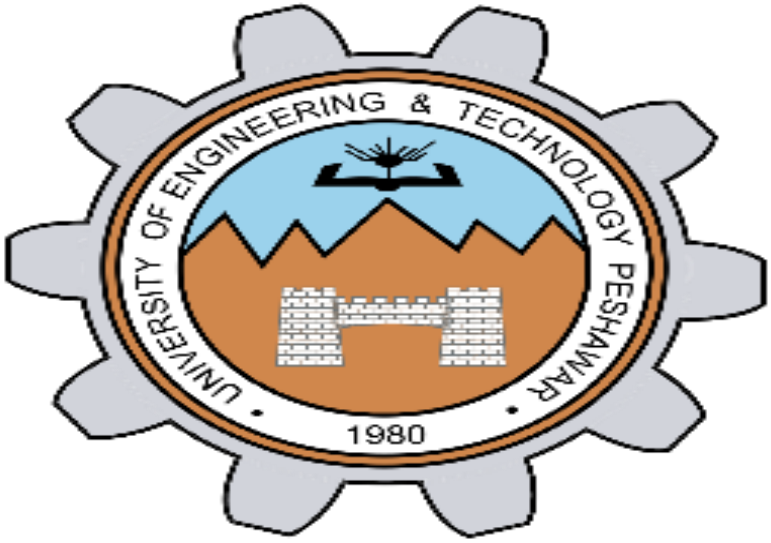
University of Engineering & Technology, Peshawar

DEPARTMENT OF COMPUTER SYSTEM ENGINEERING

Fall 2021



LAB 09

Modelsim Tasks

Computer Organization and Architecture Lab

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Task1 : Model 2x4 Decoder using MODELSIM

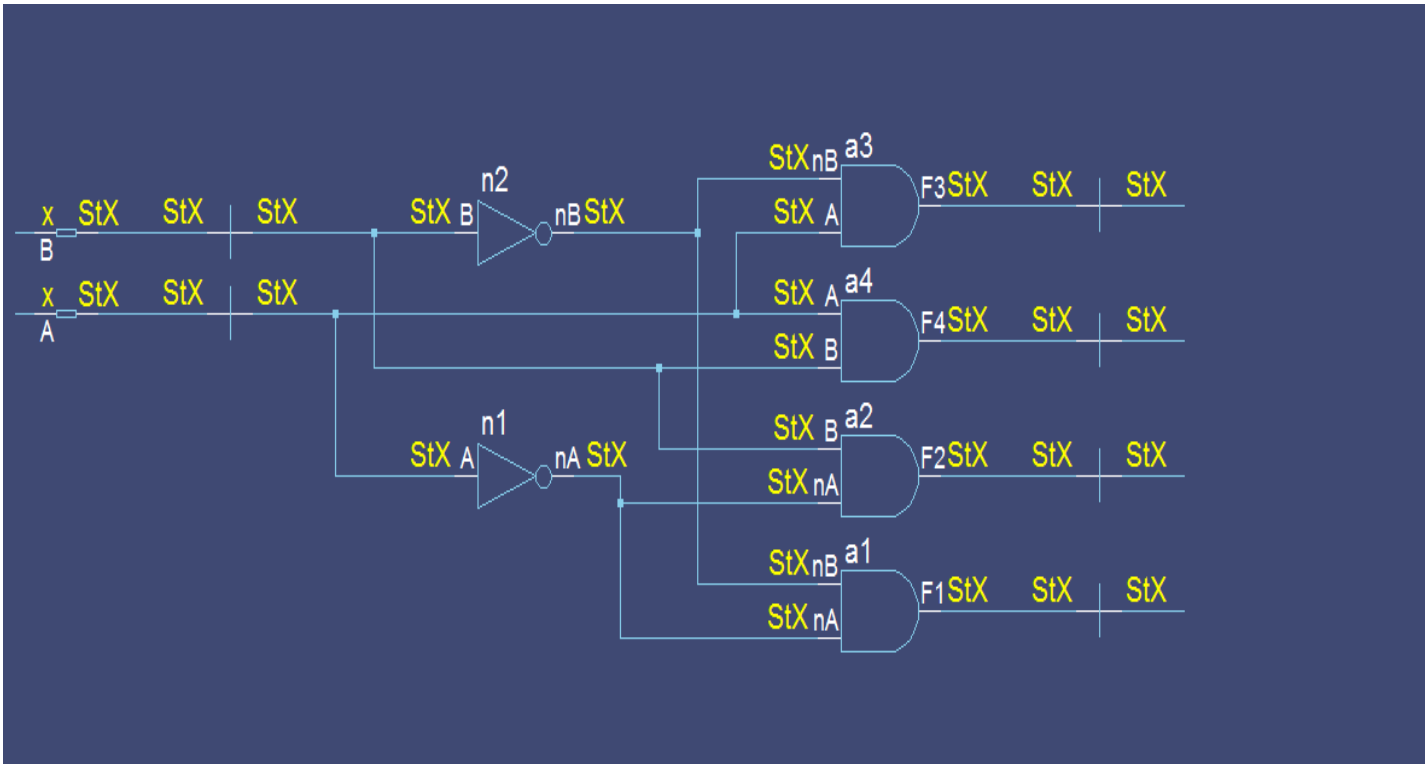
MODULE FUNCTION:(2x4 Decoder)

```
module decoder2x4(A,B,F1,F2,F3,F4);
input A,B;
output F1,F2,F3,F4;
wire nA,nB;

not n1(nA,A);
not n2(nB,B);

and a1(F1,nA,nB);
and a2(F2,nA,B);
and a3(F3,A,nB);
and a4(F4,A,B);
endmodule
```

