CSE 115
Programming Language I
Final Examination Fall 2015

Total Marks 75 Time 90 minutes

Instructions

You have to answer **three** out of **five** questions from Section 1.
Section 2 is a mandatory section. You must answer all questions in Section 2.

SECTION 1

You have to answer three out of five questions from this section.

Question 1

A. (4 points) There are four errors in the following code. List down the errors and show the corrections. One example is shown bellow for your reference.
(3 points) Write the output of the corrected program for the case when user enters 1 as the radius.

		Error list
1	#define <stdio.h>	
2	double circumference (double x);	Example:
		Error: #define <stdio.h>
3	int main()	Corrected: #include <stdio.h>
4	{	
5	double x;	
6	printf("Please enter the radius: ");	
7	scanf("%lf", x);	
8	result = circumference(x) ;	
9	printf("The circumference of the circle is %f\n", result);	
10	}	
11	int circumference (double r)	
12	{	
13	return 2*3.1415*r;	
14	}	

B. Here is a special program to help our CSE 115 students. It is a simple print based program where a student enters his or her final score of CSE 115 and the program suggests various things given below. You have to code the logic part of it using

i) (4 points) If-else-if control structure
ii) (4 points) Switch case control structure

0 to 19: CSE is not cool!
20 -39: Your faculty is not cool!
40 -59: Try a bit harder, you are very close!
60 – 100: You don't need the help of this program!!!

Question 2

A. (5 points) Write a program that takes a word less than 25 characters as user input and then displays the first and last characters of the input. Follow the example shown bellow for the output format.

Sample input: Superman
Sample output: Superman starts with the letter s and ends with the letter n.

B. (10 points) A password is called STRONG if it holds all of the following properties:

(a) It has at least 8 characters.
(b) It contains at least one lower case letter, and at least one upper case letter.
(c) It does not contain any blank space.

Write down a program that will take a password as input to a string and will print a message indicating whether it is STRONG or WEAK.

Sample input: Strange
Sample output: The password is WEAK.

Question 3

A. (5 points) What will be the output of the following code segment?

```
float a = 3.0, b = -17.0;
float *fp;

fp = &b;
b++;
*fp = *fp - 2.0;
a = *fp;
a++;
printf("a = %d, b = %d", a, b);
```

B. Consider the following code to answer i) and ii).

```
#include <stdio.h>

int task(int n);

int main()
{
    int num,xy;
    printf("Enter a positive integer:\n");
    scanf("%d",&num);
    xy=task(num);
    printf("Result=%d",xy);
}

int task(int n)
{
    if(n==0)
       return n;
    else
       return n+task(n-1);//self call to function task()
}
```

i) (5 points) In general, can you figure out what the function ***task*** returns for any given positive integer ***n***?

ii) (5 points)Trace the recursive calls for the function task if ***n*** equals 7.

Question 4

A. (8 points) Write a function *average* to compute and return the average element of an array of 20 integers. In calculating the average, if any number divisible by 3 is encountered, skip it. (Suppose the array elements are 1, 2, 3, 4, 5, 6..... . Your program should skip the numbers 3 and 6 in calculating the average.)

```
double average(int x[ ]) {
   -------------------------
   -------------------------
}
```

B. (7 points) Write a code that fills out a 5x5 two-dimensional array with user inputs and then calculates the sum of diagonal elements of the array. Note, you should include the middle element only once.

Example: For the 2D array shown bellow, your program should calculate sum as,
sum = 1 + 7 + 9 + 4 + 1 +1 + 0 + 6 + 2 = 31

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

Question 5

A. (8 points) An electricity board charges the following rates for the use of electricity:

For the first 200 units: 6 Taka per unit
For the next 200 units: 8 Taka per unit
For the next 200 units: 10 Taka per unit
Beyond 600 units: 12 Taka per unit

Write a program to read the number of units consumed and print out the amount to be paid.

Example:
Enter total units consumed: 450
Amounts to be paid: 3300

B. (7 points) Write down a program that will open a text file named "Final Exam.txt", write all numbers that are multiple of 7 between n1 to n2 in the file and closes it. Both n1 and n2 will be input to your program.

SECTION 2

You must answer all questions in this section.

Question 6

NSU hosts the Dhaka Regional of ACM programming contest in every alternative year. Teams from different universities all over the country participate in this contest. Assume, as a programmer, you have to design a project to help the contest organizers to store all teams' information and decide the winning team. For each team, you have to store the following information:

- Team name
- Name of three student members
- Name of their educational institute
- Number of problems solved in the contest (note, total number of problem is 10)

For example, following is all required information of a team,
Team name: NSU Buglovers
Team members' names: Hasib, Faiyaz, Samiul
Name of their educational institute: North South University
Number of problems solved: 8

Now your task is to complete the project by implementing the following steps,

i. (5 points) Declare a structure called ***Team*** to store the necessary data for each team.
ii. (5 points) Take input for 200 participating teams.
iii. (10 points)Write a function ***DecideChampion*** to decide the champion team based on the total number of problems solved in the contest.
iv. (5 points) Create a file named ***Champion.txt*** and write down the information (i.e. team name, members' names, university name, and number of problems solved) of the champion team on the file.

Question 7

(5 points) How can we improve the course CSE 115? Do you have any suggestions? Please share.