 **COMSATS University Islamabad**

**Department of Computer Engineering**

**LAB #2**

**Programming Fundamentals**

**Basic Steps for Algorithm Development and Piece-Wise Functions using if/else Statement**

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**Objective:**

* Learn to develop algorithms for different computational problems
* Learn basic input-out in C using printf() and scanf() functions
* Learn basics of conditional execution using if/else statements

**Lab task 1: Develop an Algorithm:**

Following figure shows a pattern of squares generated for different input values of N (for N=0 to N=5). Develop a general algorithm to fill in the grid for any input N. Use the 4-step process that was discussed in the class (and is given below for reference)

The four – step algorithm development process:

1. Work an example yourself.
2. Write down what you just did.
3. Generalize your steps.
4. Test your algorithm.

**Solutions:**

**STEP 1: Work on example on yourself**

N=2

2(2)+3=7

Where 7 is the number of boxes coloured when N=2.

**Step 2: Write down what you just did**

Multiply 2 by 2

You get 4

Add 4 and 3

You get 7

7 is your answer.

**Step 3: Generalize this step**

Replace 2 with N

Vary it from 0 – 5 in a loop with initial count as 0

As with each value of N answer will change replace it with X

2(N)+3=X

X is your answer.

**Step 4: Test your algorithm:**

If N = 0

2 (O) + 3 = 3

Then X = 3

If N = 1

2 (1) + 3 = 5

Then X = 5

If N = 2

2 (2) + 3 = 7

Then X = 7

If N = 3

2 (3) + 3 = 9

Then X = 9

If N = 4

2 (4) + 3 = 11

Then X = 11

If N = 4

2 (5) + 3 = 13

Then X = 13.

As all answers are correct then our algorithm is correct.

**Lab task 2: Write a C Program to Implement a Piecewise Function**

Write a C program for following piecewise function. Program must take input from user and calculate and print the function result on screen.

−𝑛 − 4, 𝑛 

𝑛2 − 7, 

𝑓[𝑛] = 120/n + 𝑛, 𝑛 

{𝑤ℎ𝑒𝑟𝑒 𝑛 𝑖𝑠 𝑎𝑛 𝑖𝑛𝑡𝑒𝑔𝑒𝑟 𝑣𝑎𝑟𝑖𝑎𝑏𝑙𝑒

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int n=0;

int result;

printf("enter a number: %d" ,n);

scanf("%d", &n);

if(n<3)

result = -n - 4;

else if(n>10)

result = (120/n) + n;

else

result =(n\*n) - 7;

printf("%d", result);

return 0;

}

**Result:**

enter a number: 05

Result = 18

**Lab task 3: Write a C Program to Distinguish Odd and Even no**

Write a program that takes integer input from user and tells (displays on the output console screen) whether it is even or odd.

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int a;

printf("Enter a number: %d", a);

scanf("%d", &a);

if(a%2==0)

printf("%d is even ", a);

else

printf("%d is odd ", a);

return 0;

}

**Result:**

Enter a number: 07

7 is odd

**Conclusion:**

In this lab, we learned to write an algorithm through the four steps of writing algorithm and also how to implement piece wise function using if else conditional statement. We also learned the use and purpose of printf() and scanf() in a C program.