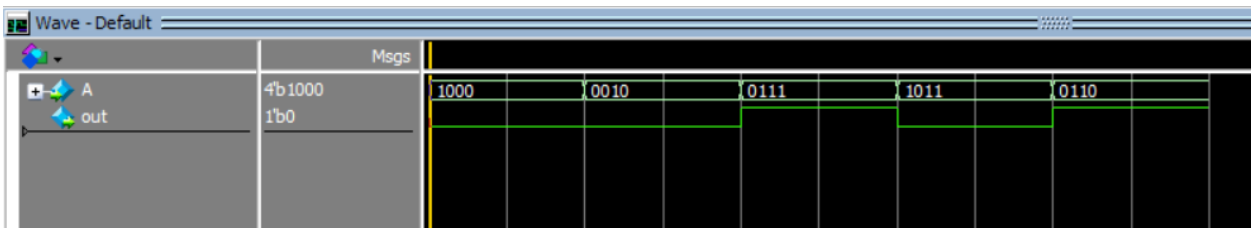
ASSAIGNMENT 1 (extra)

P1)code :

E: > Digital_course > design > session1 > HA > extra > p1.v > ...

```
1   module problem1 (A,out);
2   input [3:0] A ;
3   output reg  out ;
4
5   always @ (*) begin
6       if (A < 8 && A > 2) begin
7           out = 1'b1;
8       end
9       else out = 1'b0;
10  end
11  endmodule
```

Waveform snippet:



P2)

While b=0 → the output will be equal to the value of a (XOR act as a buffer)

While b=1 → the output will be equal to the value of a bar (XOR act as an inverter)

P3) code:

E: > Digital_course > design > session1 > HA > extra > P3.v > ...

```
1   module problem3 (A,B,C,F);
2   input A,B,C;
3   output F;
4   wire XOR , XNOR ;
5
6   xor (XOR,A,B);
7   xnor (XNOR,B,C);
8   and (F,XOR,XNOR,C);
9
10  endmodule
```

Waveform snippet:

Here is the truth table

C	B	A	A ⊕ B	B ⊙ C	F
0	0	0	0	1	0
0	0	1	1	1	1
0	1	0	1	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	1	0	0
1	1	0	1	1	1
1	1	1	0	1	0

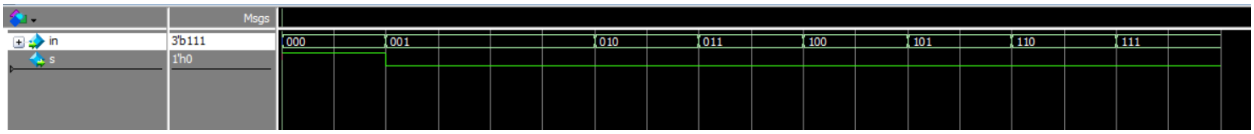
The output will be high only when the input is (110)

P4)code :

E: > Digital_course > design > session1 > HA > extra > P4.v > ...

```
1   module problem4 (in,s);
2   input [2:0] in;
3   output s;
4
5   assign s = ~|in ;
6   endmodule
```

Waveform snippet:

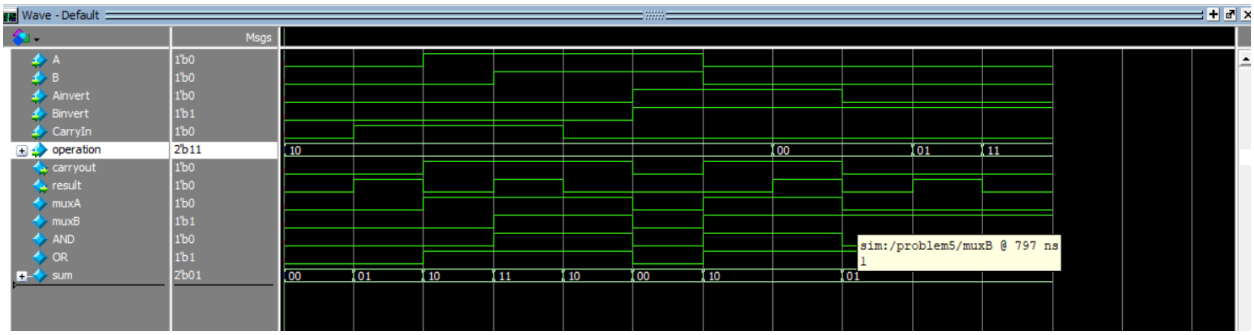


P5)code:

E: > Digital_course > design > session1 > HA > extra > p5.v > ...

```
1   module problem5 (A,B,Ainvert,Binvert,CarryIn,operation,carryout,result);
2   input A,B,Ainvert,Binvert, CarryIn ;
3   input [1:0] operation ;
4   output carryout ;
5   output reg result ;
6   wire muxA , muxB , AND , OR ;
7   wire [1:0] sum;
8   assign muxA = (Ainvert == 0) ? A: ~A ;
9   assign muxB = (Binvert == 0) ? B: ~B ;
10  and (AND,muxA,muxB);
11  or (OR,muxA,muxB);
12  assign sum = muxA + muxB +CarryIn ;
13  assign carryout = sum[1];
14
15  always @(*) begin
16      case (operation)
17          2'b00 : result = AND;
18          2'b01 : result = OR;
19          2'b10 : result = sum[0];
20          2'b11 : result = 0;
21      endcase
22  end
23  endmodule
```

Waveform snippet:



Here is the github linh for all code files used in assignment