Assignment No. 2
CSE523: ADVANCED DATA STRUCTURE AND ALGORITHMS

Objective of the assignment: To assess the knowledge of students for the topics taught in class.

Instructions to be followed by students:

1. **Last Date of Submission:** 20-Nov-2021 (Saturday). Late submission will not be entertained.
2. Write your Name, Registration No. and Roll No. on the first page.
3. **Assignment Type and Mode of Submission:** Assignment should be **Hand written** and is required to be uploaded only on UMS as a pdf file.
4. **Set-A** assignment is to be submitted by the students having **even roll numbers**.
   Set-B assignment is to be submitted by **odd roll number** students.
5. All questions are compulsory.
6. Students are required to do their respective assignment by their own. Cheating cases will be awarded zero marks.
7. Each question is of 10 marks.

Set-A (Even Roll Numbers)

1. Solve using Huffman Coding Technique: Consider the string **AAABBCCCDDEEEE**. Each letter in the string must be assigned a binary code satisfying the following properties:

a. For any two letters, the code assigned to one letter must not be a prefix of the code assigned to the other letter.

b. For any two letters of the same frequency, the letter which occurs earlier in the dictionary order is assigned a code whose length is at most the length of the code assigned to the other letter.

Among the set of all binary code assignments which satisfy the above two properties, what is the minimum length of the encoded string?

2. Explain the concept of Ziv-Lempel Encoding. Encode the string **"UUWUWUYWUUYWUUZUUU…"** with LZ77.

3. What are Buddy system in Memory Management and what is it's use? Elaborate in detail using an appropriate example.

Set-B (ODD Roll Numbers)

1. Explain the concept of Ziv-Lempel Coding. Encode the string **"AABABACBAACBAADAAA . . ."** with LZ77.

2. **Solve using Huffman Coding Technique:** Consider the string **XYYZZRRPPP**. Each letter in the string must be assigned a binary code satisfying the following properties:

   a. For any two letters, the code assigned to one letter must not be a prefix of the code assigned to the other letter.

   b. For any two letters of the same frequency, the letter which occurs earlier in the dictionary order is assigned a code whose length is at most the length of the code assigned to the other letter.

   Among the set of all binary code assignments which satisfy the above two properties, what is the minimum length of the encoded string?

3. Explain the concept of Garbage collection in context to Memory Management along with some example program.
