K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)
End Semester Exam
Nov 2021 – Dec 2021
B.Tech Program: Information Technology
Examination: TY Semester: V
Course Code: 1UITDLC5054 and Course Name: Advanced Data Structures and Algorithmic
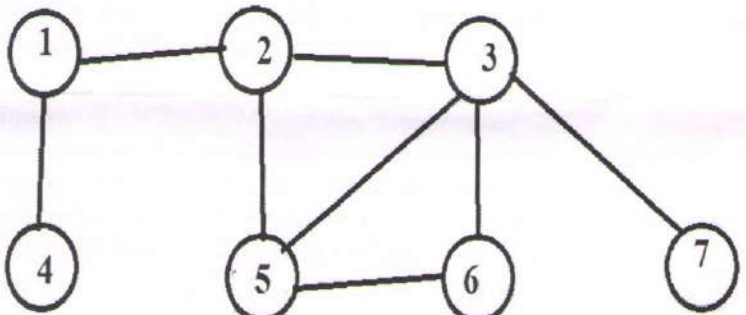Performance Analysis

Duration: 03 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 Method to analyse and measure the time complexity of an algorithm.	2	CO1	U
ii)	Explain concept of Red-Black Tree with example.	2	CO2	U
iii)	How to achieve O (n log n) time complexity in the worst case for quick sort.	2	CO3	U
iv)	Explain Optimal Merge Pattern with Example.	2	CO3	U
v)	Define the knapsack problem. How to solve using dynamic programming.	2	CO4	U
vi)	What do you mean by valid hit and spurious hit in the Rabin Karp algorithm for string matching?	2	CO5	U
vii)	How does the Boyer Moore algorithm work?	2	CO5	U
viii)	Describe NP Complete problem with example.		CO6	U
Q.2	Solve any four questions out of six.	16		
i)	Solve the following recurrence relation using Master Method $T(n) = 4T(n/3) + n^2$	4	CO1	Analyze
ii)	Differentiate Topological Sorting vs Depth First Traversal (DFS).	4	CO2	Analyze
iii)	Sort the sequence using Merge sort algorithm: 33, 22, 44, 08, 99, 88, 11	4	CO3	Apply

iv)	How will you construct an optimal binary search tree? What are the advantages of Optimal binary search tree?	4	CO4	Apply
v)	Explain Naïve String Matching Algorithm. Give Example.	4	CO5	U
vi)	How does genetic algorithm work? Explain phases are considered in a genetic algorithm	4	CO6	Apply
Q.3	Solve any two questions out of three.	16		
i)	Solve the Following using Recurrence Tree $T(n) = T(n/2) + T(n/4) + T(n/8) + n$	8	CO1	Analyze
ii)	Find the path of travelling salesperson problem of given Matrix.	8	CO4	Analyze
iii)	Find longest common subsequence of following strings X = ababcde Y = bacadb	8	CO5	Analyze
Q.4	Solve any two questions out of three.	16		
i)	Create Red-Black Tree -- 41,38,31,12,19,8	8	CO2	Analyze
ii)	Given Data N=4 p1, p2, p3, p4 = (100, 10, 15, 27) d1, d2, d3, d4 = 2, 1, 2, 1 Find feasible solutions using job sequencing with deadlines.	8	CO3	Analyze
iii)	Find a vertex-cover of maximum size in a given undirected graph	8	CO6	Analyze

For Q.3 ii) the matrix:

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0