PVP 20

Code: 20CS3403, 20IT3403

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2023

DESIGN AND ANALYSIS OF ALGORITHMS
(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.
BL – Blooms Level CO – Course Outcome

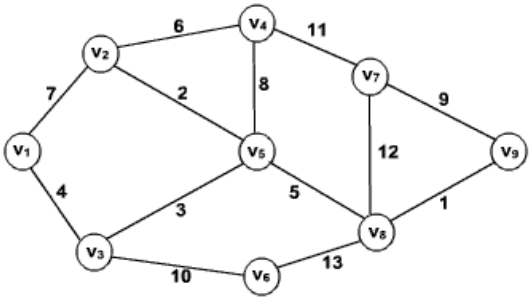
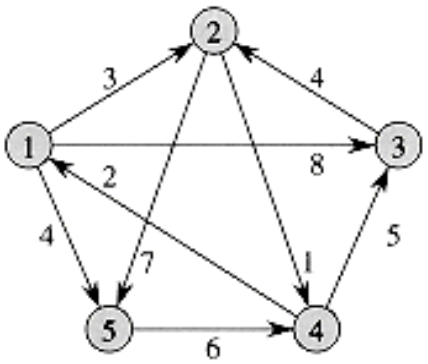
			BL	CO	Max. Marks
		UNIT-I			
1	a)	Define time complexity? Describe different notations used to represent these complexities. Illustrate with suitable examples.	L2	CO1	7 M

	b)	Determine the space complexity of the below Algorithm
		Algorithm (A, B, m, n)
		{
		For I: = 1 to m do
		{
		For j: = 1 to n do
		{
		C [I,j] = A [I, j] + B [I,j]
		}
		}
		}
			L3	CO1	7 M

		OR			
2	a)	Write an algorithm to check the given number is Armstrong or not.	L2	CO1	7 M

	b)	Apply the step Count method to find the time Complexity of the following algorithm.
		
		$for(i = n; i >= 1; i-- = k)$
		{
		$print"Hello";$
		}
		Note: here k is some constant
			L3	CO1	7 M

UNIT-II					
3	a)	Construct tree of calls for the given array using merge sort {'S', 'I' ,'D', 'D', 'H', 'A', 'R', 'T', 'H', 'A' } Derive the time complexity of merge sort.	L3	CO3	7 M
	b)	Find the minimum and maximum values for the list of elements 23,45,-32,78,54,12,39,86,77,21 using divide and conquer method.	L3	CO3	7 M
OR					
4	a)	Consider the array of elements and search the element 55 using binary search 25,35,45,55,65,66,67,75,76,77,78,86,87. Derive the time complexity of binary search.	L3	CO3	7 M
	b)	Using strassen's matrix find the multiplication matrix for the below matrices $A=\begin{bmatrix}3 & 6\\ 2 & 6\end{bmatrix}$ $B=\begin{bmatrix}4 & 3\\ 2 & 8\end{bmatrix}$ Derive the time complexity by solving it's recurrence relation.	L4	CO3	7 M
UNIT-III					
5	a)	Write an algorithm for prim's method and find the minimum cost spanning tree for the following graph	L4	CO2	7 M

					
	b)	Write an algorithm to perform single source shortest path with an example.	L2	CO2	7 M
		OR			
6	a)	Write an algorithm for krushkal method with an example graph.	L2	CO2	7 M
	b)	Construct optimal schedule for the following jobs n=8, (p1,p2,p3,p4,p5,p6,p7,p8)=(40,100,50,30,4,7,12,11) and (d1,d2,d3,d4,d5,d6,d7,d8)=(1,4,2,3,3,2,2,1)	L4	CO2	7 M
		UNIT-IV			
7	a)	Compare and contrast divide and conquer, greedy and dynamic programming problem solving strategies. Define Principle of Optimality.	L4	CO4	7 M
	b)	Using 0/1 knapsack approach, find the optimal solution for given problem n=5,m=26,profits(P1,P2,P3,P4,P5)=(23,24,15,13,16) and weights (W1,W2,W3,W4,W5)= (11,12,8,7,9).	L3	CO4	7 M
		OR			
8	a)	Find all pairs shortest paths for the following graph and write the algorithm. 	L3	CO4	7 M

	b)	Explain the Travelling Sales person problems with an example and analyze its recurrence relation.	L4	CO4	7 M
		UNIT-V			
9	a)	Explain briefly about N-Queens Problem. Construct state space tree for placing 4-Queen's.	L3	CO2	7 M
	b)	Consider the following matrix and find optimal tour by using travelling sales person problem by using branch and bound ∞ 11 10 9 6 8 ∞ 7 3 4 8 4 ∞ 4 8 11 10 5 ∞ 5 6 9 5 5 ∞	L4	CO4	7 M
		OR			
10	a)	If the portion of solution space for an 8-queens problem is given as (7, 1, 4, 6), then identify the remaining portion of solution space. Use back tracking to solve the problem.	L4	CO4	7 M
	b)	Consider the sum of subset problem n=4, sum=13, and w_1=3, w_2=4, w_3=5 and w_4=6. Solve the problem using backtracking.	L3	CO2	7 M