Computer Fundamentals & Programming – Assignment 01

Topic: Number Systems, Conversions, and Algorithm Design

Section A — Base Conversion Problems

A1. Convert from Base-2 to Base-10

1. Convert 1011_2 to decimal.

2. Convert 100101.01_2 to decimal.

3. Convert 101000.011_2 to decimal.

A2. Convert from Base-10 to Base-2

1. Convert 18.25_{10} to binary.

2. Convert 13.5_{10} to binary.

3. Convert 40.375_{10} to binary.

A3. Non-Decimal to Non-Decimal Conversion

1. Convert 24.13_5 to base-3.

2. Convert 1011.101_2 to base-8.

3. Convert $A.C_{16}$ to base-8.

Section B — Arithmetic in Non-Decimal Bases

Perform the following operations in their respective bases:

1. $1011_2 + 1101_2$

2. $11010_2 - 1011_2$

3. $157_8 + 24_8$

4. $725_9 - 348_9$

5. $A3_{16} + 1C_{16}$

Section C — Algorithm Design & Flowcharts

C1. Largest Digit of a Number

Design an algorithm and draw its flowchart to read an integer from the user and print its largest digit.

C2. Checking Whether the Sum of Digits Is Prime or Composite

Design an algorithm and draw its flowchart to read a number, compute the sum of its digits, and determine whether this sum is prime or composite.

C3. Fibonacci Sequence up to the n-th Term

Design an algorithm and draw its flowchart to read an integer n and print the Fibonacci sequence up to the n-th term.

C4. Counting Positive Numbers Until the User Enters −1

Design an algorithm and draw its flowchart that repeatedly reads integers until −1 is entered, and prints how many of the entered numbers were positive.

C5. Sum of All Prime Numbers Up to n

Design an algorithm and draw its flowchart to compute the sum of all prime numbers from 1 to n.