

316124



DOON UNIVERSITY, DEHRADUN

Final Examination, 2024

Academic Year 2023-24 (Even Semester)

School of Technology

Department Name: Computer Science

Programme Name: B.Sc. (Hons)

Semester: 4

Course Name: Design and Analysis of Algorithms(724113)

Code:CSC-253

Time Allowed 2.00 Hours

Maximum Marks: 30

Note: Attempt all questions.

SECTION: A

Q1. Very Short answer question (Any four)

(4X2=8)

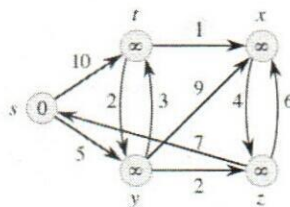
- a) What are lower bound arguments? Name the methods used for Lower bound analysis.
- b) What is Branch and Bound Technique? Write any two differences between Backtracking and Branch and Bound.
- c) Define Intractability. Draw the vein diagram showing relationship between P, NP, NP complete and NP hard problems.
- d) Define Decision tree. How it can be used to find Lower bound Arguments?
- e) Define MST problem. Name any two solutions to this problem.

SECTION: B

Q2. Short Answer question. (Any four)

(4X3=12)

- a) What is Cook's theorem? According to this theorem, how an NP Complete problem can be reduced to SAT problem?
- b) What is Backtracking? Draw the complete tree to solve a 4-queen problem.
- c) Solve the 0/1 knapsack problem using Dynamic Programming.
 $P = \{20, 15, 30, 5, 25\}$, $W = \{1, 2, 2, 1, 3\}$, $m = 6$
- d) How Dynamic programming can be used to solve Matrix chain multiplication problem? Write all the three steps including recursive solution (only mathematical expression).
- e) Find Single source shortest path for the following graph. (source=s)



SECTION: C

Q2. Long answer question. (Any two)

(5X2=10)

- a) Write an algorithm to solve fractional knapsack problem using Greedy method. Calculate the optimal profit for the following problem:-

M=50

i	1	2	3	4	5
W _i	5	10	15	10	20
P _i	25	30	60	100	40

- b) What are Optimal Binary Search trees? How they can be used for making Huffman codes?
Generate the codes for the following data.

Letter	frequency(%)
A	60
B	15
C	10
D	14.5
E	0.5

- c) What is the optimal solution for the following multistage Graph:-

