SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING /
SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Academic Year: 2021-22

Programme: B. Tech / MBA Tech (Computer) Year: II Semester: IV

Subject: Design and Analysis of Algorithms

Date: 18 April 2022

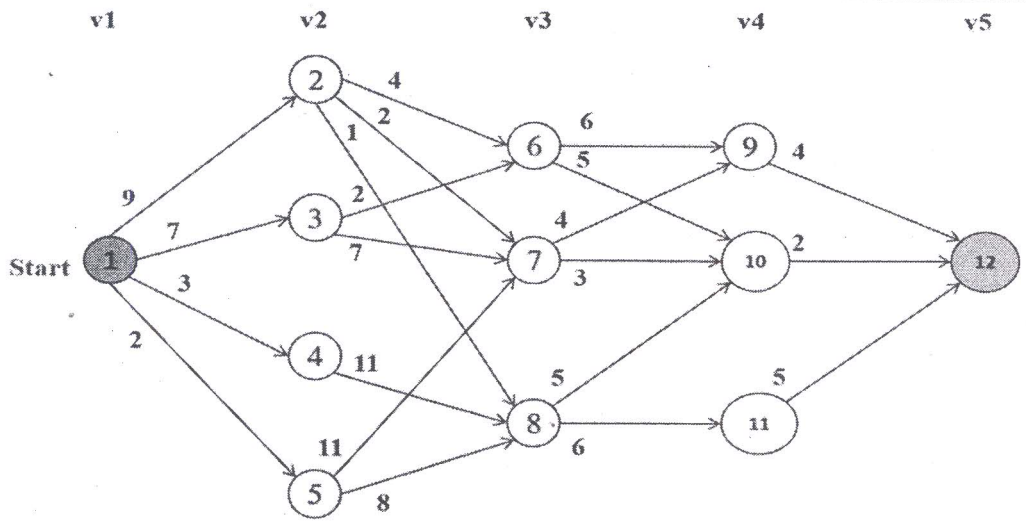
Marks: 100
Time: 10.00 am to 1.00 pm
Durations: 3 (hrs)
No. of Pages: 3

Final Examination

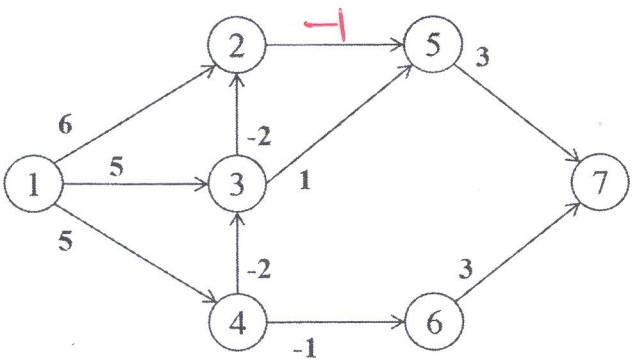
Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. _1___ is compulsory.
2) Out of remaining questions, attempt any __4___ questions.
3) **In all ___5_ questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume Suitable data if necessary.**

Q1			
CO-1; SO-1; BL-1	a.	What is Algorithm? Define any four characteristics that must be satisfied by an Algorithm.	[05]
CO-2; SO-1; BL-2	b.	Explain the general method for Divide and Conquer approach. State the control abstraction for divide and conquer strategy.	[05]
CO-3; SO-6; BL-2	c.	Explain the algorithm for the fractional knapsack problem.	[05]
CO-4; SO-1; BL-1	d.	Draw portion of the solution tree to the 4-Queens problem generated during backtracking.	[05]
Q2 CO-1; SO-1; BL-2	a.	Discuss best case, worst case and average case in terms of asymptotic notations for computing time complexity of a function with suitable example.	[10]
Q2 CO-4; SO-6; BL-3	b.	Solve the following multistage graph problem to find minimum cost path from node 1 to node 12, using dynamic programming approach.	[10]

Q3
CO-1; SO-1; BL-5
	a.	Evaluate the time complexity of below algorithm.
		Algorithm RSum(a,n) // Here a is an array of size n.
		{
		if(n<=0)
		{
		printf(" ABCD");
		return 0;
		} else
		{
		printf("PQRS");
		return a[n]+Rsum(n-1);
		}
		}
			[10]

Q3 CO-3; SO-6; BL-3	b.	Construct Huffman Code for given characters and their frequencies given as-f:5, e:9, c:12, b:13, d:16, a:45.	[10]
Q4 CO-2; SO-1; BL-1	a.	Write an algorithm to sort an array using Merge sort along with the Merge function which combines the sub-arrays into the final sorted array. Provide a recurrence relation for merge sort and derive the time complexity using substitution method.	[10]
Q4 CO-4; SO-1; BL-2	b.	Apply bellman-ford algorithm on the following graph. The source vertex is 1. 	[10]

Q5 CO-3; SO-1; BL-6	a.	Interpret the algorithm for Job Sequencing with deadlines by taking suitable example.	[10]
Q5 CO-4; SO-6; BL-3	b.	Consider an instance of Sum of Subset problem where, w = {5, 7, 10, 12, 15, 18, 20} and m = 35. Find all possible subsets of 'w' that sum to 'm' using backtracking algorithm. Draw the state space tree that is generated.	[10]
Q6 CO1-; SO-1; BL-1	a.	Explain Master's Theorem to solve recurrences. Solve following recurrence relation using Master's Theorem. $T(n) = \sqrt{2}\,T\left(\frac{n}{2}\right) + \log n$	[10]
Q6 CO-4; SO-1; BL-2	b.	What is longest common subsequence (LCS) problem? Find the LCS for the strings "spanking" and "amputation" using dynamic programming.	[10]
