

East West University
Faculty of Science and Engineering
Department of Electrical and Electronic Engineering
Mid Term Exam, Spring 2024
EEE 105 Computer Programming Section: 03
Course Teacher: Kamanashis Saha

Full Marks: 40

Exam Time : 55 minutes

Answer all the questions.

[The marks on the right hand side in square brackets indicate marks allocated for that question only]

1. [CO1, Apply]

Suppose you have built a computing device that takes an integer number, n as an input and displays all the odd numbers between 0 and n . For example, if the input integer is $n = 10$, your device will display: 1, 3, 5, 7, 9. Now write an algorithm to show step by step working mechanism of the device and draw its flow chart. [10.0]

2. [CO2, Apply]

(a) What will be the output of the following C code: [3.0]

```
#include<stdio.h>
int main()
{
    int a = 38, b = 10;
    double e = 2.718281828459045;
    switch(a/b)
    {
        case 0 : printf("Step-0 : %.0lf\n", e);
                break;
        case 1 : printf("Step-1 : %.1lf\n", e);
        case 2 : printf("Step-2 : %.2lf\n", e);
                break;
        case 3 : printf("Step-3 : %.3lf\n", e);
        case 4 : printf("Step-4 : %.4lf\n", e);
        case 5 : printf("Step-5 : %lf\n", e);
                break;
        default : printf("Step-6 : %lf\n", e);
    }
    return 0;
}
```

(b) Write down a program in C which takes a positive integer number 'n' as input and displays the sum of the following series. [10.0]

$$sum = 1^1 + 2^2 + 3^3 + 4^4 + \dots + n^n$$

For example, if the input integer is $n = 3$, the result will be $1^1 + 2^2 + 3^3 = 32$ and your program will display the result as “The sum is 32”.

If the input integer is $n = 7$, the result will be

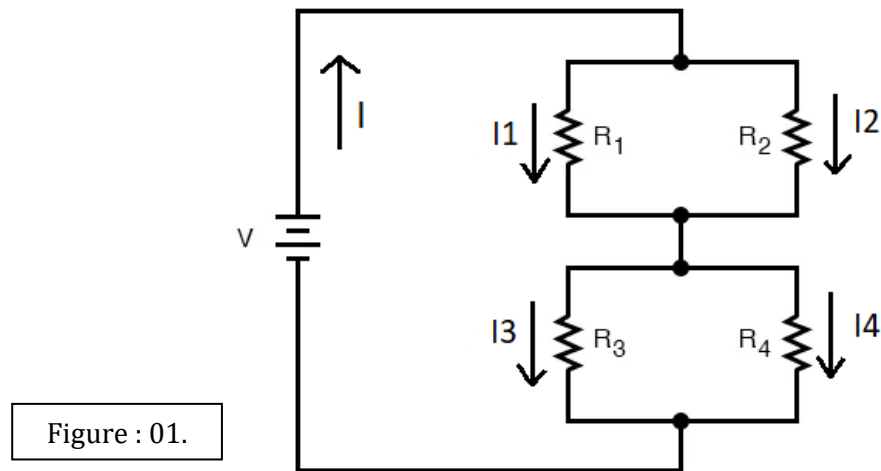
$$1^1 + 2^2 + 3^3 + 4^4 + 5^5 + 6^6 + 7^7 = 873612$$

and your program will display the result as “The sum is 873612”.

3. [CO2, Apply]

Write down a single program code in C which will perform the following tasks:

- (i) The program will take the values of four resistances $R1$, $R2$, $R3$ and $R4$ and the voltage, V as float inputs for the following circuit diagram shown in Figure. 01. [2.0]



- (ii) The program will calculate and display the power consumed by four resistances $R1$, $R2$, $R3$ and $R4$. [7.0]

- (iii) Then the program will compare the power consumed by two resistances $R1$ and $R2$ and display which resistance is consuming the minimum power among them. The console window will show the following: [2.0]

- If both resistances consume an equal amount of power, your program will display: “R1 and R2 consume the same amount of power”.
- If R1 resistance consumes minimum amount of power, your program will display: “R1 consumes minimum power”.
- If R2 resistance consumes minimum amount of power, your program will display: “R2 consumes minimum power”.

- (iv) Similarly, the program will compare the power consumed by $R3$ and $R4$ and display which resistance is consuming the minimum power among them. [2.0]

- (v) Now consider the resistance $R1$ as a variable resistance. Vary the value of $R1$ from $5k\Omega$ to $10k\Omega$ with 200Ω increment in your C program and calculate the value of current, I for each of the $R1$ values. Finally, your program will display different values of I for the varying values of $R1$ on the console window. [4.0]

Possible outcomes on console window: Possible outcome on the console window for a set of inputs is shown below. Your program must display similar outputs after the compilation and execution for different input values of $R1$, $R2$, $R3$, $R4$ and V :

Enter the value of R2: 2000
Enter the value of R3: 5000
Enter the value of R4: 10000
Enter the value of V : 10

Power consumed by R1 : 0.002778
Power consumed by R2 : 0.001389
Power consumed by R3 : 0.013889
Power consumed by R4 : 0.006944

R2 consumes minimum power
R4 consumes minimum power

The values of I for varying R1 are :

0.001500	0.001471	0.001442	0.001415	0.001389	0.001364	0.001339
0.001316	0.001293	0.001271	0.001250	0.001230	0.001210	0.001190
0.001172	0.001154	0.001136	0.001119	0.001103	0.001087	0.001071
0.001056	0.001042	0.001027	0.001014	0.001000		