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| **EWULogo.png** | **EAST WEST UNIVERSITY** |
| **Department of Computer Science and Engineering** |
| **B.Sc. in Computer Science and Engineering Program** |
| **Term I, Fall 2021** |

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| **Course:** | **CSE246 (Algorithms), Section - 1** |
| **Instructor:** | **Taskeed Jabid** |
| **Full Marks:** | **25** |
| **Time:** | **1 Hour and 20 Minutes + 10 Minutes** |

**Note:** There are FIVE questions, answer ALL of them.

***In some question, you need to choose some input data. I expect that no input data set will be same with any other script.***

1. Write down a set with 11 elements which evenly portioned the set for the first time if we choose the first element as pivot element. You have to choose the set in a way so that swap operation occurs exactly twice except pivot shifting. After writing the set, show in which positions the swap operations will occur.

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| **Value** | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |

1. Write down the merge function used in miergesort. What is the time complexity of merge function? If complexity of merge function can be reduced to log(n) then what will be the complexity of mergesort.
2. Choose the frequency of the following characters as instructed and generate the Huffman tree with that specific input frequencies. Also, write down the code of each character and achieved efficiency using this coding scheme.

A: Random number between 50-70

B: Random number between 20-30

C: Random number between 35-50

D: Random number between 50-70

E: Random number between 85-99

F: Random number between 30-40

G: Random number between 15-25

H: Random number between 10-20

1. The actual base case for closest pair calculation appears when there are only two points available in the list. However, the closest pair algorithm using divide and conquer approach terminate the recursion before it reaching that level. What is the reason for this? Explain with simple example.
2. Write down the pseudocode of fractional knapsack problem and show the working steps with any sample data (with at least 5 items) of your own