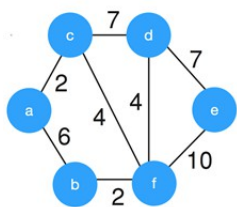


**University of Mumbai**  
**Examinations Summer 2022**

Time: 2 hour 30 minutes

Max. Marks: 80

<b>Q1.</b> <b>(20 Marks)</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
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:  
 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

<b>Q2.</b> <b>(20 Marks)</b>	<b>Solve any Four out of Six</b> <span style="float: right;"><b>05 marks each</b></span>
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

<b>Q3.</b> <b>(20 Marks)</b>	<b>Solve any Two Questions out of Three</b> <span style="float: right;"><b>10 marks each</b></span>
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.

<b>Q4.</b> <b>(20 Marks)</b>	<b>Solve any Two Questions out of Three</b> <span style="float: right;"><b>10 marks each</b></span>
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	<p>Write algorithm for 0/1 knapsack problem using dynamic programming .Also solve the following example.  <math>N=4, M=21</math> <math>(p_1, p_2, p_3, p_4)=(2, 5, 8, 1), (w_1, w_2, w_3, w_4)=(10, 15, 6, 9)</math></p>