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

| **Course:** | **CSE246 (Algorithms), Section - 1** |
| --- | --- |
| **Instructor:** | **Taskeed Jabid** |
| **Full Marks:** | **25** |
| **Time:** | **1 Hour and 15 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. I hope it is not too much expectation.***

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 three times except pivot shifting. After writing the set, show in which positions the swap operations will occur. If your pivot value is decrease by 2 then how may swap will be occurred for your original data.

| **Index** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Value** | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |

1. Write down the merge function which used in merge sort to merge two halves of sorted array into a combined sorted array
2. Write down a set with 10 elements (reasonably random data) and display the operation of bubble sort. Write down the content of the array and number of swaps occurred after each pass of outer loop. [Do not show after each swap operation].
3. What are generic steps required to solve problem using Divide and Conquer technique. Discuss the basic idea of closest pair algorithm. Why the dive and conquer technique to find closest pair works faster than adhoc approach.
4. The following data is start time (S) and finish time (F) of some activities which requires a shared resource. Every activity has a C value which indicated whether the shared resource needs cleaning or not. If it requires cleaning then cleaning requires extra one unit time and in that time no activity can start their job. Write down which activities should be selected so that maximum number of activities can take the service the shared resource. [Show your working steps with reasonable details.

| A | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S | 5 | 2 | 3 | 2 | 8 | 15 | 11 | 7 | 2 | 13 | 8 | 4 | 19 |
| F | 7 | 4 | 8 | 11 | 14 | 20 | 17 | 14 | 9 | 18 | 17 | 12 | 20 |
| C | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |

A: Activity Number

S: Start time of each activity

S: End time of each activity

C: Indicates whether cleaning is required [0 means bot required; 1 means cleaning required]