United International University (UIU)
Dept. of Computer Science & Engineering (CSE)

**Final Exam:: Trimester: Spring 2022**

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

Total Marks: 40 Duration: 2 hours

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

1 a) Write a program to determine whether a square matrix is an upper triangular matrix or not. If the matrix is an upper triangular matrix, multiply all the entries of its main diagonal, otherwise, add all the entries of the main diagonal. [4]

[A square matrix is called **upper triangular** if all the entries below the main diagonal are zero. For example, A and B are two upper triangular matrices of size 3×3 and 4×4, but C is not an upper triangular matrix.]

| Input Matrix | Output | Explanation |
|---|---|---|
| $A = \begin{bmatrix} 5 & 8 & 9 \\ 0 & 7 & 5 \\ 0 & 0 & 7 \end{bmatrix}$ | 245 | The given matrix is an upper triangular matrix. Therefore, 5×7×7=245. |
| $B = \begin{bmatrix} 5 & 8 & 1 & 7 \\ 0 & 5 & 2 & 1 \\ 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 5 \end{bmatrix}$ | 625 | The given matrix is an upper triangular matrix. Therefore, 5×5×5×5=625. |
| $C = \begin{bmatrix} 6 & 2 & 5 \\ 1 & 0 & 8 \\ 7 & 5 & 9 \end{bmatrix}$ | 15 | The given matrix is not an upper triangular matrix. Therefore, 6+0+9=15. |

b) Find the final content of the *arr* array after the execution of the following code snippet. [4]

```
int arr[][3] = {{4, 1, 7}, {5, 6, 12}, {3, 10, 11}};
int value = 0, i, j;
for (i = 0; i < 3; i++){
   for (j = 0; j < 3; j++){
      value = arr[i][j];
      if (value % 2 == 1)
         arr[i][j] = value + 1;
      if (arr[i][j] % 2 == 0)
         arr[i][j] = value * 2;
   }
}
```

2 a) Write a Program that will take as input a string, and toggle cases of all the letters. [4]

| Input | Output |
|---|---|
| SPL Laboratory | spl lABORATORY |
| United International University | uNITED iNTERNATIONAL uNIVERSITY |

b) Show manual tracing of str1 and str2 of the following code segment and find output. [4]

```
char str1[100] = "Hello";
char str2[100] = "Bonjour";
int i, k;
strncat(str1, "Maria", 2);
strncpy(str2, "Federick", 3);
i=strlen(str1);
for(k=0; str2[k] !='\0'; k++)
    str1[i+k] = str2[k];
str1[i + k] = '\0';
puts(str2);
printf("\n");
puts(str1);
printf("\n");
strrev(str1);
puts(str1);
```

3 a) Write a program that performs the following operations: [4]

i. Write a user-defined function "countDigit". The "countDigit" function takes an integer as a parameter and returns the number of digits in that integer.

ii. In the main() function, take an integer as input from the user and call the "countDigit" function. You should print the answer in the main() function.

b) Find the output of the following code segment. [4]

```
void fun1(int *brr, int n){
   for(int i = 0; i<n; i++){
      printf("%d ", *(brr+i));
      *(brr+i) = *(brr+i) - 2;
   }
   printf("\n");
}
void fun2(int crr[], int m){
   for(int i = 0; i<m ; i++){
      printf("%d ", crr[i]);
      crr[i] = crr[i] + 4;
   }
   printf("\n");
   fun1(crr, 5);
}
int main (){
   int arr[] = {5, 10, 13, 17, 23};
   fun2(arr, 5);
   fun1(arr, 5);
}
```

4 a) Write a program that reads the following "Sample.txt" file that has integer numbers on separate lines and computes the average of the numbers. [4]

Sample.txt

```
4
7
11
...
...
13
15
```

b) Write the output of the following code segment. The ASCII code of 'A' is 65 and 'a' is 97. [4]

```
#include<stdio.h>
void function(char str[], int code, int n);
void main() {
        char name[50] = "Abu Sayeed Shiblu";
        function(name, 'A', 0);
}
void function(char str[], int code, int n) {
        printf("%c, ", code);
        int num = code % strlen(str);
        if (n > 4) return;
        function(str, str[num], ++n);
}
```

5 Write one program that does the following operations: [8]

i) Takes as input an array of N names, an array of N ids and an array of N salaries where the name, id, and salary of the $i^{th}$ index belongs to the same person.

ii) Stores all the above information in an array of structures. Then, prints "Information Stored Successfully."

iii) Initiates a search operation: Takes a name of a person from the user (See Intermediate Output) to search from the array of persons. If found, displays the information of the requested person (See Output). If the person's salary is more than 16000, the status of the person is "A" or else the status is "B". If not found, displays "The person is not in the directory."

| Input | Intermediate Output | Output |
|---|---|---|
| Kamal<br>Zara<br>Sam<br>Rakib<br>Sam<br>312 218 219 215 340<br>16500 10063 10005 16708 19685 | Information Stored Successfully.<br><br>Please write the name of the person you want to know about:<br><br>Kamal | Search Result:<br><br>Name: Kamal<br>ID: 312<br>Status: A |
| Kamal<br>Zara<br>Sam<br>Rakib<br>Sam<br>312 218 219 215 340<br>16500 10063 10005 16708 19685 | Information Stored Successfully.<br><br>Please write the name of the person you want to know about:<br><br>Sam | Search Result:<br><br>Name: Sam<br>ID: 219<br>Status: B<br><br>Name: Sam<br>ID: 340<br>Status: A |
| Kamal<br>Zara<br>Sam<br>Rakib<br>Sam<br>312 218 219 215 340<br>16500 10063 10005 16708 19685 | Information Stored Successfully.<br><br>Please write the name of the person you want to know about:<br><br>Ahasan | The person is not in the directory. |