United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam:: Trimester: Spring 2024

Course Code: CSE 1111, Course Title: Structured Programming Language

Total Marks: **40** Duration: **2 hours**

[Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.]

There are FIVE questions. Answer all the questions. Marks are indicated in the right margin.

Q.1 a) Write a **C program** according to the following: **[4]**

i. Write a function ***int factorial(int n)*** that will return the factorial of a given number. Factorial of a number can be calculated by multiplying the numbers from 1 to n consecutively. For example, factorial of 4 = 1×2×3×4 = 24. Assume n will not be greater than 10.

ii. Write a function ***int sum(int a, int b)*** that will return the sum of two given numbers.

iii. In the main function, take **three** integers as inputs and calculate the sum of the factorial of those integers using the above functions ***factorial()*** and ***sum()***. Note that you **cannot make any modifications** to the previously defined functions.

b) Find the **output** of the following program (left). Notice the **local and global contexts**. **[4]**

```c
#include<stdio.h>
int x = 2, y = 3;
int fun1(int n){
    return n%11;
}
void fun2(int arr[], int n){
    for(int i = 0; i<n; i++){
        x = fun1(x) + fun1(y);
        arr[i] = arr[i] + x;
        y = fun1(y) + fun1(x);
    }
}
int main(){
    int a[] = {2, 3, 5, 7, 11};
    fun2(a, 5);
    for(int i = 0; i<5; i++)
        printf("%d ", a[i]);
}
```

C Code for **1(b)**

```c
#include <stdio.h>
#include <string.h>

int main() {
    char A[101] = {'\0'};
    char B[101] = "string";

    strncpy(A, B, 4);
    strncat(A, "kernel", 3);

    for(int i=0; B[i]!='\0'; i++) {
        if(B[i]=='i') {
            B[i] = '\0';
        }
    }
    printf("%s - %s\n", A, B);
    return 0;
}
```

C Code for **2(a)**

Q.2 a) Show **manual tracing** (every change) of variables i, A, and B of the program above at right. **[4]**

b) Consider the following string declaration: **[4]**

```
Char str[55]="I love spl. Uiu has some good labs for spl.";
```

Write a **C program** that will **replace** each occurrence of the word **"spl"** with **"dsa"** and **print out** the resulting text. You **cannot** use any **library functions**.

Q.3 a) **Identify** and **correct the errors** of the following code: **[3]**

```c
struct student{
    char name[];
    int ID;
}
int main() {
    student s1,s2;
    s1.name="Rahim";
    s1.ID=101;
    struct student* s_ptr = s2;
    scanf("%s",&s_ptr.name);
    scanf("%d",&s_ptr.ID);
}
```

Q.3 b) Write a **C program** to store the following information about **patients** and perform the following **operations**: **[5]**

i. **Create a structure** named **Patient** with the following **members**: **name** (string), **age** (int), **height** (float), **weight** (float) and **BMI** (float).
ii. **Declare an array** of size **100** of type **Patient** structures.
iii. **Take inputs** (name, age, height, weight) from the keyboard and **calculate** the **BMI** of the respective patient using the formula: **weight / (height)**.
iv. **Find and display** all the information of the **youngest** patient with **lowest age**.

Q.4 a) Write the **output** of the program provided below on the left. **[4]**

b) Find the **output** of the code provided below on the right. **[4]**

```
#include <stdio.h>
int power_of_2(int n) {
   printf("Inside power_of_2(%d)\n", n);
   if(n == 1) return 1;
   if(n % 2 != 0) return 0;
   return power_of_2(n / 2);
}
int main(void){
    int num = 16;
    power_of_2(num);
    return 0;
}
```

C Code for **4(a)**

```
#include <stdio.h>
void inc(int *ap, int dummy){
    for(int i=0; i<dummy; i++){
        *ap = *ap + 1;
        ap = ap + 2;
    }
    dummy = 100;
}
int main() {
    int a[] = {1,2,3,4,5,6,7,8};
    int dummy = 3;
    inc(&a[2], dummy);
    for(int i=0; i<8; i++)
           printf("%d ",a[i]);
    printf("\nDummy=%d\n", dummy);
    return 0;
}
```

C Code for **4(b)**

Q.5 a) Write a **C program** that does the following: **[4]**

- Declare an integer array **arr** with array size 100.
- Declare a **pointer variable arrPtr** and **assign** the array **arr** to it.
- Scan the elements of the array **arr** using the pointer **arrPtr** with **offset**.
- **Find** and **print** the largest element of **arr** using the pointer **arrPtr**.

b) Suppose, you are trying to **save a simple string** in a file named "**string.txt**", and for this you have written the following code:

```
FILE *fp = fopen("string.txt", "w");
fprintf(fp, "Yet another string\n");
fclose(fp);
```

i. What will happen if the file **does not exist**? **[1]**
ii. What is the difference between **read** and **append** mode? **[1]**
iii. Write **C code** segment to **re-open the same file** in **append** mode and add a new string **"This is another string"** into the file and then **close** the file. **[2]**