The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical & Computer Engineering

Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	: **EEX3467 Software Engineering Concepts & Programming**
Academic Year	: 2021/2022
Date	: 21st June 2022
Time	: 1000-1300hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper contains five (05) questions. **ALL FIVE (5) questions are compulsory.**
3. Answers should be in clear handwriting.
4. This is a Closed Book Test **(CBT).**

Q1. [20 marks]

The following scenario should be considered for both Q1 and Q2.

OUSL evaluation system consists of a Continuous Assessment (CA) components and a final examination. CA components consist of 4 lab tests and a mini project.

- Average of Lab Test marks (avgLab) is calculated by adding Lab test marks and dividing by 4.
- Mini Project mark (mpMark) is the average of the mini project report mark (mpReport) and the viva -voce examination mark (mpViva)
- Overall Continuous Assessment Mark (ocam) is calculated as ocam = mpMark * 0.6 + avgLab * 0.4.

Students who satisfy all of the following conditions are eligible to sit for the final examination.

- Marks for the mini project (MP)>= 40
- Average marks for Lab tests (AvgLab) >=50
- OCAM > = 40

Draw a complete flow chart to check the eligibility of a student to sit the final examination. User should give marks for labs and mini project as inputs and displaying a student's eligibility status should be the output.

Q2. [20 marks]

Write a C program to check the eligibility of a student to sit the final examination according to the scenario given in Q1.

Your program should adhere to the following guidelines:

- There should be a function called **Check_eligibility** that returns 1 if a student is eligible and 0 if not eligible. The function should take only the avgLab and mpMark as parameters.
- All lab test marks, and the mini project mark should be read from the keyboard with appropriate messages
- Lab test marks should be read into an array called labTestMarks.
- The main program should read all the values and use the function eligible to print a message indicating "You are eligible to sit the final examination" or "You are not eligible to sit the final examination" depending on the value returned by the function eligible.
- The program should contain appropriate comments for a third person to understand its purpose.

Q3. [20 marks]

i. Explain the difference between an array and a structure in C language. (3 marks)

ii. Consider the following program segment written by a student to print all even numbers stored in an array containing 10 integers

```
#include <stdio.h>

int main() {
        int i;
        int numbers[10] = {3,6,2,9,8,7,1,5,8,3};
        for (i=0; i<10; i++) {
                if (numbers[i] % 2 != 0) break;
                printf("%d  is an even number \n", numbers[i]);
        }
}
```

However, the student found out that the program did not work as expected.

a. What is the output of this program? Explain your answer (2 marks)

b. Assist the student by correcting the program to make it print all the even numbers in the array. (3 Marks)

iii. The following program is supposed to swap (interchange two values) The program does not work as expected.

```
#include <stdio.h>

void swap(int a, int b) {
        int temp;
        temp = a;
        a = b;
        b = temp;
}

int main() {
        int a = 12, b = 50;
        printf("Initial values of a and b are  %d     %d \n", a,b);
        swap(a,b);
        printf("Swapped values of a and b are  %d     %d \n", a,b);
}
```

a. What is the output of this program? Explain your answer. (2 marks)

b. Make the necessary corrections to the above program, **using pointers**, to make the program work correctly. (3 Marks)

iv. The lecturer of a subject wishes to record the following information with regard to its students: registration number (as an integer), email address (as a string), telephone number as a (string)

a. Declare a structure called Student to record the above data. (3 marks)

b. Create a variable of type student called new student and store the following values related to a student:

registration number: 2345678, email address: s2345678@ousl.lk telephone number: 098 3345 837 (2 marks)

c. Write a statement to display the details of the variable newstudent with appropriate messages. (2 marks)

Q4. [20 marks]

i. Write down the stages of the traditional waterfall life cycle model in the order that they need to be executed (6 marks)

ii. Read the following scenario and answer the questions a. and b.

- An air line reservation system known as **myBooking** allows passengers to book their air tickets using an online system
- Passengers must first login to the **myBooking** system to use the air line reservation system
- At a one given time only 100,000 users can use **myBooking** system
- Passengers can search for the flights available using the **myBooking** system and check for the ticket prices
- As the air ticket prices fluctuates according to the demand, the system should respond within 40 seconds when a user search for a ticket price
- Passengers can book the ticket and if needed can select their preferred seat
- The **myBooking** online system also allows the passengers to buy the ticket by making the payment using a credit card. The credit card details should be validated by the bank. After the bank validates the credit card details, the payment will be successful so that the passenger can book the ticket
- It is necessary that the passenger book the ticket after login within 30 minutes
- The admin of the system can update the flight details, create flights, and cancel flights
- Cancellation of flights can also be done by the passenger

a. Identify actors and business processes in this scenario and draw a complete use case diagram to illustrate the given requirements. (10 marks)

b. Briefly describe 2 non functional requirements for this system, which can be objectively validated (4 marks)

Q5. [20 marks]

i. Draw the flow graph for the pseudo code given. Find the cyclomatic complexity indicating all steps and formulas used (6 marks)

```
If width > length then
        Biggest_dimension = width
        If height > width then
                Biggest_dimension = height
        End if
Else
        Biggest_dimension = length
        If height > length then
                Biggest_dimension = height
        End if
End if
```

ii. Assume that a computer program should accept values between Rs. 45.55 to Rs. 90.99 from its users. If Equivalence class testing is used, how many classes are needed to test the above program? Explain with an example for each class (3 marks)

iii. Consider the following scenario and answer the questions given below under a. and b. (4 marks)

At the end of each month, QWE bank calculates the interest for each account and deposit the amount to the bank. Suppose at the end of May 2022, the calculated interest is Rs. 25.3265 for one account. However, the bank software credits only Rs. 25.32 to the account and ignores 0.0065. This amount is made to get saved into another account.

a. What is the security threat involved in the above case?
b. What is difference between hackers and crackers?

iv. What are the three roles associated with the software development framework 'Scrum'? (3 marks)

v. List and briefly explain two values given in the Agile manifesto (2 marks)

vi. Name and briefly describe two tasks carried out by a project manager involved in the process of project planning, execution and control (2 marks)

END