

UNIT-3

GREEDY AND DYNAMIC PROGRAMMING APPROACH

PORTIONS FOR CT-2 (4 MARKS: Q.no : 1-11 && 12 Marks: : Q.no : 1 - 5)

4 MARKS

1. Differentiate between greedy method and dynamic programming.
2. Differentiate between divide and conquer and dynamic programming
3. State fractional knapsack problem
4. Write a short note on Huffman code
5. How many bits may be required for encoding the message 'sims'?

Character	Frequency
m	1
i	1
s	2

6. What is called the prefix property of Huffman code? Give an example.
7. What is a minimum spanning tree? What are its applications?
8. Write a short note on Tree Traversals
9. State Principle of optimality
10. Write a short note on dynamic programming.
11. Write recurrence relation for 0/1 knapsack problem.
12. What is longest common subsequence problem? Give an Example.

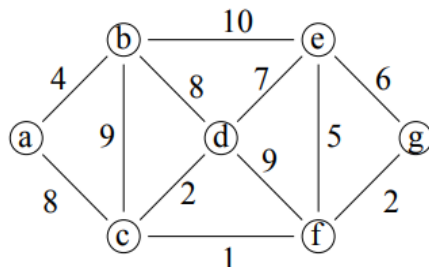
12 Marks

1. What are the different Greedy Criterion? Explain. Consider the five items along with their respective weight and values:

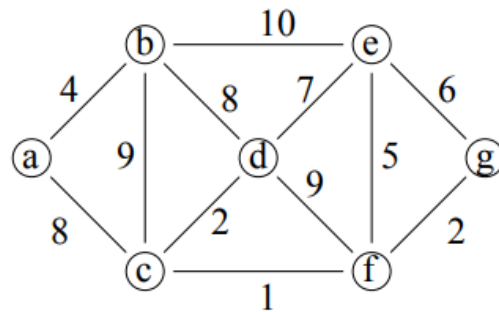
$$I=\{I_1, I_2, I_3, I_4, I_5\}, \quad W=\{5, 10, 20, 30, 40\}, \quad V=\{30, 20, 100, 90, 160\}$$

The knapsack has capacity $w=60$. Find the solution of the problem using Greedy approach. Also write the algorithm for the same and find its time complexity.

2. Define spanning tree? Discuss the design steps in Prim's algorithm and construct the Minimum spanning tree for the following Graph 'G'.



3. Define spanning tree? Discuss the design steps in Kruskal algorithm and construct the Minimum spanning tree for the following Graph 'G'.



4. Write the procedure to find the Huffman code. Also find the Huffman codes for the following symbols along with their frequencies given.

Symbol	a	b	c	d	*
Frequency	0.35	0.1	0.2	0.2	0.15

5. Solve the following instances of 0/1 Knapsack problem using dynamic programming with maximum knapsack capacity as 5 and $I = \{I_1, I_2, I_3, I_4\}$

Weight = {2,1,3,2} and their Values = {12,10,20,15}.

6. Find the optimal binary search tree for the key and probabilities given below.

Key	A	B	C	D
Probabilities	0.1	0.2	0.4	0.3

7. Given two sequences $X = \langle x_1, x_2, \dots, x_m \rangle$ and $Y = \langle y_1, y_2, \dots, y_n \rangle$. Find the longest common subsequence (LCS) of X and Y using dynamic programming. Also write a subroutine to print the longest common subsequence (LCS).

8. Discuss matrix chain multiplication with reference to Dynamic Programming Technique and also apply it on the following arrays.

30	1	40	10	25
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