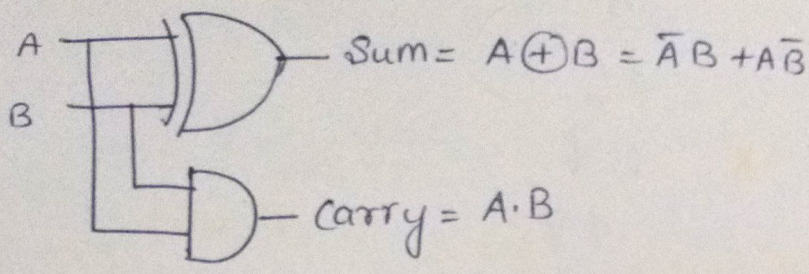
HA

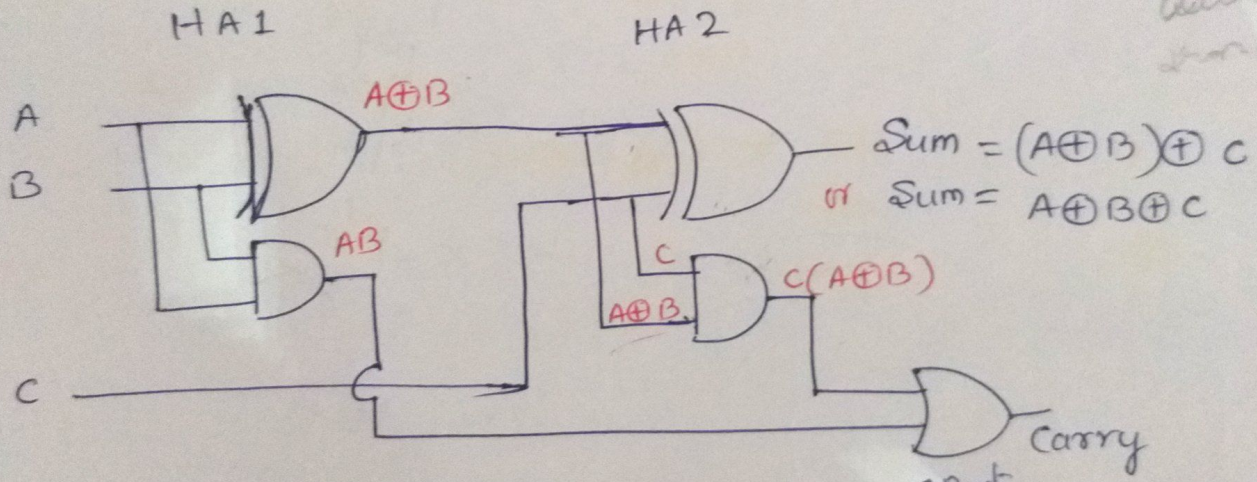


FA

Sum = $(A \oplus B) \oplus C$, Carry = $AB + BC + CA$

$= AB + C($

FA Using 2 HA's



OR gate

Carry = $AB + BC + CA$

$= AB + BC(A + \bar{A}) + CA(B + \bar{B})$ $\quad \because A + \bar{A} = 1$, $B + \bar{B} = 1$

$= AB + AB\bar{C} + \bar{A}BC + AB\bar{C} + A\bar{B}C$

$= AB + ABC + \bar{A}BC + A\bar{B}C$

$= AB(1 + C) + C(\bar{A}B + A\bar{B})$ $\quad (1 + C = 1)$

Carry $= AB + C(A \oplus B)$