The Co-operative University of Kenya

INSTRUCTIONS:

- Answer question **ONE (compulsory)** and any other **TWO** questions

QUESTION ONE (30 MARKS)

a) What is the output of the following program

```
1. #include <stdio.h>
2. int main(void)
3. {
4.      int a = 4, b = 5, c;
5.      a = (a > 3) + (b <= 5);
6.      b = (a == 3) + ((b-2) >= 3);
7.      c = (b != 1);
8.      printf("%d %d %d\n", a, b, c);
9.      return 0;
10. }
```
[6 Marks]

b) Write a program that declares two integers, assigns to them the values 40 and 60, and displays their sum, difference, product, the precise result of their division, and the remainder. To find the remainder use the % operator.   [4 Marks]

c) Fix the errors in order to run the program and display the value of m. (Indicate the line number where the bug and and propose a solution)

```
1. include stdio
2. int main(void);
3.    (
4.     int= m
5.     b = 10
6.     m = 2b+100
7.     print(%f\n", M);
8.     Return0;
9.    )
```
[6 Marks]

d) What is the output of the following program?

```
1. #include <stdio.h>
2. int main(void)
3. {
4.      int a = 4, b = 3, c = 5;
5.      printf("%d\n",(a < b) == !(c > b));
6.      return 0;
7. }
```
[2 marks]

e) Write a program that reads an integer and displays a message to indicate whether it is even or odd. [2 marks]

f) What is the output of the following program?
```
1. #include <stdio.h>
2. int main(void)
3. {
4.      int a = 10, b = 20, c;
5.      c = (a < 15) && (++b > 15);
6.      printf("%d %d\n", c, b);
7.      return 0;
8. {
```
[2 marks]

g) Write a program that reads a student's grade and displays its corresponding description, as follows:

18–20	Excellent
16–18	Very Good
13–16	Good
10–13	Dangerous Zone
0–10	Need Help

[8 Marks]

QUESTION TWO (20 MARKS)

a. Write a program that reads a man's height (in metres) and weight (in kilograms) and calculates his body mass index (BMI) using the formula $BMI=weight/height^2$. The program should display the BMI and a corresponding message according to Table 1 below, and the lower and upper limit of the normal weight for the given height.

Table 1.

Weight Categories

Mass Index	Result
BMI < 20	Lower than normal weight
20 <= BMI <= 25	Normal weight
25 < BMI <= 30	Overweight
30 < BMI <= 40	Obese
40 < BMI	Extremely obese

[10marks]

b. Define the structure type city with members: city name, country name, and population. Write a program that uses this type to read the data of 80 cities and store them in an array. Then, the program should read the name of a country and a number and display the cities of that country whose population is greater than the input number [10 Marks]

2

QUESTION THREE (20 MARKS)

a. What is the output of the following program?

```
1. #include <stdio.h>
2. int main(void)
3. {
4.    unsigned int i = 10;
5.    if((i >> 4) != 0)
6.    printf("One\n");
7.    else
8.    printf("Two\n");
9.    printf("%d\n", i);
10.   i = 1;
11.   if((i << 3) == 8)
12.   printf("One\n");
13.   else
14.   printf("Two\n");
15.   printf("%d\n", i);
16.   return 0;
17. }              [5 marks]
```

b. Write a function that takes as parameters two pointers to floats and swaps the values they point to. (5 Marks)

c. Suppose you wish to give a loan to a person who is either over 21 years or has a bank balance of Kes 90,000. The loan amount is half the bank balance. Write a program to implement this. Do not use the IF or SWITCH STATEMENTS. (10 Marks)

QUESTION FOUR (20 MARKS)

d. What is the output of the following program?

```
1.  #include <stdio.h>

2.  int main(void)

3.  {

4.     int *ptr1, *ptr2, *ptr3, i = 10, j = 20, k = 30;

5.     ptr1 = &i;

6.     i = 100;

7.     ptr2 = &j;

8.     j = *ptr2 + *ptr1;

9.     ptr3 = &k;

10.    k = *ptr3 + *ptr2;

11.    printf("%d %d %d\n", *ptr1, *ptr2);

12.    return 0;

13.    }                              [4 Marks]
```

e. Write a function that takes as parameters three values and returns the minimum of them.   [6 marks]

f. Write a program that will give the following display. Use a nested for loop.

```
1x0=0
1x1=1
1x2=2

2x0=0
2x1=2
2x2=3

3x0=0
3x1=3
3x2=6                                    [10 marks]
```

QUESTION FIVE (20 MARKS)

g. What is the output of the following program

```
1.  #include <stdio.h>
2.  void test(int *p, int a);
3.  int main(void)
4.  {
5.        int i = 100, j = 200;
6.        test(&i, j);
7.        printf("%d %d\n", i, j);
8.        return 0;
9.  }
10. void test(int *p, int a)
11. {
12.       *p = 300;
13.       a = 400;
14. }                                    [5 marks]
```

h. Write a program that reads the name of a file and displays its second line. [15 marks]