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	: 20th August 2022
Time	: 1000-1300hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper contains four (04) questions.
3. Answer all questions.
4. Answers should be in clear handwriting.
5. This is a Closed Book Test **(CBT).**

Question 1

The following scenario should be considered for both parts i and ii. **[40 marks]**

Employees at ABC star company will be eligible for an annual bonus based on their performance this year. An employee is categorized as a **Permanent employee** or a **Temporary employee** (known as employee status). If the employee is a temporary employee or his/her service is less than 6 months, then he/she is not eligible for the bonus. All employees need to go through a performance evaluation process and thereafter a score will be given. The bonus awarded to eligible employees is based on the score obtained for performance evaluation as follows:

SCORE	BONUS (NO. OF BASIC SALARIES)
65 and above	2 times their basic salary
50 – 64	Same as their basic salary
Less than 50	No bonus

i. Draw a complete flowchart to calculate the **bonus** to be given to an employee. The program should read the necessary values such as the employee number (**empNo**), service duration (**serviceDuration**), employee status (**empStatus**) , score obtained at the performance evaluation (**score**) and basic salary (**basicSal**) and output the employee number (**empNo**) and the bonus to be received. [20 marks]

ii. Write a C program to read the necessary input values from the keyboard, calculate the **bonus** and output the employee number and the bonus to be received. [20 marks]

Your program should adhere to the following guidelines:

- There should be a function called **check_eligibility** that returns 1 if the employee is eligible to get a bonus this year, else a 0 should be returned. This function should take only the **serviceDuration** and **empStatus** as parameters.

- All inputs should be read from the keyboard with appropriate messages.
- The main function should read all the values and call the function **check_eligibility** to check the eligibility.
- All the calculations, except checking the eligibility with the **check_eligibility** function, and instructions for producing the output should be written inside the main function
- The program should contain appropriate comments for a third person to understand its purpose.

Question 2 **[20 marks]**

i. There are different types of data types used in C programming. Two of them are **Basic** and **Derived**. Give one example each for the above two data types (2 marks)

ii. What will be the output of following program. (1 marks)

```
#include <stdio.h>
   void main()
 {
    int x = 5 * 9 / 3 + 9;
     printf("x = %d", x);

 }
```

iii. When writing C programs, one can use the **const** keyword or **#define** preprocessor directive to define constants. Write one C example statement for each of the above methods to define a constant in C programming. (2 marks)

iv. Consider the following program segment written by a student to assign 10 integer values read as user inputs from the keyboard to an array called **myArray** and print the array using a for loop. However, the student found out that the program did not work as expected. Rewrite the program with the necessary corrections to achieve the desired result. (8 marks)

```
#include <stdio.h>

int main() {

   int myArray[];
   int i;
   for(i=0; i<10; i)
   {
      printf("enter no %d in array \n", i+1);
      scan ("",myArray[i]);
   }
    for(i=0; i<10; i)
   {
      printf(" \n",myArray[i]);
    }

}
```

v. Write a C program to get two user inputs from users called **num1** and **num2.** You need to print the **sum** of **num1** and **num 2.** For this purpose, use a function. You need to use pointers to pass the values to the function. (7 marks)

Question 3 **[20 marks]**

i. In the traditional waterfall life cycle model, there are 6 phases. The first phase is requirement analysis, second phase is design phase, and the third phase is the construction phase.

a. What are the other phases of the waterfall life cycle model? List them in the order they should be carried out. (3 marks)

b. Briefly describe the requirement analysis phase. (3 marks)

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

- An online learning management system known as **abcLMS** is used at the ABC University for various learning management tasks
- A Student need to first register with the system by completing and submitting an online form. Filling the digital form is mandatory for the registration process
- After registering with the LMS, the student can login to the system
- The **abcLMS** should be able to handle 50,000 students at any given time
- Lecturers can upload course materials to and remove course materials from the **abcLMS**
- If a student faces any issue or need help regarding the course, he/she can use the "Help wanted" forum. If a student wishes to use his/her mother tongue (language) in this forum, there is a possibility for the student to do so by switching to the preferred language
- The Lecturers can view the "Help wanted" forum and answer the queries
- The Lectures should be able to get the student log report after each month
- It is necessary to get this student log report withing 2 min after requesting for the report
- The examination division should be able to download the "Grade Book" at the end of each semester

a. Draw a complete use case diagram to illustrate the given requirements. (10 marks)

b. List down **2** non-functional requirements for this system, which can be objectively validated. (4 marks)

Question 4 **[20 marks]**

i. Draw a flow graph corresponding to the algorithm given as following pseudo code. Find the cyclomatic complexity indicating all steps and formulas used. (6 marks)

```
if A = 450 then
    if B > C then
        A = B
    else A = C
    end if
end if
print A
```

ii. A computer program validates a numeric field (x) as follows: 100.01 < = x <= 201.99 If boundary value analysis is used, how many values need to be tested minimum and what are they? (2 marks)

iii. What are the three (3) security goals? Briefly describe each of them. (3 marks)

iv. State three (3) best practices that can be identified during a daily scrum meeting? (3 marks)

v. Briefly describe three (3) objectives of project management. (3 marks)

vi. There are 4 categories of software maintenance. List down 3 of them with a brief description of each. (3 marks)

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