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## Digital Systems LAB Assignment-5

**Question 1)** Design a 4-bit comparator that gives a 1 when both the values are equal, 0 if they are unequal. The 4-bit comparator has A[3:0] and B[4:0] inputs, and a single output f. If A=B, f=1, otherwise f=0. You have to synthesize and show the implementation on FPGA.

### 4 Bit Comparator

```
`timescale 1ns / 1ps

module comparator(A, B, f);
    input [3:0]A;
    input [3:0]B;
    output f;

    assign f= (A==B) ? 1:0;

endmodule
```

### Test Bench

```

`timescale 1ns / 1ps

module test_bench();
reg  [3:0]A;
reg  [3:0]B;
wire f;

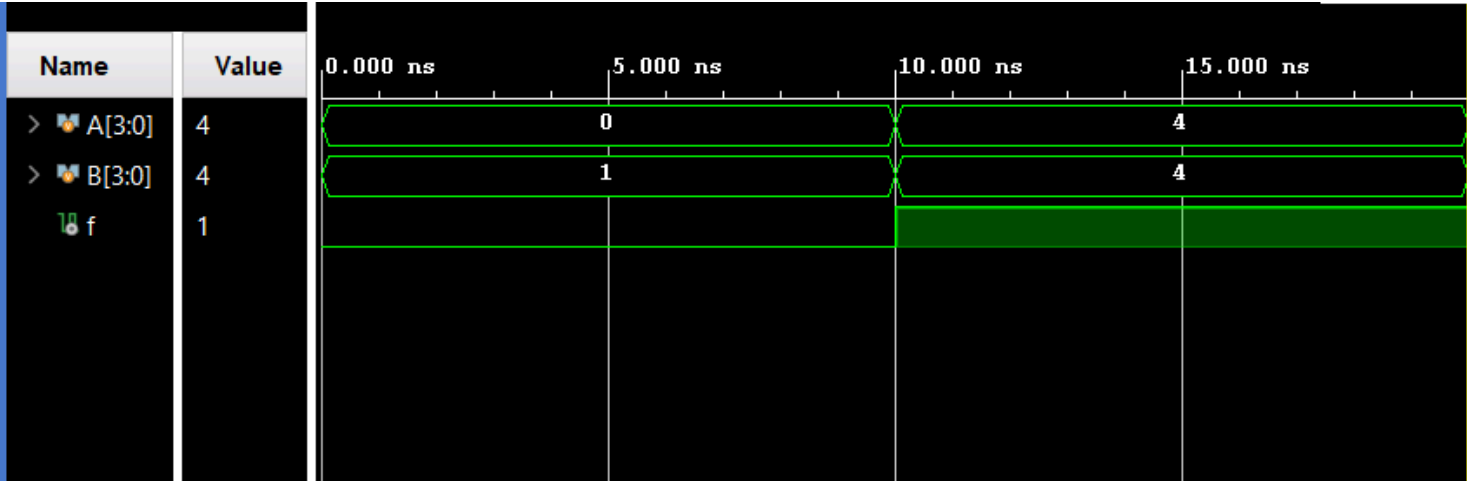
comparator uut(A,B,f);

initial
begin
A= 4'b0000; B=4'b0001;#10
A= 4'b0100; B=4'b0100;#10

$finish();

```

## Simulation



# Constrain.xdc

Properties

Hardware

comparator.v × test\_bench.v × Constrain.xdc ×

C:/Users/patel/Lab5/Lab5.srcs/constrs\_1/new/Constrain.xdc

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1

set\_property IOSTANDARD LVCMOS33 [get\_ports f]

2

set\_property IOSTANDARD LVCMOS33 [get\_ports {A[3]}]

3

set\_property IOSTANDARD LVCMOS33 [get\_ports {A[2]}]

4

set\_property IOSTANDARD LVCMOS33 [get\_ports {A[1]}]

5

set\_property IOSTANDARD LVCMOS33 [get\_ports {A[0]}]

6

set\_property IOSTANDARD LVCMOS33 [get\_ports {B[3]}]

7

set\_property IOSTANDARD LVCMOS33 [get\_ports {B[2]}]

8

set\_property IOSTANDARD LVCMOS33 [get\_ports {B[1]}]

9

set\_property IOSTANDARD LVCMOS33 [get\_ports {B[0]}]

10

set\_property PACKAGE\_PIN R2 [get\_ports {A[3]}]

11

set\_property PACKAGE\_PIN T1 [get\_ports {A[2]}]

12

set\_property PACKAGE\_PIN U1 [get\_ports {A[1]}]

13

set\_property PACKAGE\_PIN W2 [get\_ports {A[0]}]

14

set\_property PACKAGE\_PIN R3 [get\_ports {B[3]}]

