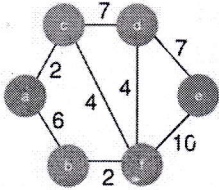


University of Mumbai
Examinations Summer 2022

Time: 2 hour 30 minutes

Max. Marks: 80

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.

	 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: <pre> Bouding 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 } </pre> 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

	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 $n=7, m=15$ ($p_1, p_2, \dots, p_7$) = (10,5,15,7,6,18,3), ($w_1, w_2, \dots, w_7$) = (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.

C	Write algorithm for 0/1 knapsack problem using dynamic programming .Also solve the following example. $N=4, M=21$ $(p_1, p_2, p_3, p_4)=(2, 5, 8, 1), (w_1, w_2, w_3, w_4)=(16, 15, 6, 9)$