+Internal Assessment Question Paper – 1

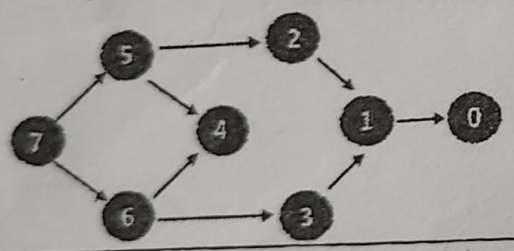
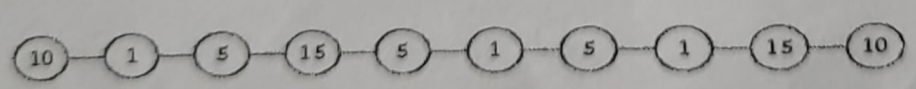
M.S. Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)
Department of CSE

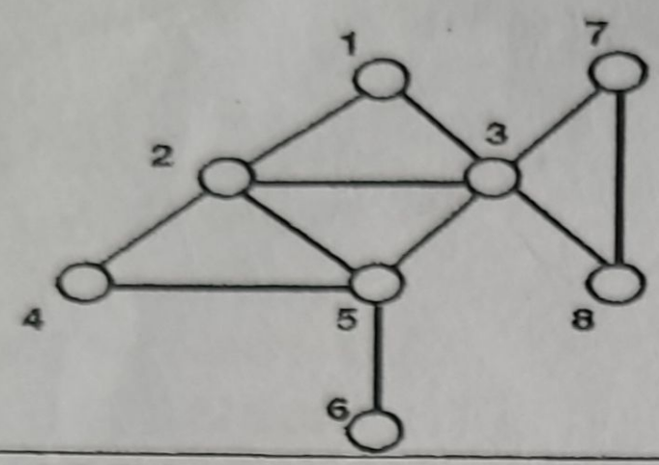
Programme: B.E
Course: Design & Analysis of Algorithms
Sem: IV
Max Marks: 30
Date:31-05-2024

CIE: I
Time: 1Hr

Term: April-July 2024
Course Code: CS43
Section: A,B,C
Portions for Test: L1-L17.
Time:10-11

Instructions to Candidates: Mobiles, smart watches or any electronic gadgets are strictly banned.
1st question is compulsory. Answer any **one** from Question 2 or Question 3.

Sl#		Question	Marks	Bloom's Level	CO Mapping
1	a)	Identify the stable matching set between the students and colleges given the following. (Assume college approaches students for admission) with Algorithm. Students preference list S1 C1 C2 C3 S2 C2 C3 C1 S3 C3 C1 C2 College preference list C1 S2 S3 S1 C2 S1 S2 S3 C3 S1 S2 S3	5	L3	CO1
	b)	Find the Topological ordering for the following given graph using Source Removal method and DFS method. 	5	L3	CO2
	c)	Discuss the greedy algorithm for Interval Scheduling. Explain the running time of the algorithm.	5	L2	CO3
2	a)	In the given graph, consider two players P1 and P2 where they select nodes alternately with P1 moving first. Each node has a value bi, represented inside the node. At all times, the set of all selected nodes must form an independent set in G. If the target bound B=20 is to be achieved by P2 is it possible? 	3	L2	CO1
	b)	Describe the merge sort Algorithm.Analyze the running time of Merge-Sort using the Unrolling method .	6	L3	CO2
	c)	i. What are different types of asymptotic notations Explain its significant. ii. Justify the transitivity property of asymptotic growth rate.Suppose that f and g are two functions such that for some other function h, we have $f = O(h)$ and $g = O(h)$. Then Prove $f + g = O(h)$.	6	L2	CO1
3	a)	What is a general plan for analyzing the recursive algorithm? Mathematically analyze the time complexity for the Tower of Hanoi problem?	6	L2	CO1

)	Write the DFS algorithm and show the working of DFS over the given graph using source vertex 1. Illustrate the same using its Data Structure.  	6	L3
	Prove that ,If G has a topological ordering, then G is a DAG.	3	L2

Outcomes meant to be assessed by the IA Test-I:

)1: Define the basic concepts and analyze worst-case running times of algorithms using asymptotic analysis.

)2: Illustrate the design techniques for graph traversal and divide and conquer algorithms with analyze their mplexity.

)3: Illustrate the design techniques for Greedy algorithms and analyze their complexity.