15

set\_property PACKAGE\_PIN T2 [get\_ports {B[2]}]

16

set\_property PACKAGE\_PIN T3 [get\_ports {B[1]}]

17

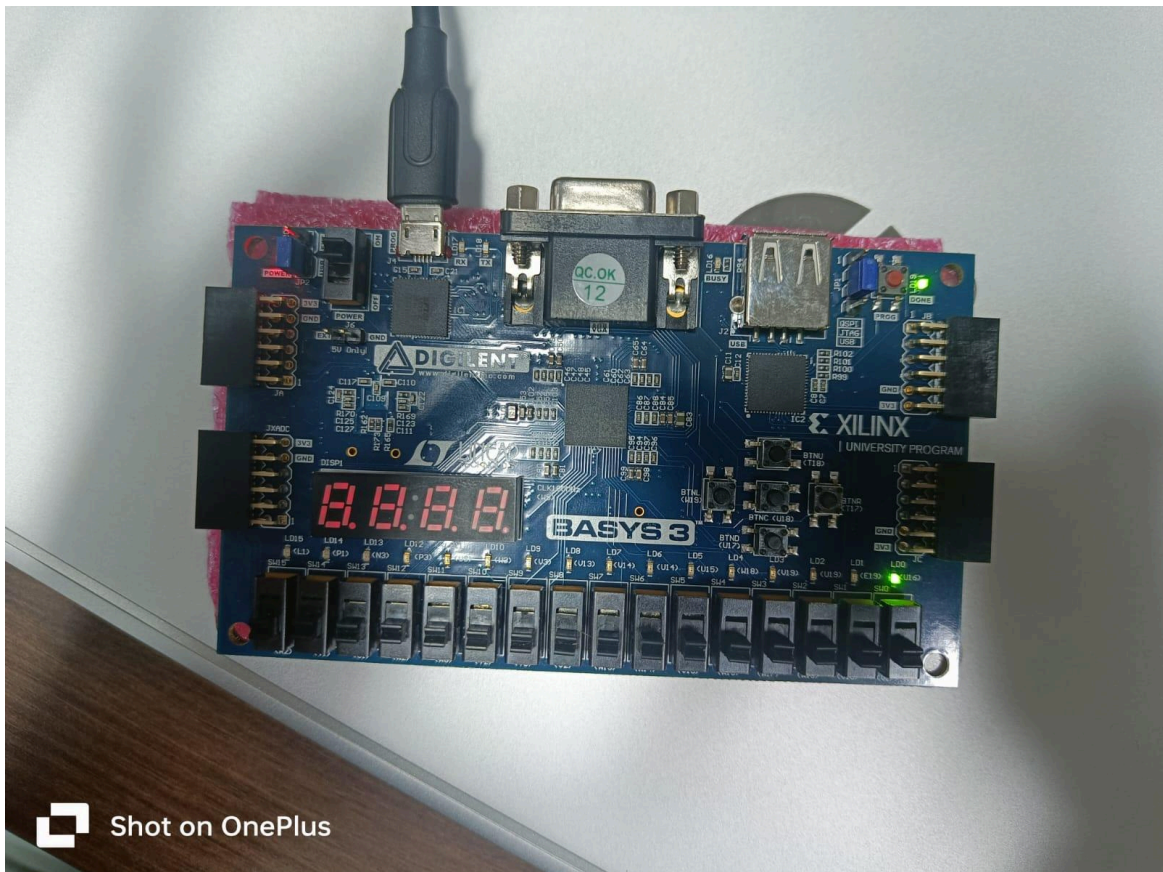
set\_property PACKAGE\_PIN V2 [get\_ports {B[0]}]

