Department of Computer Science & Engineering
University of Asia Pacific(UAP)

Final Examination Spring 2022 1nd Year 2nd Semester

Course Code: CSE 103 **Course Title: Structured Programming** **Credits: 3**

Full Marks: 150 **Duration: 3 Hours**

Instructions:

1. There are **Six (6)** Questions. Answer all of them. Question no. 1 and 6 have alternatives. Questions 2-5 do not have any alternative questions. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. **a)** Write down a C program where you take an English sentence as input and do the followings: **(7+8)**

i. Print all vowels appearing in the sentence.

ii. Print position of last occurrence of the letter 'L' in the sentence.

Sample input:

Enter string: **GOOGLE**

Output: **ALL VOWELS O O E**

Last occurrence of L is at position 4

b) What is the output of the following code segment? Show the value of the updated strings in each of the line numbers that are explicitly mentioned below: **(10)**

```
#include <stdio.h>
#include <string.h>
int main() {
      char s1[30] = "Johny";
      char s2[30] = "pa";
      char s3[30] = "yes ";
      char s4[30], s5[30];
1.    strcat(s1," ");
2.    strcpy(s4,s1);
3.    strcat(s4,s1);
4.    strcat(s4,s3);
5.    strcpy(s5, "");
6.    strcpy(s5, s2);
7.    strncat(s5, s2,2);
8.    strcat(s4, s5);
9.    printf("%s",s4);
      return 0;
}
```

OR

a) Inumaki Toge can use curses to fight enemies. Let's have a look at his curse-using abilities and constraints. **(15)**

Abilities:

- Toge can write any curse in string form on a piece of paper and throws it to an enemy and the curse gets activated.

For example: If he writes "shut up", the enemy won't be able to talk for 2 hours.

Constraints:

- Toge cannot use any capital letters or numbers or any other characters (except space) while writing the curse. If he uses any of those forbidden characters, the curse backfires.

For example: If he writes "Shut Up 100%", then Toge won't be able to talk for the next 30 minutes.

- Toge cannot use more than 10 small letters. If he uses more, the curse also backfires.

For example: If he writes "shut up already", then Toge won't be able to talk for the next 30 minutes.

Write a C program that will take input Toge's curse as a string and print the end result as shown in the following examples by examining the curse.

Example 1:
Input: shut up
Output: Curse got activated!

Example 2:
Input: Shut Up 100%
Output: Curse backfired!

Example 3:
Input: shut up already
Output: Curse backfired!

b) What is the purpose of strcmp library function. Give an example. What is the difference between strcmp and strcmpi library functions? **(10)**

2. a) Write down a function that will take an integer as parameter and will return 1 if the integer is a LEAP YEAR and return 0 otherwise. Using this function write down a program that will print all LEAP YEARS between two ranges n1 and n2. Both n1 and n2 will be input to your program. Assume that n1 < n2. Recall that a **leap year** occurs every four years (those whose number is divisible by four) except for century years whose number is divisible by 100 but not by 400. **(15)**

Sample Input/Output:

Enter n1: 96

Enter n2: 110

96 104 108

b) Write down a program that will take a string as an input and will determine whether it is a palindrome or not. You are allowed to use any library function you need. A palindrome is a string which remains the same even after reversing it. **(10)**

3. a) Consider the following declaration: **(10)**

```
int x[6] = {1, 13, 17, 8, 7, 18};
int  *p;
p = &x[3];
```

Suppose address of x is 700. What are the values of the followings?

(i) p+1

(ii) *p - 20

(iii) *(p+1)

(iv) *(p-1) - *p

(v) ++(*p)

b) Write a code that fills out an N x N two-dimensional array with user inputs and then calculates the sum of the main diagonal elements. N will be input to your program. Example: For the 2D array shown below, the main diagonal elements are shown in gray box. Your program should calculate the sum of these diagonal elements, i.e., sum = 5 + 0 + 4 + 4 + 8 = 21. **(15)**

5	5	8	8	7
1	0	2	4	6
7	4	4	5	6
9	3	9	4	1
7	1	3	1	8

4. a) Write down a program that will take N students' marks in CSE 103 course as input and determine the grade statistics, i.e., the number of students getting each grade. N will also be input to your program. Assume that the grades are calculated based on the following chart: **(15)**

90 -- 100 A

80 -- <90 B

70 -- <80 C

60 -- <70 D

0 -- <60 F

b) Write down a program that reverses the elements of a given array. The number of elements and all elements of the array will be input to your program. **(10)**

Input: Input array elements 15 9 30 15 40 0 7 11 16 100
Output: Reversed array: 100 16 11 7 0 40 15 30 9 15

5. **a)** What will be the value of b and c after executing the following piece of codes? **(5)**

```
int  a [ ] = { 2, 3, 0, 1, 9, 5};
int i = 2 ,b,c;
b = a[i] + a[i+1];
c = a[a[i]];
```

b) Consider the following printMe(n) function. What will be the output if we execute printMe(5) from the main function? Show the function calling in a block diagram **(10)**

```
void printMe(int n){
    if(n <= 0) return;
    else{
        printf("%d ",n);
        printMe(n-2);
        printf("%d ",n);
    }
```

c) Write down a program that will write all even numbers between 1 to n into a text file named "yourname.txt". For example, if your name is Kamal the destination file name should be kamal.txt. n will be input to your program. **(10)**

6. **a)** (i) Write down a structure capable of storing the following information about a student registered in a course: **(20)**

- ID
- Gender
- Class test score
- Mid-term score
- Final Exam score
- Total score

(ii) Use the above structure to take input of N students' information as input in an array of structure. N will also be input to your program.

(iii) In the same program, write down a function that will take students' information (within an array of structure) and the number of the students as parameters and returns how many of them failed. Assume that a student needs to obtain total 40 in order to pass in the exam.

(iv) In the same program, write down another function that will take students' information (within an array of structure) and the number of students as parameters and returns the ID of the student obtaining the highest marks.

b) When you are opening a file using *fopen* library function, what are the reasons that *fopen* may fail while opening in (i) write mode, and (ii) read mode? **(5)**

OR

a) (i) Write down a structure ***movieStar*** that can store the following information about movie stars of the film industry. The gender information must be stored as a character 'M' or 'F' to represent male and female movie stars respectively. **(20)**

- Name
- Age
- Annual income
- Gender

(ii) Use the ***movieStar*** structure to take input of N movie stars' information. N will also be input to your program.

(iii) Write down a function that will take an array of ***movieStar*** structure and the number of movie stars as parameters and returns the income of the lowest annual earning movie star.

(iv) Write down a function that will take an array of ***movieStar*** structure and the number of movie stars as parameters and returns the age of the oldest movie star in the industry.

b) When you are opening a file using *fopen* library function, what are the different modes of opening? **(5)**