B.Sc. Engg. SWE 1st Semester — 7 March 2019 (Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION — **WINTER SEMESTER, 2018-2019**

DURATION: 1 Hour 30 Minutes — **FULL MARKS: 75**

CSE 4107: Structured Programming I

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) You have been assigned the task of developing a grading software to calculate the grades of the students. The software will take the mark $m, (0 \leq m \leq 100)$ obtained by a student as input and then print the grade of the student according to the following table. You have also been instructed to only use switch cases in the program. The use of *if* condition will not be accepted by the clients. 12

Table 1: Table for Question 1(a)

Grade	Marks
A	70-100
B	50-69
C	40-49
F	0-39

b) A **narcissistic number** is a number that is the sum of its own digits each raised to the power of the number of digits. The definition of a narcissistic number relies on the decimal representation 13

$$n = d_k d_{k-1} \ldots d_1 \text{ of a natural number n,}$$

i.e.,

$$n = d_k * 10^{k-1} + d_{k-1} * 10^{k-2} + \cdots + d_1 * 10^0$$

With k digits d_i satisfying $0 \leq d_i \leq 9$. Such a number n is called narcissistic if it satisfies the condition

$$n = d_k^k + d_{k-1}^k + d_{k-2}^k + \cdots + d_1^k$$

For example, the 3-digit decimal number 153 is a narcissistic number because

$$153 = 1^3 + 5^3 + 3^3.$$

Write a program which will take two input m, n where 0<m<n<100000 and display all narcissistic number in the range [m,n] inclusive in the output.

2. a) Write a program to sort the array named list in descending order and display. 10

```
int list [10] = {5,4,1,2,8,3,7,9,6,10};
```

b) A Pythagorean triple is a set of three integer a, b, c where the sum of the square of two of the numbers is equal to the square of the third number. Write a program that will take three integers as input from the user and print whether the numbers form a Pythagorean triple or not. The program will continue taking input until the user enters a Pythagorean triple as input. 10

c) Differentiate between global variable and local variable with the help of suitable examples. 5

3. a) Determine the output for the following block of code. 12

```
#include<stdio.h>
void fun1(int x, int y);
double fun2(double b);
int a = 5;
double b = 10;

int main(){
    int a = 15;

    printf("In main: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
    fun1(a, b);
    printf("Leaving main: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
    return 0;
}
void fun1(int x, int y){

    printf("In F1: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
    b = fun2(x + y);
    printf("Leaving F1: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
}
double fun2(double b){

    printf("In F2: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
    b = a + b;
    printf("Leaving F2: a = %+.2lf,", (double)a);
    printf(" b = %+.2lf\n", (double)b);
    return b + a;
}
```

Figure 1: Code for Question 3(a)

b) Write a program that will take a number n, as input from the user and draw a pattern similar to the following figure. The output shown here is for n = 5. 8

```
1
1 *
1 * 3
1 * 3 *
1 * 3 * 5
```

Figure 2: Figure for Question 3(b)

c) What are the limitations and disadvantages of using *switch* instead of *if* statement? Explain using a suitable example. 5

4. a) Alphabetical characters include 'A'-'Z' and 'a'-'z'. Following program should take input from the user until it finds a non-alphabetical character. It will show the number of consonants and vowels present in the input as output. 12

Find out the logical and syntax error in the following code.

```
#include<stdio.h>

int main(){
    int ch, count_cons, count_vow , total=0;

    while(ch>= 'A' || ch<= 'Z' && ch>= 'a' || ch<= 'z')
    {
        scanf("%c ",ch)
        switch(ch)
        {
            case 'a':
            case 'A':
            case 'e':
            case 'E':
            case 'i':
            case 'I':
            case 'o':
            case 'O':
            case 'u':
            case 'U':
                    count_vow++;
            default :
                    count_cons++;
        }
    }
    total = count_vow+count_cons
    printf("Total:%d\n ",total);
    printf("Consonants:%d, Vowels:%d",count_cons,count_vow);

    return 0;
}
```

Figure 3: Code for Question 4(a)

b) Write a program where the main function will take a character variable *c*, as input and print whether the input is an upper-case letter, lower-case letter or a number. **You must write three separate functions to perform the three different checks.** You cannot check the type of the character in the main function. 8

c) Explain the differences between **i++** and **++i** operations with necessary examples. 5