18

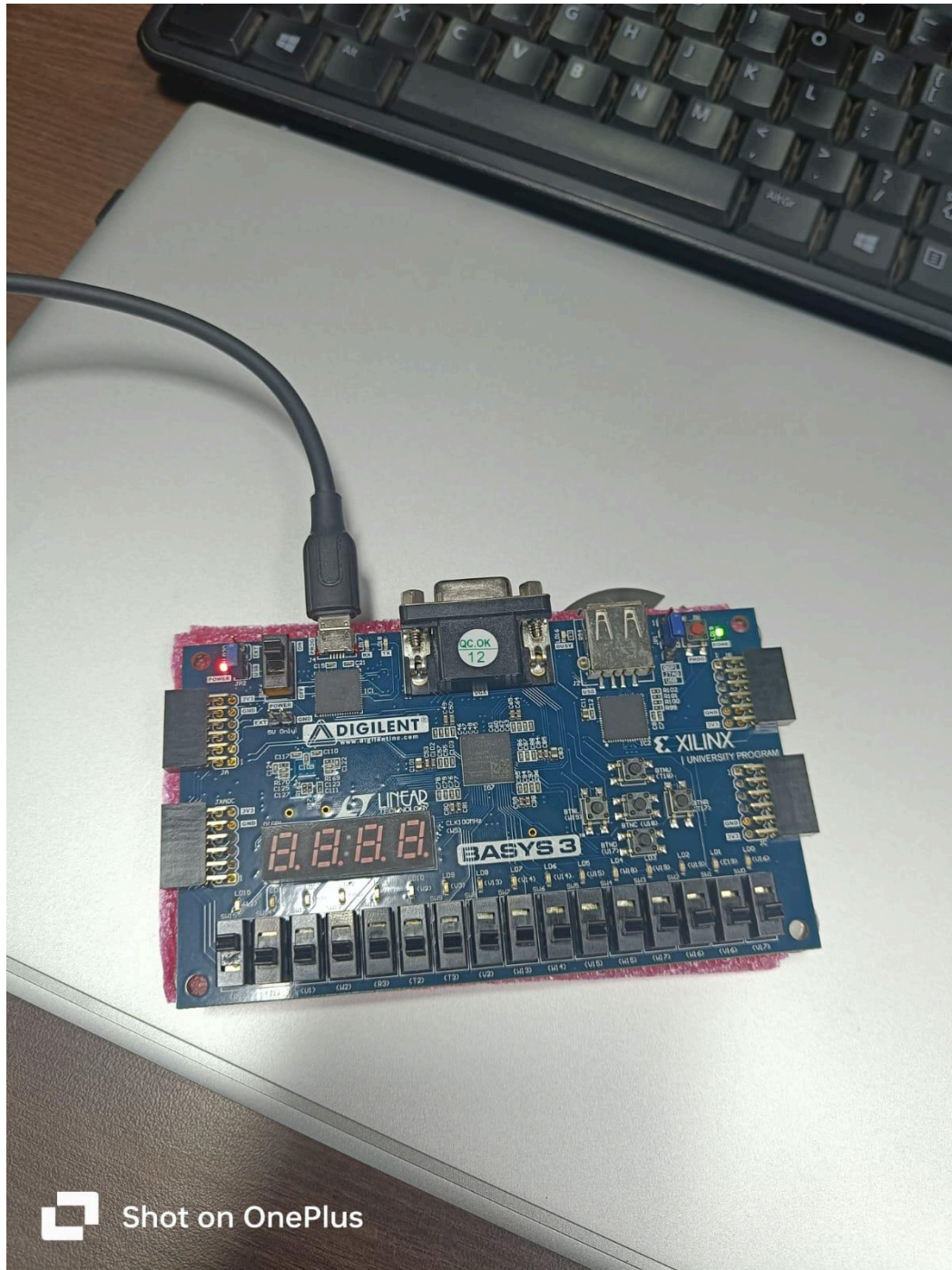
set\_property PACKAGE\_PIN U16 [get\_ports f]

19

A[3]=R[2]  
A[2]=T[1]  
A[1]=U[1]  
A[0]=W[2]  
B[3]=R[3]  
B[2]=T[2]  
B[1]=T[3]  
B[0]=V[2]  
f=Led=U[16]