MODULE STIM: (2x4 Decoder)

```
module stim();
reg A,B;
wire F1,F2,F3,F4;
decoder2x4 t(A,B,F1,F2,F3,F4);
initial
begin
$display("A B F1 F2 F3 F4");

A=0; B=0;
#10 $display("%b %b %b %b %b %b  ",A,B,F1,F2,F3,F4);
A=0; B=1;
#10 $display("%b %b %b %b %b %b  ",A,B,F1,F2,F3,F4);
A=1; B=0;
#10 $display("%b %b %b %b %b %b  ",A,B,F1,F2,F3,F4);
A=1; B=1;
#10 $display("%b %b %b %b %b %b",A,B,F1,F2,F3,F4);
end
endmodule
```

Output:




```
# vsim work.stim
# Loading work.stim
# Loading work.decoder2x4
run
# A B F1 F2 F3 F4
# 0 0 1 0 0 0
# 0 1 0 1 0 0
# 1 0 0 0 1 0
# 1 1 0 0 0 1
quit -sim
```

Task2 : Model 3x8 Decoder using MODELSIM

MODULE FUNCTION:(3x8 Decoder)

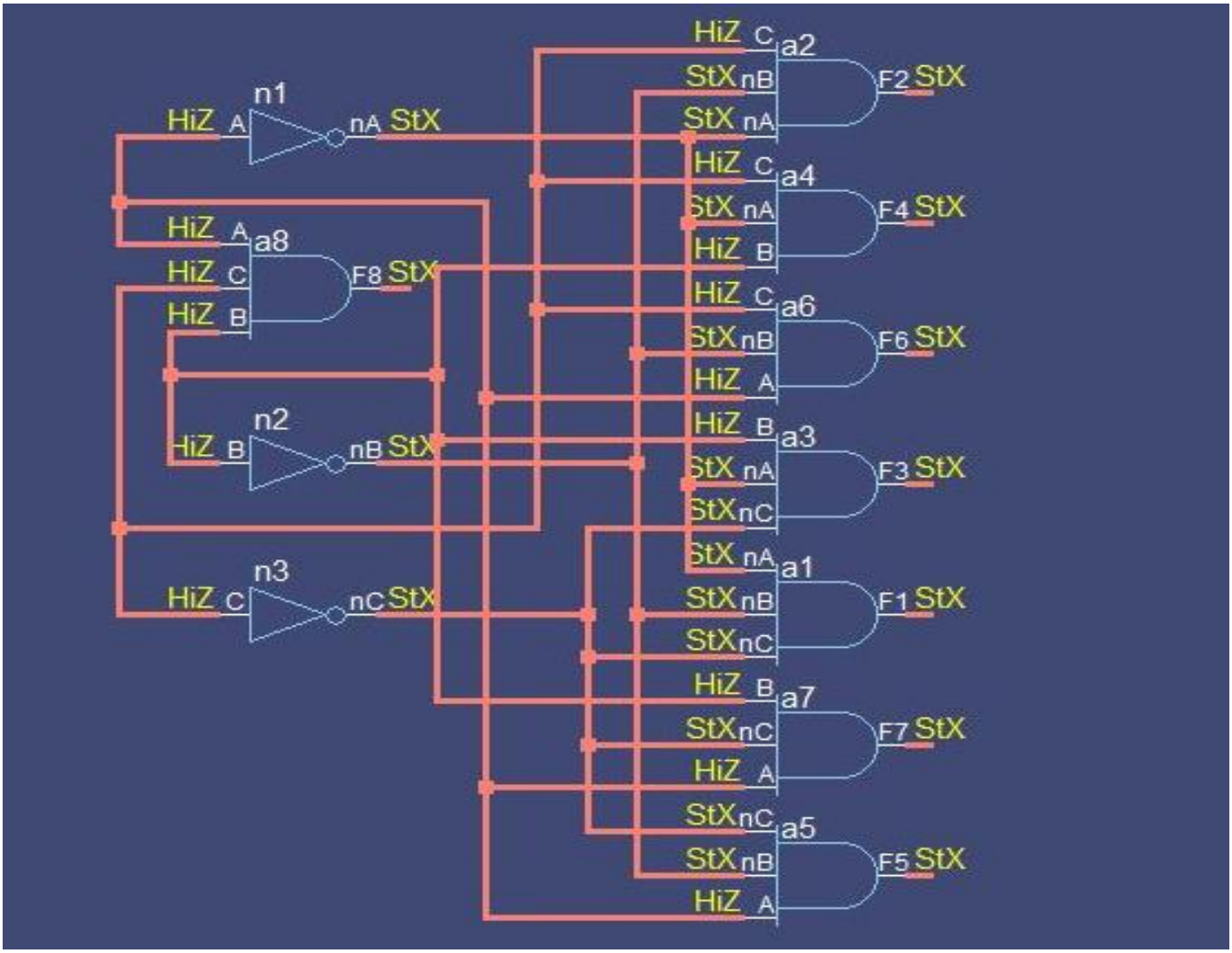
```
module decoder3x8(A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);

input A,B,C;

output F1,F2,F3,F4,F5,F6,F7,F8;

wire nA,nB,nC;


not n1(nA,A);

not n2(nB,B);

not n3(nC,C);


and a1(F1,nA,nB,nC);

and a2(F2,nA,nB,C);

and a3(F3,nA,B,nC);

and a4(F4,nA,B,C);

and a5(F5,A,nB,nC);

and a6(F6,A,nB,C);

and a7(F7,A,B,nC);

and a8(F8,A,B,C);

endmodule
```

