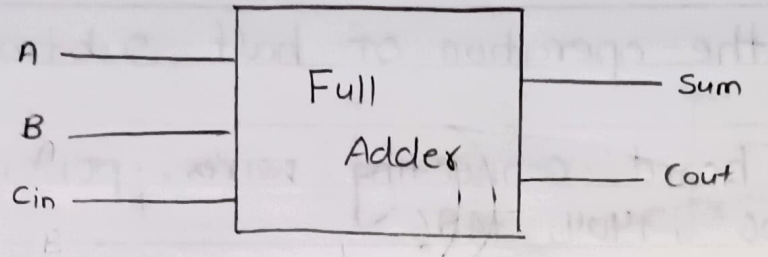
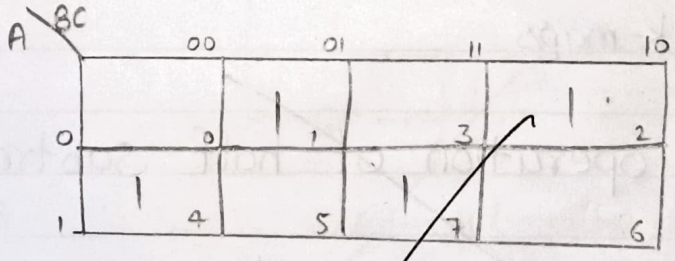


Truth table of full adder

INPUTS			OUTPUTS	
A	B	Cin	Sum	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

K-map for Sum



$$S = A\bar{B}\bar{C}in + \bar{A}\bar{B}Cin + \bar{A}B\bar{C}in$$

$$= Cin\,(AB + \bar{A}\bar{B}) + \bar{C}in\,(A\bar{B} + \bar{A}B)$$

$$= Cin\,(\overline{A \oplus B}) + \bar{C}in\,(A \oplus B)$$

Experiment 3 (A)

DATE
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Aim: To verify the operation of full adder.

Apparatus: Bread Board, connecting wires, power supply, IC 7408, 7486, 7432, LED, display board.

Theory: It is a logic gate circuit that outputs three binary digits as its input and generators two output i.e sum and carry inputs from previous stage.

$$\text{Sum} = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$
$$= A \oplus B \oplus C$$

$$\text{Carry} \Rightarrow C_{out} = BC + AC + AB$$

Full adder output is sum + carry Out

i.e $\Rightarrow (A \oplus B \oplus C) + (AB + BC + AC)$

Procedure:

- Connect circuit diagram as per the circuit diagram.
- Input IC's on bread board.
- Give V_{cc} & ground to all IC's
- Verify the truth table.

Let,

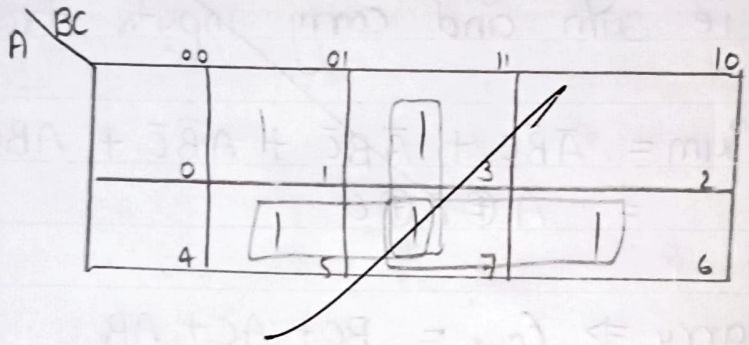
$A \oplus B = x$

$= C_{in}\bar{x} + \bar{C}_{in}x$

$= x + C_{in}$

$S = A \oplus B \oplus C_{in}$

K-map for Carry

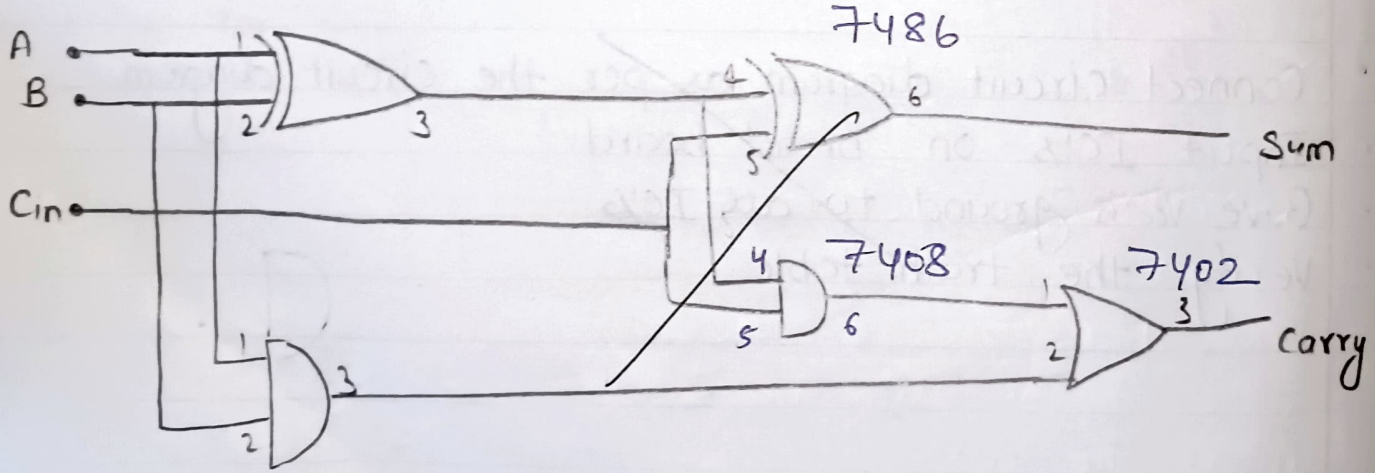


$C_{out} = BC_{in} + AC_{in} + AB$

$= A\bar{B}C_{in} + ABC_{in} + ABC_{in} + AB\bar{C}_{in}$

$= C_{in}(A\bar{B} + \bar{A}B) + AB(C_{in} + \bar{C}_{in})$

$C_{out} = AB + C_{in}(A \oplus B)$



Result: operation of full adder has been verified.

Precautions:
- Iput the IC carefully in bread board without damaging.
- Switch off bread board when not in use.