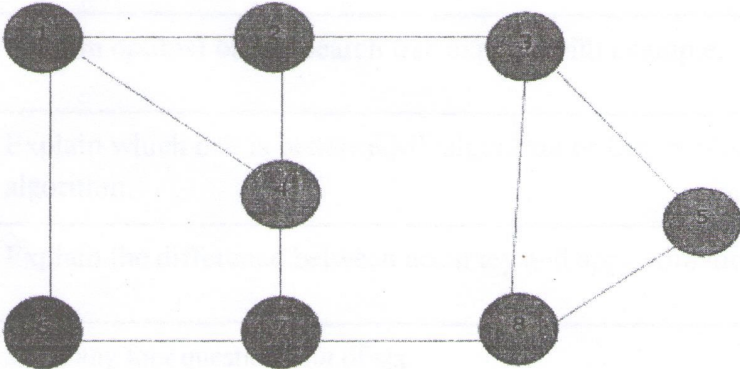
Nov - Dec 2022 B.Tech Program: Information Technology Examination: TY Semester: V Course Code: ITDLC5054 and Course Name: Advanced Data Structures and Algorithmic Performance Analysis Duration: 2.5 Hours Max. Marks: 60				
Instructions: (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary.				
		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Explain Theta Notation (Θ -notation) with graph.	2	CO1	U
ii)	Explain B+ Tree with Example.	2	CO2	U
iii)	Explain the three parts of divide and conquer approach.	2	CO3	U
iv)	Explain the time complexity of optimal merge pattern.	2	CO3	U
v)	Explain the difference between single pair shortest path and all pair shortest path problem.	2	CO4	U
vi)	Explain optimal binary search tree explain with example.	2	CO4	U
vii)	Explain which one is better: KMP algorithm or Boyer-Moore algorithm.	2	CO5	U
viii)	Explain the difference between accuracy and approximation?	2	CO6	U
Q.2	Solve any four questions out of six.	16		
i)	Solve the equation by Substitution Method to identify the running time. $T(n) = T\left(\frac{n}{2}\right) + n$	4	CO1	A

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ii)	Sketch a RED BLACK Tree by inserting following sequence number 8, 18, 5, 15, 17, 25, 40, 80	4	CO2	A
iii)	Solve to find max and min from the sequence 33, 11, 44, 55, 66, 22 using divide and conquer approach.	4	CO3	A
iv)	Demonstrate Matrix Chain Multiplication algorithm with the help of suitable example.	4	CO4	A
v)	For string matching, working module $q = 11$, demonstrate how many spurious hits does the Rabin-Karp matcher encounters in Text $T = 31415926535.....$	4	CO5	A
vi)	Demonstrate the difference between NP hard and NP complete problem.	4	CO6	A
Q.3	Solve any two questions out of three.	16		
i)	Solve following recurrence relation using Master's theorem to identify the asymptotic bound on T- $T(n) = 3T(n/2) + n^2$	8	CO1	U
ii)	Demonstrate and find the optimal solution for the 0/1 knapsack problem making use of dynamic programming approach. Consider- $n = 4$ $w = 5$ kg $(w_1, w_2, w_3, w_4) = (2, 3, 4, 5)$ $(b_1, b_2, b_3, b_4) = (3, 4, 5, 6)$	8	CO4	A
iii)	Solve to find the longest common subsequence for strings $X = BACDB$ and $Y = BDCB$.	8	CO5	A
Q.4	Solve any two questions out of three.	16		

i)	Solve to find the number of different topological orderings possible for the given graph: 	8	CO2	A																					
ii)	Given the jobs, their deadlines and associated profits as shown <table border="1" data-bbox="288 727 1072 935"> <thead> <tr> <th>Jobs</th> <th>J4</th> <th>J1</th> <th>J3</th> <th>J2</th> <th>J5</th> <th>J6</th> </tr> </thead> <tbody> <tr> <td>Deadlines</td> <td>2</td> <td>5</td> <td>3</td> <td>3</td> <td>4</td> <td>2</td> </tr> <tr> <td>Profits</td> <td>300</td> <td>200</td> <td>190</td> <td>180</td> <td>120</td> <td>100</td> </tr> </tbody> </table> Solve the following questions- Write the optimal schedule that gives maximum profit. Are all the jobs completed in the optimal schedule? What is the maximum earned profit?	Jobs	J4	J1	J3	J2	J5	J6	Deadlines	2	5	3	3	4	2	Profits	300	200	190	180	120	100	8	CO3	A
Jobs	J4	J1	J3	J2	J5	J6																			
Deadlines	2	5	3	3	4	2																			
Profits	300	200	190	180	120	100																			
iii)	Solve to find vertex cover of this graph, the set of edges of the given graph is - $\{(1,6),(1,2),(1,4),(2,3),(2,4),(6,7),(4,7),(7,8),(3,8),(3,5),(8,5)\}$ 	8	CO6	A																					
