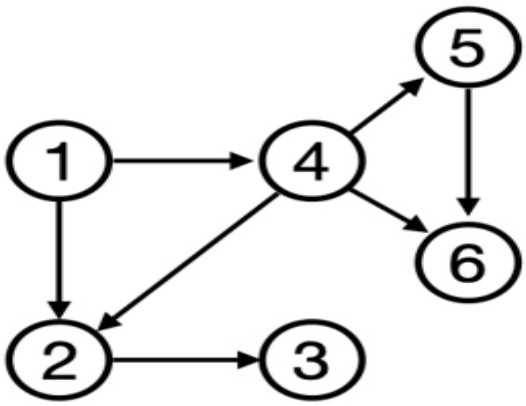
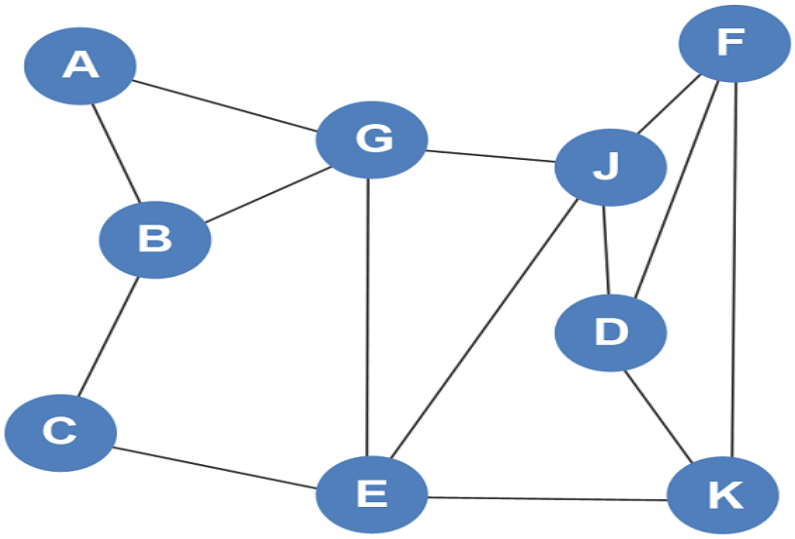
Internal Assessment Question Paper – 1

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

Programme: B.E **Term:** Jan-May 2021 **CIE:** I
Course: Design and Analysis of Algorithms **Course Code:** CS42 **Date:** 9/06/2021
Credits: 3:1:0 **Sem:** IV **Section:** A, B & C
Max Marks: 30 **Time:** 1Hr **Portions for Test:** Units 1 & 2

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

Sl#	Question	Marks	Bloom's Level	CO
1	a. What is the difference between perfect matching and stable matching? Consider an execution of the G-S algorithm that returns a set of pairs S for the given set of men M and women W. Prove that "The set S is a stable matching".	**6**	Understand	CO1
	b. Construct a proof for "If f is a polynomial of degree d, in which the coefficient a_d is positive. Then f = $O(n^d)$".	**4**	Understand	CO1
	c. Apply the divide and conquer algorithm to the following numbers, and count the number of inversions in it. {21, 16, 22, 15, 24, 32, 12, 14, 27, 11}	**5**	Apply	CO2
2	a. Design an algorithm to find stable matching for a given "n" men & "n" women set. State the real world example for stable matching algorithm.	**6**	Understand	CO1
	b. Compute the topological ordering for the following graph using source removal method. 	**4**	Apply	CO2

	c. Construct the DFS Traversal tree for the following graph with "A" as the source vertex. 	**5**	Apply	CO2
	OR			
3	a. Prove the following. i. $T(n) = 4n^2+3n+2$ is $O(n^3)$ ii. $T(n) = 4n^2+3n+2$ is $\Omega(n)$	**4**	Apply	CO1
	b. Design an algorithm to determine whether a given graph is bipartite or not.	**5**	Understand	CO2
	c. Design an algorithm for sorting numbers using divide and conquer method. Discuss the best, average and worst-case efficiency of the algorithm.	**6**	Understand	CO2

Course Outcomes meant to be assessed by the IA Test:

CO1: Define the basic concepts and analyze worst-case running times of algorithms using asymptotic analysis. (PO1, PO2, PO3, PSO2, PSO3)

CO2: Recognize the design techniques for graph traversal using representative algorithms. (PO1, PO2, PO3, PSO2, PSO3)