Code No. : 22967

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
M.Tech. (C.S.E.) II-Semester Main Examinations, August-2023
Advanced Algorithms

Time: **3 hours**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Max. Marks: **60**

Part-A (10× 2 = 20 Marks)
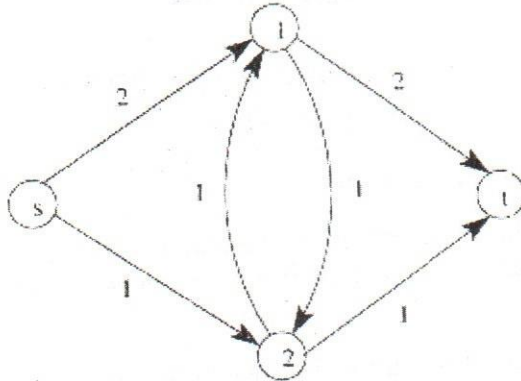
Q. No.	Stem of the question	M	L	CO	PO
1.	An input to quick sort algorithm consists of elements in increasing order. What is the time complexity of the algorithm for this set in O-notation?	2	2	1	1,2
2.	Give the order of vertices in which they are visited when the following graph is traversed using DFS algorithm considering A as a source vertex.	2	3	1	1,2
3.	Consider the graph G shown below. Identify the independent sets from the following sets. {1,2}, {1,2,3}, {1,3}, {2,3}, {2,3,4}, {2,4}	2	3	2	1,2,3
4.	Identify an augmenting path in the following graph with respect to the graph matching M = {(E,F), (C,D)}. Enhance the cardinality of the graph matching M by using the augmenting path.	2	3	2	1,2,3

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5.	What is the time complexity of Strassen's Matrix Multiplication algorithm?	2	1	3	1,2
6.	What is the maximum flow in the following flow network?	2	2	3	1,2,3
7.	Which algorithm design strategy is used to solve all pairs shortest paths problem?	2	1	4	1,2
8.	Represent the following polynomial using sparse representation. $$A = x^{250} + 8x^{23}$$	2	2	4	1,2
9.	Draw a Venn diagram giving the relationship between the P, NP, NP hard and NP complete classes of problems.	2	1	5	1,2,3
10.	Give the list of types of randomized algorithms.	2	1	5	1,2

Part-B (5×8 = 40 Marks)

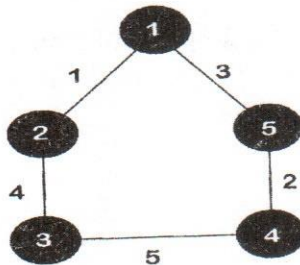| #					
11. a)	Write and explain a quick sort algorithm.	4	2	1	1,2
b)	Sort the following set of numbers using quick sort algorithm. Show the order of elements after each step of the algorithm. 320, 15, 212, 130, 5, 100, 338, 40, 455, 600	4	3	1	1,2,3
12. a)	Design an Algorithm to find Maximum weight maximal independent set.	4	3	2	1,2,3
b)	Construct a Minimum Spanning Tree for the following graph using Kruskal algorithm.	4	3	2	1,2,3
13. a)	Obtain LUP decomposition for the following 4x4 matrix A. A={{2,3,1,5}, {6,13,5,19},{2,19,10,23},{4,10,11,31}}	4	3	3	1,2,3
b)	Explain Ford-Fulkerson method to compute maximum flow in a given graph.	4	2	3	1,2

			M	L	CO	PO
14.	a)	What is Optimal Binary Search Tree? Draw all possible binary search trees for the identifier set {do, if, while}.	4	2	4	1,2
	b)	Given the following data, construct an Optimal Binary Search Tree. N=4, P=(3,3,2,1), Q=(2,1,3,1,2).	4	3	4	1,2,3
15.	a)	What is randomized algorithm? Explain Las Vegas and Monte-Carlo classes of algorithms.	4	2	5	1,2,3
	b)	Write and explain a randomized search algorithm	4	3	5	1,2,
16.	a)	Give the list of various sorting algorithms and their time complexities	4	1	1	1,2
	b)	Explain Greedy algorithm design strategy.	4	1	2	1,2
17.		Answer any *two* of the following:				
	a)	Explain Edmond Karp maximum flow algorithm.	4	2	3	1,2
	b)	Obtain a unique 2-tuple for each number in the range 0 to p-1 where p = p1 x p2 (p1=3 and p2=4).	4	3	4	1,2,3
	c)	Explain approximation algorithms.	4	2	5	1,2

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level -- 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	42.5%

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