

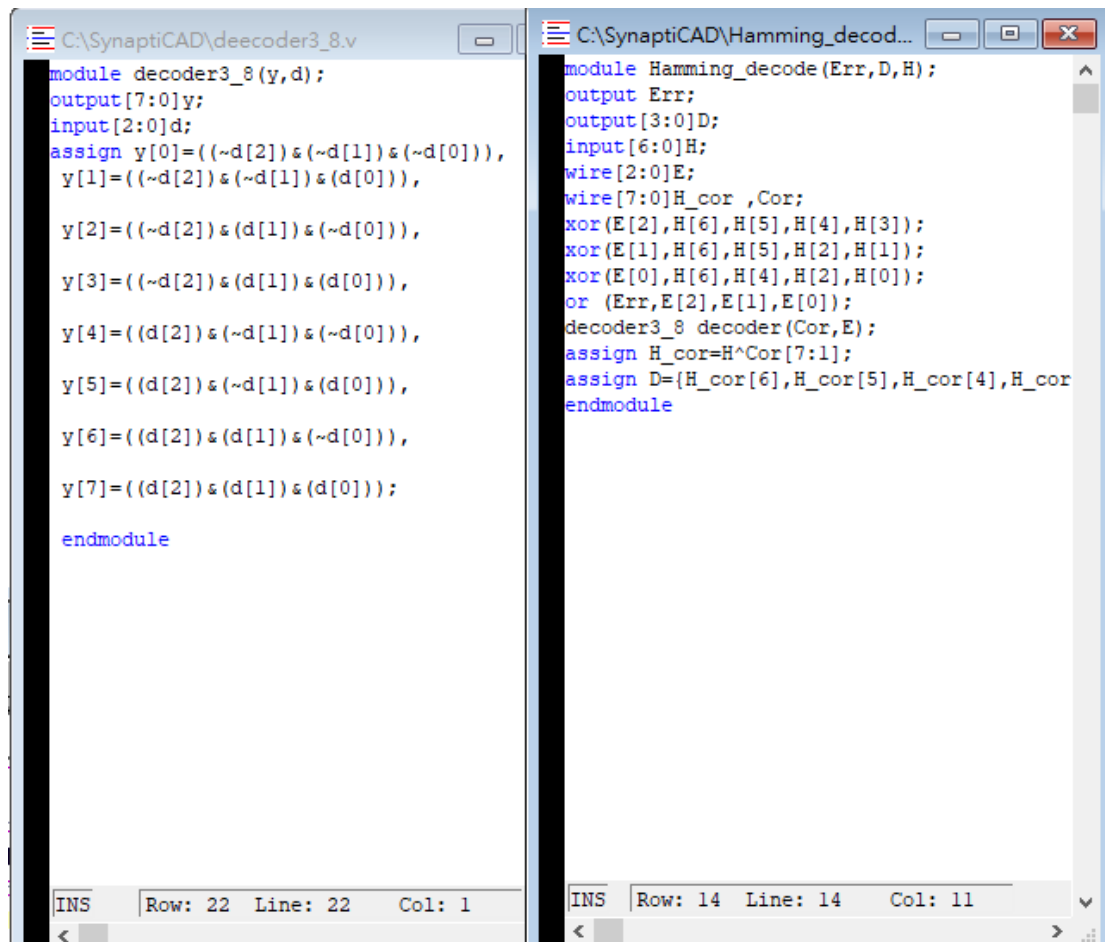
數位系統導論既實習

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程式碼內容:



