23ECB204 – DIGITAL ELECTRONICS AND MICROPROCESSOR

UNIT -1 COMBINATIONAL LOGIC

23ECB204/ DE & MP /V.AISHWARYA, AP/ECE / Unit 1/ Decimal Adder

Introduction to Decimal Adder

- The decimal adder is an essential tool for adding decimal numbers quickly and accurately.

- It helps us perform basic arithmetic operations and understand the fundamental concepts of the decimal number system.

Decimal Number System

Place Value

In the decimal system, the value of a digit depends on its position or place value - ones, tens, hundreds, and so on.

Base 10

The decimal system is a base 10 number system, using the digits 0-9. Each place value is a power of 10.

Decimal Points

The decimal point separates the whole number part from the fractional part, allowing us to express both integer and decimal values.

Addition of Whole Numbers

Place Values

Line up the numbers vertically, ensuring the place values (ones, tens, hundreds, etc.) are properly aligned.

Carry Over

If the sum in a column exceeds 9, carry the appropriate number to the next column on the left.

1   **2**   **3**

Add Digits

Add the digits in each column, starting from the rightmost column (the ones place).

Addition of Decimal Fractions

Align Decimal Points

Ensure the decimal points are perfectly aligned when adding decimal fractions.

Add Digits

Add the digits in each column, starting from the rightmost column (the ones place).

Decimal in Result

The decimal point in the final result should be directly below the decimal points in the original numbers.

Carrying in Decimal Addition

1 **Carry to Next Column**

When the sum in a column exceeds 9, carry the appropriate number to the next column on the left.

2 **Align Decimal Points**

Ensure the decimal points remain properly aligned throughout the addition process.

3 **Decimal in Final Result**

The decimal point in the final result should be directly below the decimal points in the original numbers.

Aligning Decimal Places

1

2

Whole Numbers

Line up the whole number digits, ensuring the place values are properly aligned.

Decimal Points

Align the decimal points of the numbers being added.

3

Decimal Fractions

Ensure the decimal fraction digits are also properly aligned.

Step-by-Step Decimal Addition

1. Align Decimal Points

Ensure the decimal points of the numbers being added are perfectly aligned.

2. Add Digits

Add the digits in each column, starting from the rightmost column (the ones place).

3. Handle Carries

If the sum in a column exceeds 9, carry the appropriate number to the next column on the left.

4. Decimal in Result

The decimal point in the final result should be directly below the decimal points in the original numbers.