A=0000  
B=0000  
Led is Blinking



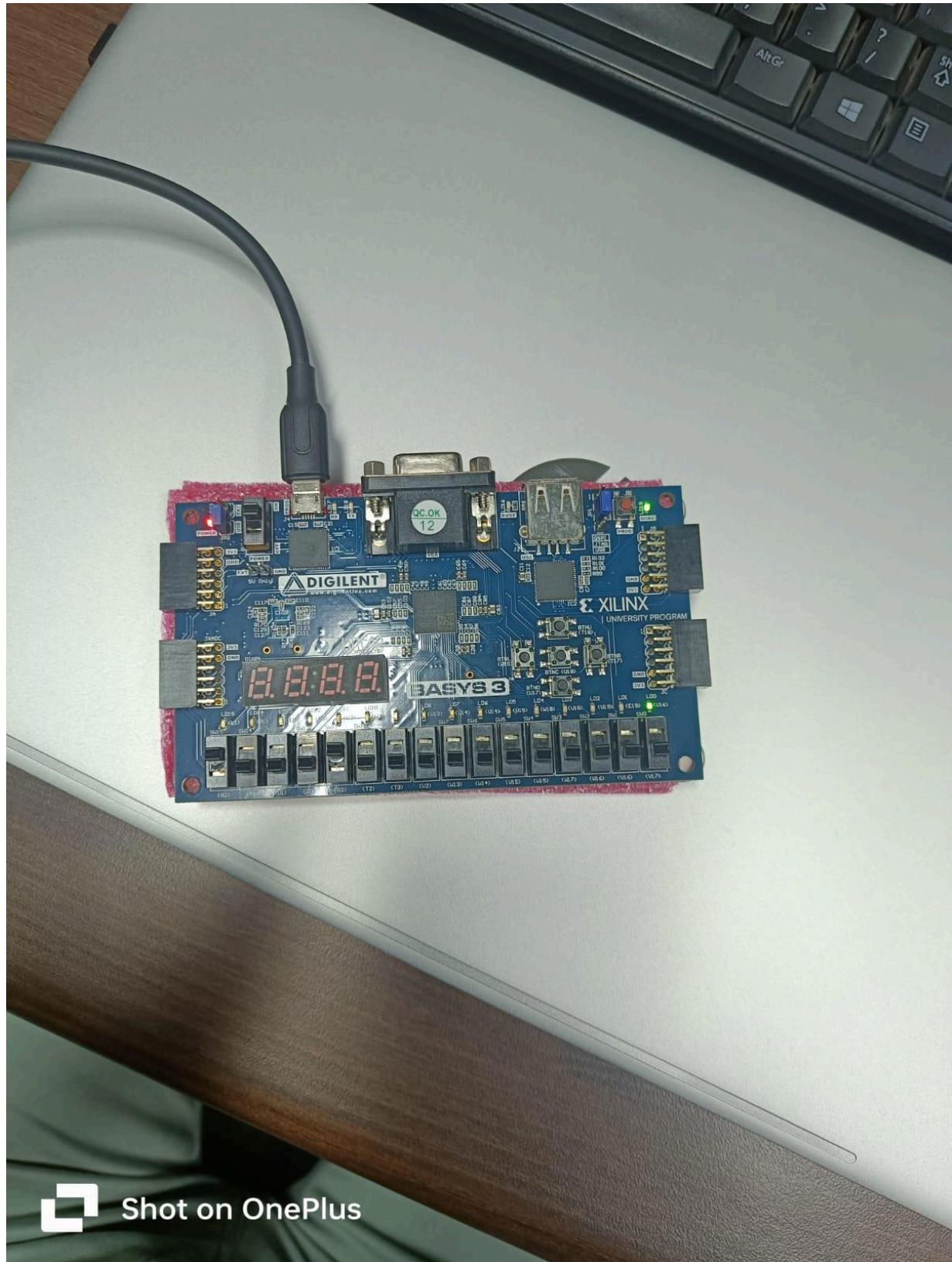
Shot on OnePlus

A=1000

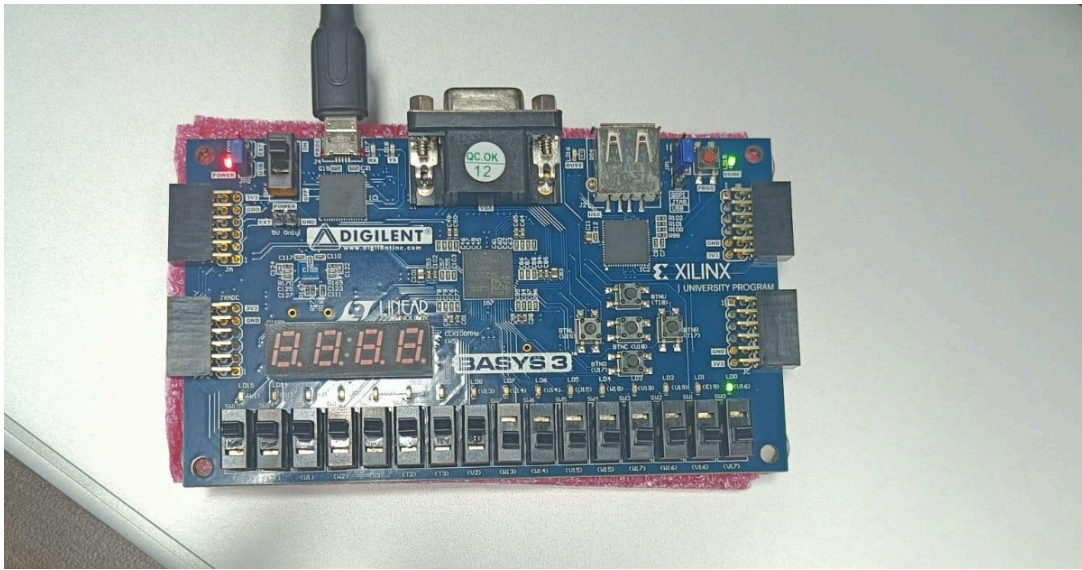
B=0000

Led is Not Blinking





A=1000  
B=1000  
Led is Blinking



A=1111  
B=1111  
Led is Blinking