The image shows two side-by-side windows from the SynaptiCAD software. The left window, titled 'C:\SynaptiCAD\decoder3\_8.v', contains Verilog code for a module named 'decoder3\_8'. It has an output 'y' of size 8 and an input 'd' of size 3. The code uses assign statements to calculate each bit of 'y' based on combinations of 'd' bits and their complements. The right window, titled 'C:\SynaptiCAD\Hamming\_decod...', contains Verilog code for a module named 'Hamming\_decode'. It has an output 'Err', an output 'D' of size 3, and an input 'H' of size 6. The code uses wire declarations, xor gates to calculate error signals 'E', an 'or' gate to combine them into 'Err', an instance of the 'decoder3\_8' module, and assign statements to calculate the corrected data 'D'.

```
module decoder3_8(y,d);
output[7:0]y;
input[2:0]d;
assign y[0]=((~d[2])&(~d[1])&(~d[0])),
y[1]=((~d[2])&(~d[1])&(d[0])),

y[2]=((~d[2])&(d[1])&(~d[0])),

y[3]=((~d[2])&(d[1])&(d[0])),

y[4]=((d[2])&(~d[1])&(~d[0])),

y[5]=((d[2])&(~d[1])&(d[0])),

y[6]=((d[2])&(d[1])&(~d[0])),

y[7]=((d[2])&(d[1])&(d[0]));

endmodule
```

```
module Hamming_decode(Err,D,H);
output Err;
output[3:0]D;
input[6:0]H;
wire[2:0]E;
wire[7:0]H_cor ,Cor;
xor(E[2],H[6],H[5],H[4],H[3]);
xor(E[1],H[6],H[5],H[2],H[1]);
xor(E[0],H[6],H[4],H[2],H[0]);
or (Err,E[2],E[1],E[0]);
decoder3_8 decoder(Cor,E);
assign H_cor=H^Cor[7:1];
assign D={H_cor[6],H_cor[5],H_cor[4],H_cor[3],H_cor[2],H_cor[1],H_cor[0]};
endmodule
```

測試檔內容:

```
C:\SynaptiCAD\test.v
module code_test;

    wire Err;
    wire[3:0]D;
    reg[6:0]H;

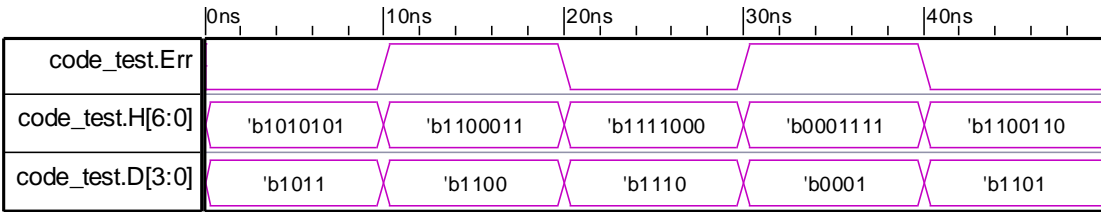
    Hamming_decode m(Err,D,H);

    initial begin
        H=7'b1010101;
        #10 H=7'b1100011;
        #10 H=7'b1011010;
        #10 H=7'b0101111;
        #10 H=7'b1101010;

        #10 $finish;
    end
endmodule
```

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波形圖:



手寫測試檔:

No. \_\_\_\_\_  
Date \_\_\_\_\_

1.  $H = 1010101$       2.  $H = 1100011$

$D_3 D_2 D_1 D_0 = 1011$        $D_3 D_2 D_1 D_0 = 1100$

$E[2] = 1 \oplus 0 \oplus 1 \oplus 0 = 0$        $E[2] = 1 \oplus 1 \oplus 0 \oplus 0 = 0$

$E[1] = 1 \oplus 0 \oplus 1 \oplus 0 = 0$        $E[1] = 1 \oplus 1 \oplus 0 \oplus 1 = 1$

$E[0] = 1 \oplus 1 \oplus 1 \oplus 1 = 0$        $E[0] = 1 \oplus 0 \oplus 0 \oplus 1 = 0$

$Err = 000 = 0$        $Err = 010 = 1$

3.  $H = 1111000$       4.  $H = 0001111$

$D_3 D_2 D_1 D_0 = 1110$        $D_3 D_2 D_1 D_0 = 0001$

$E[2] = 1 \oplus 1 \oplus 1 \oplus 0 = 1$        $E[2] = 0 \oplus 0 \oplus 0 \oplus 1 = 1$

$E[1] = 1 \oplus 1 \oplus 0 \oplus 0 = 0$        $E[1] = 0 \oplus 0 \oplus 1 \oplus 1 = 0$

$E[0] = 1 \oplus 0 \oplus 0 \oplus 0 = 1$        $E[0] = 0 \oplus 0 \oplus 1 \oplus 1 = 0$

$Err = 100 = 1$        $Err = 100 = 1$

No. \_\_\_\_\_  
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5.  $H = 1100110$

$D_3 D_2 D_1 D_0 = 1101$

$E[2] = 1 \oplus 1 \oplus 0 \oplus 0 = 0$

$E[1] = 1 \oplus 1 \oplus 1 \oplus 1 = 0$

$E[0] = 0 \oplus 1 \oplus 1 \oplus 0 = 0$

$Err = 000 = 0$

心得:  
Ok!