# National University of Computer & Emerging Sciences, Karachi
## Fall-2021 School of Computing
## Midterm-II
### 22nd Nov 2021, 10:30 am – 12:30pm

| Course Code: CS1002 | Course Name: Programming Fundamentals |
|---|---|
| **Instructor Name:** Mr. M. Shahzad, Dr. Abdul Aziz, Dr. Farrukh Shahid, Dr. Murk Marvi, Mr. Basit Ali, Ms. Abeer, Mr. Hamza Ahmed, Ms. Attiya Jokio, Ms. Sobia Iftikhar, Ms. Sumaiyah | |
| **Student Roll No:** 2K-3174 | **Section:** 1-J |

**Instructions:**

- Return the question paper and make sure to keep it inside your answer sheet.
- Read each question completely before answering it. There are **six questions and two pages**.
- In case of any ambiguity, you may make assumption. However, your assumption should not contradict any statement in the question paper.
- Do not write anything on the question paper (except your ID and group).
- All questions carry equal marks.                    **Max Marks**: 120

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**Question#1:** Draw a flowchart of the mentioned problem and write the algorithm mentioning all the steps. A Self-Driving car (SD) is moving on a motorway and communicating with Unmanned Aerial Vehicle (UAV) while traveling from Karachi to Islamabad. The SD car is equipped with multiple sensors, LiDAR, and RADAR, to perform several tasks such as navigation, object, people detection, etc. The SD car uses LiDAR, RADAR, or other sensors for detecting objects in the surrounding based on the following conditions. When a vehicle is near the UAV and less traffic on a motorway, it uses LiDAR for object detection. When there is a high volume of traffic and car, and UAV are in close vicinity, SD car uses RADAR to detect objects. On the other hand, when the distance between UAV and car is more significant, and traffic is less, SD car uses LiDAR to detect objects. If the UAV is far and there is high traffic, SD uses sensor data to detect objects.

**Question#2:** Develop a program that predicts the score needed on a final exam to achieve a desired grade in a course. In the input shown below, the final counts 25 percent of the course grade. The program should interact with the user as follows:

**Input:**

    Enter desired grade: B
    Enter minimum average required: 79.5
    Enter current average in course: 74.6
    Enter how much the final counts as a percentage of the course grade: 25

**Output:** You need a score of 94.20 on the final to get a B.

**Question#3:** The National Earthquake Information Center has asked you to write a program implementing the following decision table to characterize an earthquake based on its Richter scale number.

| Richter Scale Number (n) | Characterization |
|---|---|
| $n < 5.0$ | Little or no damage |
| $5.0 \leq n < 5.5$ | Some damage |
| $5.5 \leq n < 6.5$ | Serious damage. walls may crack or fall |
| $6.5 \leq n < 7.5$ | Disaster: houses and buildings may collapse |
| higher | Catastrophe. most buildings destroyed |

**Question#4:** A famous restaurant in town offers the year's biggest sale on its entire menu, but with certain conditions. The 25% discount offer is valid for every bill exceeding Rs: 1500/- for lunch and 20% for dinner. An additional 10% for take away at lunch and 5% at dinner and 15% for mid-night. The restaurant also announced a special happy hour deal any time in a given day, where 50% discount is offer straight away but not exceeding Rs: 2500/-. Note: No discount is offer if the

payment made using Credit / Debit card. Write a program to calculate the customer bill for the given order.

**Question#5:**Imagine you are hired by an agency to encode the message comprising of digits. Your task is to write a 'C-program' that would work on any generic input. The key factors of the encoding scheme arelisted below:

1) Each digit in the input would be considered in the range 1-9 only.
2) Each digit in the input would occur only once.
3) If the input number has an even number of digits, then the encoding message would contain the maximum number from input as its first digit and the minimum number from input as its second digit.
4) If the input number has an odd number of digits, then the encoding message would contain the minimum number from input as its first digit and the maximum number from input as its second digit.

| Sample Input 1: | Sample Input 2: |
|---|---|
| 24531 | 4532 |
| Sample Output 1: | Sample Output 2: |
| 15 | 52 |

**Question#6:** An analog clock is a tool for reading the time of day. The shortest clock needle indicates the hour, a longer needle indicates the minutes, and the longest needle indicates the seconds. The clocks like the ones you can see in the picture below might be a real life example of a nested loop. What do you think? The first and outside loop would be the second's needle, which after first completion moves the inside loop: minute's needle. Then, after minute's needle first completion, we moves the hour needle, which loops inside minute loop.

Your 'C' program will take start and end time from user in an analog format and your challenge is to design a digital clock that will display Hours, Minutes and Seconds on a console from user provided start and end time. The program sample input/output will be as follows:

**Sample Input:**

Enter Small Needle :      **10**
Enter large Needle:      **12**
Enter largest Needle:      **07**

**Sample Output:**
      **10: 00: 35**

**Hint:** You may use **sleep()** function in order to wait for a current thread for a specified time

```
#include<stdio.h>

main()
{
    printf("Sleeping for 1 second.\n");
    sleep(10);
    return 0;
}
```

**BEST OF LUCK!**