

# FULL ADDER

(i) **Definition** -The full adder is a combinational circuit which is used to perform BINARY addition of three single bits.

(ii) **No. of inputs and outputs**

Number of inputs – 3

Number of outputs – 2

(iii) **Assigning symbols**

Symbols of inputs – X, Y, Z

Symbols of outputs – S (sum) and C (carry)

(iv) **Truth table**

INPUT			OUTPUT	
X	Y	Z	S	C
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

(v) **Boolean equation**

$$S = X'Y'Z + X'YZ' + XY'Z' + XYZ$$

$$= X' (Y'Z + YZ') + X (Y'Z' + YZ)$$

$$= X' (Y \text{ (XOR) } Z) + X (Y \text{ (XNOR) } Z)$$

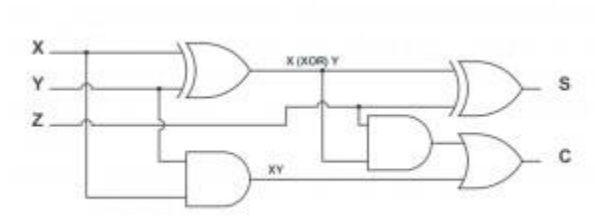
$$= X \text{ (XOR) } Y \text{ (XOR) } Z$$

$$C = X'YZ + XY'Z + XYZ' + XYZ$$

$$= Z (X'Y + XY') + XY (Z' + Z)$$

$$= Z (X \text{ (XOR) } Y) + XY$$

(vi) **Logic Diagram**



Source: <http://www.knowelectronics.org/full-adder/>