

Sipna College of Engineering & Technology, Amravati.
Department of Computer Science & Engineering

Branch:- Computer Sci. & Engg.
Subject:- A&DE

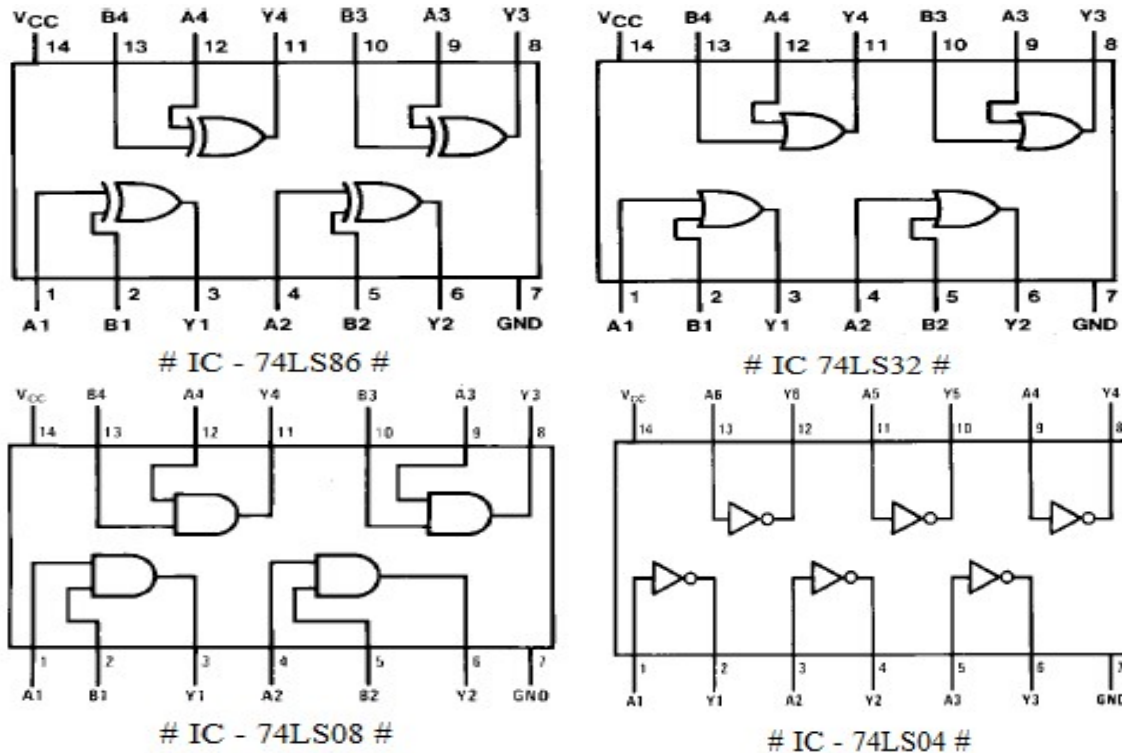
Class :- II Year
Sem :- III

Experiment No -

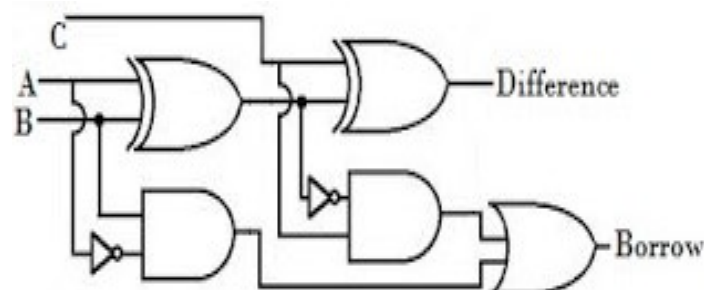
Name of the experiment: Study and realize the full subtractor and half subtractor using IC 7408, IC 7432, IC 7486, IC 7404

Apparatus: Breadboard, connecting wires
IC 74LS08(AND GATES),
IC 74LS32(OR GATE),
IC 74LS86(EX-OR GATES),
IC 74LS04(NOT GATES)

Structure of IC:

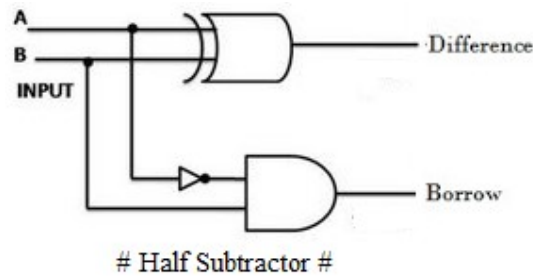


Logical Diagram:



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Full Subtractor



Theory:

FULL SUBTRACTOR:

Full subtractor is a circuit, which performs subtractions of three, inputs that is A_n , B_n , C_n and gives the output as difference and borrow. Where A_n , B_n , C_n are the n th order bits.

From the truth table the equations for borrow and difference are:

$$\text{DIFFERENCE} = \sum m(1, 2, 4, 7)$$

$$\text{BORROW} = \sum m(1, 2, 3, 7)$$

Minimising these two equations using two variables k-map is

$$D = A'BC' + AB'C' + A'B'C + ABC$$

$$B = A'B + A'C + BC$$

HALF-SUBTRACTOR:

A logic circuit for the addition of two one-bit numbers is referred to as half adder. Figure shows addition process and reproduces a truth table. Here A and B are two input and DIFFERENCE and BORROW are two outputs. From the truth table we obtain a logical expression for S and C . Outputs are

$$S = A'B + AB'$$

$$C = A'B$$

Procedure:

- 1) Take the breadboard and adjust the power supply up to 15v.
- 2) Implement the circuit as per the circuit diagram on the breadboard using IC's for AND, OR, EX-OR and NOT gate and connecting wires.
- 3) Verify outputs for different combination of input as per truth table.

Truth Table:

Full Subtractor:

Input			Output	
A	B	Cin	Difference	Borrower
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

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Half Subtractor:

Half Sub-tractor			
Inputs		Outputs	
An	Bn	Difference	Borrower
0	0		
0	1		
1	0		
1	1		

Conclusion:

After performing the experiment the truth table of full subtraction & half subtraction have been verified.

Result:

Thus we have designed the full subtractor and half subtractor circuit using AND, OR, EX-OR, NOT gates and verified the truth table.