SET B

United International University

Department of Computer Science and Engineering

Final Examination Summer 2023

Course Code: **CSE 1112** Course Title: **Structured Programming Language Laboratory**

Date: September 12, 2023 Time: 11:30 AM – 12:30 AM (1 hour) Full marks: 25

Name: Student ID:

Write down C programs for the following problems in Code Blocks (or any C compiler you prefer), and present the code to your instructor after the time is up. You can make rough calculations in this paper.

Problem 1 (Marks: 12)

In the mystical land of Digitaria, a **"Perfect Square Sorcerer"** is a number that possesses an enchanting quality: it's a **perfect square** and its **digits are arranged in non-decreasing order**. These magical numbers, such as 16, 112225, and 1444, hold a captivating spell that fascinates mathematicians.

Your quest is to write a program that reveals all the hidden wonders of Perfect Square Sorcerers within a given range. Equip yourself with the following components to embark on this numerical adventure:

a. **int is_perfect_square(int x):** This function takes an integer x as input and returns 1 (or true) if it's a perfect square, and 0 otherwise.

b. **int are_digits_non_decreasing(int x,int prev_digit):** This function takes an integer x as input and returns 1 (or true) if its digits are arranged in non-decreasing order, and 0 otherwise.**You must write this function using recursion.**

c. **int check_are_digits_non_decreasing(int x):** This is a helper function which will start the recursive call by calling the function **are_digits_non_decreasing()**

d. **void find_perfect_square_sorcerers(int start, int end):** This function prints all the Perfect Square Sorcerers that lie within the range [start, end].

Samp[le Input	**Sample Output**
Enter the range [start, end]: 1 400	Perfect Square Sorcerers within the range [1, 10000]: 1 4 9 16 25 36 49 64 81 121

SET B

Problem 2 (Marks: 13)

You've been assigned the task of developing a program to manage employee records for a company. Each employee's record should include details such as their employee ID, name, age, salary, and department. The program should allow users to add a new employee, update employee information and display details of all employees.

Tasks:

1. Create a structure named Employee which can store the following information:
   - Employee ID (an integer)
   - Name (a string)
   - Age (an integer)
2. **void addEmployee(struct Employee *EmployeeList, int *numEmployees)** which allows the management to add employees to the system if the number of employees does not exceed 100. If an employee can be added then It should update the EmployeeList and increment the value of numEmployees.
3. **void displayEmployee(struct Employee *Employee_ptr)** which prints the details of the employee Employee_ptr is pointing to.
4. **struct Employee* updateEmployeeInfo(struct Employee *EmployeeList, int numEmployees, char *EmployeeName)** allows a user to update **age** of a particular employee using the employee name. If no such employee exists, add the information as a new employee.

In the main function:

- Create an array of Employees. [There can be 100 employees at max]
- Create an int variable numEmployees which will store the number of employees present in the company.
- Provide a menu for management to add employees (using addEmployee(-) function), update employee information and show the updated information (using updateEmployeeInfo(-) and displayEmployee(-) function), as well as display information of all employees (using displayAllEmployees(-) function).

Sample Input/Output (**bold** -> user input, regular text -> console print)

```
1. Add Employee
2. Update Employee Information
3. Display All Employees
4. Exit

Enter your choice: 1

Enter details for the new employee:
Employee ID: 1
Name: Sakib
Age: 26
```

SET B

```
New employee added.

1. Add Employee
2. Update Employee Information
3. Display All Employees
4. Exit

Enter your choice: 2

Enter the name of the employee to update: Shakib
Employee information not found!!!

1. Add Employee
2. Update Employee Information
3. Display All Employees
4. Exit

Enter your choice: 2

Enter the name of the employee to update: Sakib
Enter new age: 27
Employee information updated.

1. Add Employee
2. Update Employee Information
3. Display All Employees
4. Exit

Enter your choice: 3

Employee List:
Employee 1:
Employee ID: 1
Name: Sakib
Age: 27
```