MODULE STIM: (3x8 Decoder)

```
module stim();

reg A,B,C;

wire F1,F2,F3,F4,F5,F6,F7,F8;
decoder3x8 t3x8(A,B,F1,F2,F3,F4,F5,F6,F7,F8);
initial

begin

$display("A B C F1 F2 F3 F4 F5 F6 F7 F8");


A=0; B=0;C=0;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=0; B=0;C=1;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=0; B=1;C=0;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=1; B=0;C=0;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);
```

```
A=0; B=1;C=1;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=1; B=1;C=0;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=1; B=0;C=1;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


A=1; B=1;C=1;

#10 $display("%b %b %b %b %b %b %b %b %b %b
",A,B,C,F1,F2,F3,F4,F5,F6,F7,F8);


end

endmodule
```

OUTPUT:


n1
HiZ A
nA StX
n2
HiZ B
nB StX
n3
HiZ C
nC StX
a8
HiZ A
HiZ C
HiZ B
F8 StX
a2
HiZ C
StX nB
StX nA
F2 StX
a4
StX nA
HiZ B
F4 StX
a6
HiZ C
StX nB
HiZ A
F6 StX
a3
HiZ B
StX nA
StX nC
F3 StX
a1
StX nA
StX nB
StX nC
F1 StX
a7
HiZ B
StX nC
HiZ A
F7 StX
a5
StX nC
StX nB
HiZ A
F5 StX