University of Mumbai

Examinations Summer 2022

Time: 2 hour 30 minutes Max. Marks: 80

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Q1. (20 Marks)	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	_____ is the class of decision problems that can be solved by non-deterministic polynomial algorithms.
Option A:	NP
Option B:	P
Option C:	Hard
Option D:	Complete
2.	Following data structure is used to implement LIFO Branch and Bound Strategy
Option A:	Priority Queue
Option B:	array
Option C:	stack
Option D:	Linked list
3.	For the given elements 6 4 11 17 2 24 14 using quick sort, what is the sequence after first phase, assuming the pivot as the first element?
Option A:	2 4 6 17 11 24 14
Option B:	2 4 6 11 17 14 24
Option C:	4 2 6 17 11 24 14
Option D:	2 4 6 11 17 24 14
4.	Which of the following is correct for branch and bound technique? i. It is BFS generation of problem states ii. It is DFS generation of problem states iii. It is D-search.
Option A:	Only i
Option B:	Only ii
Option C:	Only ii and iii
Option D:	Only i, and iii
5.	Consider the given graph.

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	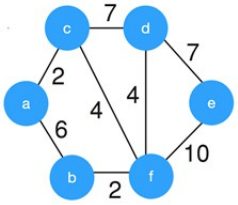 What is the weight of the minimum spanning tree using the Kruskal's algorithm?
Option A:	24
Option B:	23
Option C:	15
Option D:	19
6.	Bellman Ford algorithm is used to find out single source shortest path for negative edge weights. Bellman Ford algorithm uses which of the following strategy?
Option A:	Greedy method
Option B:	Dynamic Programming
Option C:	Backtracking
Option D:	Divide and Conquer
7.	The optimal solution for 4-queen problem is
Option A:	(2,3,1,4)
Option B:	(1,3,2,4)
Option C:	(3,1,2,4)
Option D:	(2,4,1,3)

8.	Consider the following code snippet:
	Bounding function(k,i) {
	for(j=1 to k-1)
	{ if ((x[j]==i) or (Abs(x[j]-i) ==abs(j-k))) return false;
	} return true }
	The above code represents the bounding function for which of the following algorithm?

Option A:	Subset sum problem using backtracking
Option B:	n-queens using backtracking
Option C:	Graph coloring using backtracking
Option D:	Subset sum using branch and bound
9.	What do you mean by chromatic number?
Option A:	The minimum number of colors needed to color all the vertices optimally in a Graph

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	Coloring problem
Option B:	The maximum number of colors needed to color all the vertices optimally in a Graph Coloring problem
Option C:	The number of colors using which the edges of graph have been colored in a Graph Coloring Problem
Option D:	The individual colors with which we color the vertices of a Graph in a Graph Coloring Problem
10.	Which string matching algorithm uses a Prefix Table?
Option A:	Naïve String Matching Algorithm
Option B:	Boyer Moore String Matching Algorithm
Option C:	Knuth Morris Pratt Algorithm
Option D:	Rabin Karp Algorithm

Q2. **(20 Marks)**	**Solve any Four out of Six** **05 marks each**
A	Write and Explain binary search algorithm.
B	Write a short note on job sequencing with deadline
C	Determine the LCS of the following sequences: X: {A, B, C, B, D, A, B} Y: {B, D, C, A, B, A}
D	Solve the sum of subsets problem for the following: n=4, m=15, w={3,5,6,7}
E	Give the algorithm for the N-Queen's problem and give any two solutions to the 8-Queen's problem
F	Explain and apply Naïve string matching on following strings String1: COMPANION String2: PANI

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Write algorithm for greedy knapsack and Obtain the solution to following knapsack problem where n=7,m=15 (p1,p2.....p7) = (10,5,15,7,6,18,3), (w1,w2,.....,w7) = (2,3, 5,7,1,4,1).
B	Explain Dijkstra's Single source shortest path algorithm. Explain how it is different from Bellman Ford algorithm. Explain 15-puzzle problem using LC search technique.
C	Rewrite and Compare Rabin Karp and Knuth Morris Pratt Algorithms Give the pseudo code for the KMP String Matching Algorithm.

Q4. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Write algorithm for quick sort and sort the following elements [40,11,4,72,17,2,49]
B	Write multistage graph algorithm and solve following example.

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	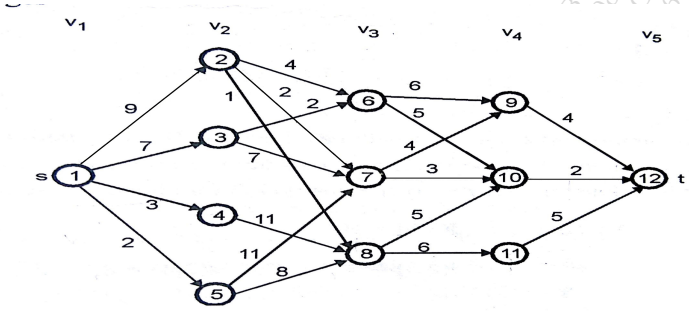
C	Write algorithm for 0/1 knapsack problem using dynamic programming .Also solve the following example. N=4, M=21 (p1,p2,p3,p4)=(2,5,8,1),(w1,w2,w3,w4)=(10,15,6,9)

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