National University of Computer & Emerging Sciences, Karachi
Fall-2019 Computer Science / Software Engineering Department
Final Examination
10th Dec 2019, 09:00 am – 12:00 noon

Course Code: CS118	**Course Name: Programming Fundamentals**
Instructor Name: Dr. Farooque/ M. Shahzad/Shoaib Rauf/ Basit Jasani	
Student Roll No:	**Section No:**

Instructions:

- Return the question paper and make sure to keep it inside your answer sheet.
- Read each question completely before answering it. There are **8 questions and 3 pages**.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- You are **not allowed to write** anything on the question paper (except your ID and group).

Time: 180 minutes. **Max Marks**: 124

Q 1. Observe and try to understand the following programs. There are no syntax errors in the programs. Write errors (runtime/compile time) with reasons if there are any available or write outputs if the programs are fine. **[Marks 3*4=12, 10 minutes]**

(i)
```
char* func (char *ptr)
{
ptr+=8;
return ptr;
}

main()
{
char *x, *y;
x="Programming Fundamentals";
y=func(x);
printf(" y = %s", y);
}
```

(ii)
```
void fun(const int *ptr)
{
*ptr = 30;
}

main()
{
int y = 40;
fun(&y);
printf("%d", y);
}
```

(iii)
```
main()
{
int ary[2][2][3] = {
                          {
{1,2,3},
                          {4,5,6}},
                          {{7,8,9},
                          {10,11,12}
                          }
                          };
int *p; p = &ary;
printf("%d %d",*p, *p+11);
}
```

(iv)
```
main()
{
char *arr[] = { "ant", "bat", "cat",
"dog", "egg", "fly" };
function(arr);
}
void function(char **ptr)
{
      char *ptr1;
      ptr1 = (ptr += sizeof(int))[-2];
      printf("%s\n", ptr1);
}
```

Q 2. Choose the most appropriate answer from given choices. Write answer in the answer sheet.

[Marks 3*4=12, 10 minutes]

(i) If x is an one-dimensional array, then A. &x [i] is same as x + i - 1 B. * (x + i) is same as * (&x [i]) C. * (x + i) is same as x[i] D. both (b) & (c)	(ii) Which of the following comments about arrays and pointers is/are not true? A. Both are exactly same B. Array is a non constant pointer C. Pointer is a 1D and dynamic array D. All of these
(iii) Consider the following program fragment. What will be the output? static char wer[3][4] = {"bag", "let", "bud"}; putchar (* (wer [1] + 1)) ; A. e B. a C. 1 D. b	(iv) How can you write a[i][j][k] in an equivalent pointer expression? A. ((***(a+i)+j)+k) B. (**(*(a+i)+j)+k) C. (*(*(a+i)+j)+k) D. *(*(*(a+i)+j)+k)

Q 3. Using nested loops, produce given output format: **[Marks 5*2=10, 30 minutes]**

a. **Output sequence:** 10, 13, 26, 29, 58, 61

b. Write a 'C' program that reads a string in dynamic array. Then draw the pyramid pattern of a user provided string.

Sample Input: Zeshan

Sample Output:

```
Z
Z E
Z E S
Z E S H
Z E S H A
Z E S H A N
```

Q 4. Ali has stored prices of all his sold products in linear 1D dynamic array. Now, he wants you to develop a single function which can calculate sum of all the products on odd indexes and even indexes separately using recursion. **[Marks 15, 20 minutes]**

Q 5. Junaid wants to store all his customer data in an encrypted text file. Help him by developing a program which contains two functions that can encrypt and decrypt the file (data.txt). Make sure that the encrypted file text is completely unreadable. Encryption means that we want to change text present in a file to look like something else. For example, an encrypted text “abcmno” can look like “cdeopq”. In decryption, we will get original text back from encrypted text.

[Marks 10+10=20, 25 minutes]

Q 6. Write a 'C' program that have a 2D-array data of 30 players, from where you have to select the batsmen on given certain criteria.

[Marks 10*2=20, 25 minutes]

ID	Matches	Runs	Fifty’s	Hundred’s	Four’s	Sixes’
1	34	1700	1	1	40	5

a. Write a function to list ID’s of top 3 scorers who scored at least 1 Hundred or 2 Fifty’s

```
void Top3MostTon( int Player[][7], int Total_rows );
```

b. Write a function to list ID's of top 3 boundary hitter. [boundary = Sixes or Fours]

void Top3BoundaryHitter(int Player[][7], int Total_rows);

Note: Use **pointer functions** to call above functions

Q 7. Write a 'C' program and consider the following two 2D arrays named as **CellNameData** and **CellExpData** as given below. The **CellNameData** array with 4×2 dimension, contains the cell no. and cell names, whereas **CellExpData** array with 5×6 dimension, contains the 4 types of gene expression values against each cell names. The first row in both array and the first column in **CellExpData** array are just row and column heads. Out of the 5 different columns in **CellExpData** array, select only those columns that match with the cell names given in **CellNameData** array. Store these data into new 2D array named as **MergeData**. After getting selected columns, expected data in **MergeData** array are shown below:

[Marks 15, 25 minutes]

[Hint: You can assume numeric values to represent the each row and column names. No points will be given on hard-coding except declaration and initialization statements]

CellNameData	
CellNo.	**CellName**
0.1	LiverCell
0.2	KidneyCell
0.3	LungCell

CellExpData					
Gnames	**LungCell**	**SkinCell**	**IntestineCell**	**LiverCell**	**KidneyCell**
Gene1	2.3	1.7	4.3	3.4	4.5
Gene2	1.5	3.6	8.1	5.5	2.9
Gene3	4.1	6.6	5.3	3.9	8.1
Gene4	9.9	2.7	6.2	5.8	3.3

MergeData			
	LiverCell	**KidneyCell**	**LungCell**
Gene1	3.4	4.5	2.3
Gene2	5.5	2.9	1.5
Gene3	3.9	8.1	4.1
Gene4	5.8	3.3	9.9

Q 8. Assume that the 100 academic journals records are stored in a txt file (data.txt) as shown:

[Marks 10*2=20, 25 minutes]

ID	Title	Journal	Issue	Year	startPage	endPage	Author
1	Cuckoo Hashing	JAlg	51	2004	121	133	Robert Tarjan
2	Deterministic Dictionaries	JAlg	41	2001	69	85	Robert Lafore
..	..	..	..	..	..	..	..
100	What Godel missed	SICO	51	2008	1	5	Paul Bailey

Hint: struct Article {int ID; char Title[30]; char Journal[50];….};

Note: "No global variables allowed. Use appropriate data types, return types and function arguments if not explicitly mentioned."

a. Write a function named "Check_Author(…)". This function searches the data for all the articles authored by "Robert Tarjan" and changes the author to "Robert Lafore". If no such articles exist the function must display "Not Found".

b. Write a function named "Article_Count(…)". This function displays all the records for which the totals pages are 50 or above and year 2000 or above.

BEST OF LUCK!