```
//ENCODER 4x2
module encoder4to2(i0,i1,i2,i3,y1,y0);
input i0,i1,i2,i3;
output reg y1,y0;
always@*
case({i3,i2,i1,i0})
4'b0001:{y1,y0}=2'b00;
4'b0010:{y1,y0}=2'b01;
4'b0100:{y1,y0}=2'b10;
4'b1000:{y1,y0}=2'b11;
default:{y1,y0}=2'bxx;
endcase
endmodule
```

```
//TESTBENCH:
`timescale 1ns/1ps
module enco_test;
reg i0,i1,i2,i3;
wire y1,y0;
integer □ ;
encoder4to2 encoder(i0,i1,i2,i3,y1,y0); /*INSTANTIATE THE
MODULE NAME (encoder4to2) THAT NEEDS BE TESTED WITH
INSTANTIATION NAME encoder*/
initial
begin
{ i0,i1,i2,i3}=0;
for(i=1; i<16; i=i+1)
#5 {i3,i2,i1,i0}=□ ;
#150 $finish;
end
initial
$monitor($time,"i0=%b, i1=%b, i2=%b, i3=%b, y1=%b,
y0=%b",□ i0,i1,i2,i3,y1,y0);
endmodule
```

// DECODER 2x4

```
module deco2to4(i0,i1,,y0,y1,y2,y3);
input i0,i1;
output reg y0,y1,y2,y3;
always@(*)
casex({i0,i1})
3'b00:{y0,y1,y2,y3}=4'b1000;
3'b01:{y0,y1,y2,y3}=4'b0100;
3'b10:{y0,y1,y2,y3}=4'b0010;
3'b11:{y0,y1,y2,y3}=4'b0001;
endcase
endmodule
```

```
//TESTBENCH:
`timescale 1ns/1ps
module test_decoder;
reg i0,i1;
wire y0,y1,y2,y3;
deco2to4 deco(i0,i1,y0,y1,y2,y3);
/*INSTANTIATE THE MODULE NAME(deco2to4) THAT NEEDS BE
TESTED
WITH INSTANTIATION NAME deco*/
initial
begin
{i0,i1}=0;
for(i=1;i<3;i=i+1);
#5 {i1,i0}=i;
end
initial
#150 $finish;
initial
$monitor($finish, "i0=%b,i1=%b,y0=%b,y1=%b,y2=%b,y3=%b",
i0,i1,y0,y1,y2,y3);
endmodule
```

# PRIORITY ENCODER(BEHAVIOURAL)

| $w_3$ | $w_2$ | $w_1$ | $w_0$ | $y_1$ | $y_0$ | $z$ |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | d | d | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 1 | x | 0 | 1 | 1 |
| 0 | 1 | x | x | 1 | 0 | 1 |
| 1 | x | x | x | 1 | 1 | 1 |

```
module pe(w3,w2,w1,w0,y1,y0,z);

input w3,w2,w1,w0;

output y1,y0,z;

always@*

casex({w3,w2,w1,w0}) // note it is casex not case

4'b0000:{y1,y0,z}=3'b000;

4'b0001:{y1,y0,z}=3'b001;
4'b001x:{y1,y0,z}=3'b011;
4'b01xx:{y1,y0,z}=3'b101;
4'b1xxx:{y1,y0,z}=3'b111;

endcase
endmodule
```

# PRIORITY ENCODER(BEHAVIOURAL)

```
//Test bench
`timescale 1ns/1ps
module test_priority;
reg w3,w2,w1,w0;
wire y1,y0,z;
integer i;
pe  encoder(w3,w2,w1,w0,y1,y0,z); /*INSTANTIATE THE MODULE NAME(pe)
THAT NEEDS BE TESTED WITH INSTANTIATION
NAME encoder*/
initial
begin
{w3,w2,w1,w0}=4'b0000;
for(i=1;i<16; i=i+1)
#5 {w3,w2,w1,w0}=i;
#150 $finish;
end
initial
$monitor($time,"w3=%b, w2=%b, w1=%b, w0=%b, y1=%b, y0=%b, z=%b" , w3,w2,w1,w0,y1,y0,z);
endmodule
```