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## Amrita School of Computing, Amritapuri

B.Tech. Computer Science and Engineering (AI)

## Fourth Semester

## 22AIE212 Design and Analysis of Algorithms

**Assignment 2** 

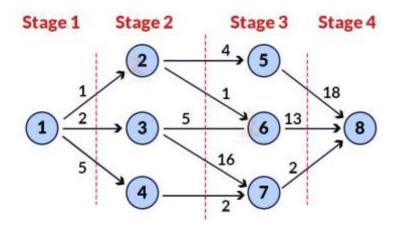
(Submission Date: 03/07/2024)

1. Given the following characters and their frequencies, construct the Huffman Tree and determine the Huffman codes for each character.

Character	Frequency
A	5
В	9
С	12
D	13
Е	16
F	45

- a) Draw the Huffman Tree step-by-step.
- b) List the Huffman codes for each character.
- c) Calculate the average code length of the generated Huffman codes.
- d) Compare the total number of bits required to encode the message using Huffman coding with the number of bits required if each character was encoded with a fixed-length code.

2.



- a) Using dynamic programming, find the shortest path from the source (1) to the destination (8).
- b) List the sequence of nodes in the shortest path and the total weight of this path.
- 3. Given a sequence of matrices {A1,A2,A3,A4,A5,A6} with dimensions, <30 x 35>,<35 x 15>, <15 x 5>, <5x 10>, <10 x 20>, <20 x 25> respectively.
  - a) Use dynamic programming to find the minimum number of scalar multiplications needed to multiply the chain of matrices.
  - b) Show the construction of the cost table and k-table
  - c) Provide the optimal parenthesizing of the matrices.