**AIM: TO IMPLEMENT HALF SUBTRACTOR AND FULLSUBTRACTOR**

**HALFSUBTRACTOR**

library IEEE;

use IEEE.STD\_LOGIC\_1164.ALL;

entity half\_sub is

port( A, B : in std\_logic;

DIFF, Borrow : out std\_logic);

end entity;

architecture dataflow of half\_sub is

begin

DIFF <= A xor B;

Borrow <= (not A) and B

end architecture;

**HALF SUBTRACTOR TESTBENCH CODE**

library IEEE;

use IEEE.STD\_LOGIC\_1164.ALL;

entity half\_sub\_tb is

end entity;

architecture tb of half\_sub\_tb is

component half\_sub is

port( A, B : in std\_logic;

DIFF, Borrow : out std\_logic);

end component;

signal A, B, DIFF, Borrow : std\_logic;

begin

uut: half\_sub port map(

A => A, B => B,

DIFF => DIFF,

Borrow => Borrow);

stim: process

begin

A <= '0';

B <= '0';

wait for 20 ns;

A <= '0';

B <= '1';

wait for 20 ns;

A <= '1';

B <= '0';

wait for 20 ns;

A <= '1';

B <= '1';

wait for 20 ns;

wait;

end process;

end tb;

**FULLSUBTRACTOR**

library IEEE;

use IEEE.STD\_LOGIC\_1164.ALL;

entity full\_sub is

port( A, B, C : in std\_logic;

DIFF, Borrow : out std\_logic);

end entity;

architecture dataflow of full\_sub is

begin

DIFF <= (A xor B) xor C;

Borrow <= ((not A) and (B or C)) or (B and C);

end dataflow;

**FULLSUBTRACTOR TESTBENCH CODE**

library IEEE;

use IEEE.STD\_LOGIC\_1164.ALL;

entity full\_sub\_tb is

end entity;

architecture tb of full\_sub\_tb is

component full\_sub is

port( A, B, C : in std\_logic;

DIFF, Borrow : out std\_logic);

end component;

signal A, B, C, DIFF, Borrow: std\_logic;

begin

uut: full\_sub port map(

A => A, B => B, C => C,

DIFF => DIFF,

Borrow => Borrow);

stim: process

begin

A <= '0';

B <= '0';

C <= '0';

wait for 20 ns;

A <= '0';

B <= '0';

C <= '1';

wait for 20 ns;

A <= '0';

B <= '1';

C <= '0';

wait for 20 ns;

A <= '0';

B <= '1';

C <= '1';

wait for 20 ns;

A <= '1';

B <= '0';

C <= '0';

wait for 20 ns;

A <= '1';

B <= '0';

C <= '1';

wait for 20 ns;

A <= '1';

B <= '1';

C <= '0';

wait for 20 ns;

A <= '1';

B <= '1';

C <= '1';

wait for 20 ns;

wait;

end process;

end tb;