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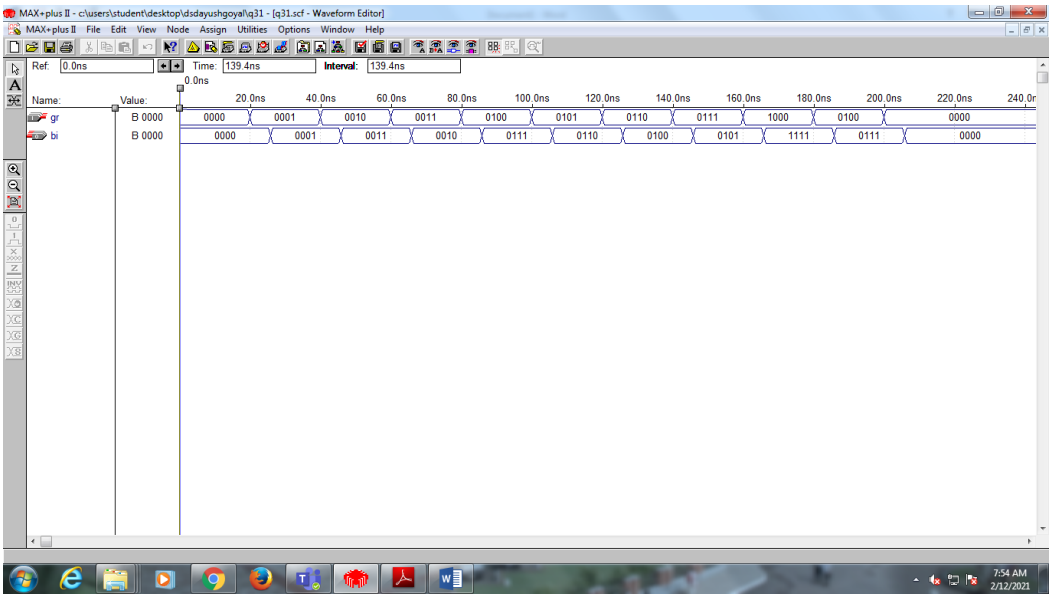
DSD Lab 3 (Week 3)

Q1)

```
module q31(gr, bi);
        parameter n = 4;
        input [n-1:0]gr;
        output [n-1:0]bi;
        reg [n-1:0]bi;
        integer i;
        always@(gr)
        begin
        bi[n-1]=gr[n-1];
        for(i=n-2;i>=0;i=i-1)
        begin
        bi[i]=bi[i+1]^gr[i];
        end
        end
endmodule
```



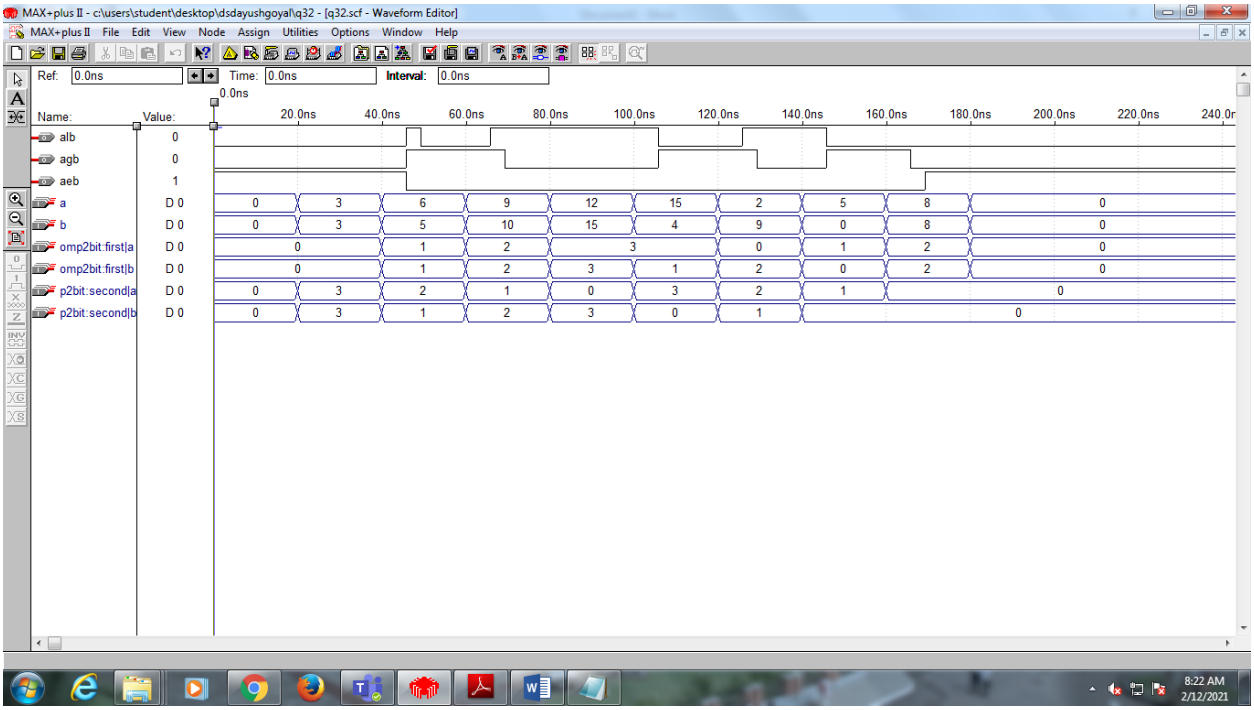
Q2)

```
module comp2bit(a,b, agb, aeb, alb);
input [1:0]a,b;
output agb, aeb, alb;
    wire w1,w2,w3,w4,w5,w6,w7,w8,w9,w10;
    not (w1,b[1]);
    and (w2,w1,a[1]);
    not (w3,b[0]);
    and (w4,a[0],w1,w3);
    and (w5,a[1],a[0],w3);
    or (agb,w2,w4,w5);

    not (w6,a[1]);
    not (w7,a[0]);
    and (w8,w6,b[1]);
    and (w9,w6,w7,b[0]);
    and (w10,w7,b[1],b[0]);
    or (alb,w8,w9,w10);
    xnor (aeb,alb,agb);
endmodule

module q32(a,b,agb,aeb,alb);
            input [3:0]a, b;
            output agb, aeb, alb;
            wire l1,e1,g1,l2,e2,g2,d1,d2;
            comp2bit first(a[3:2],b[3:2],g1,e1,l1);
            comp2bit second(a[1:0],b[1:0],g2,e2,l2);
            and (d1,e1,g2);
   and (d2,e1,l2);
```

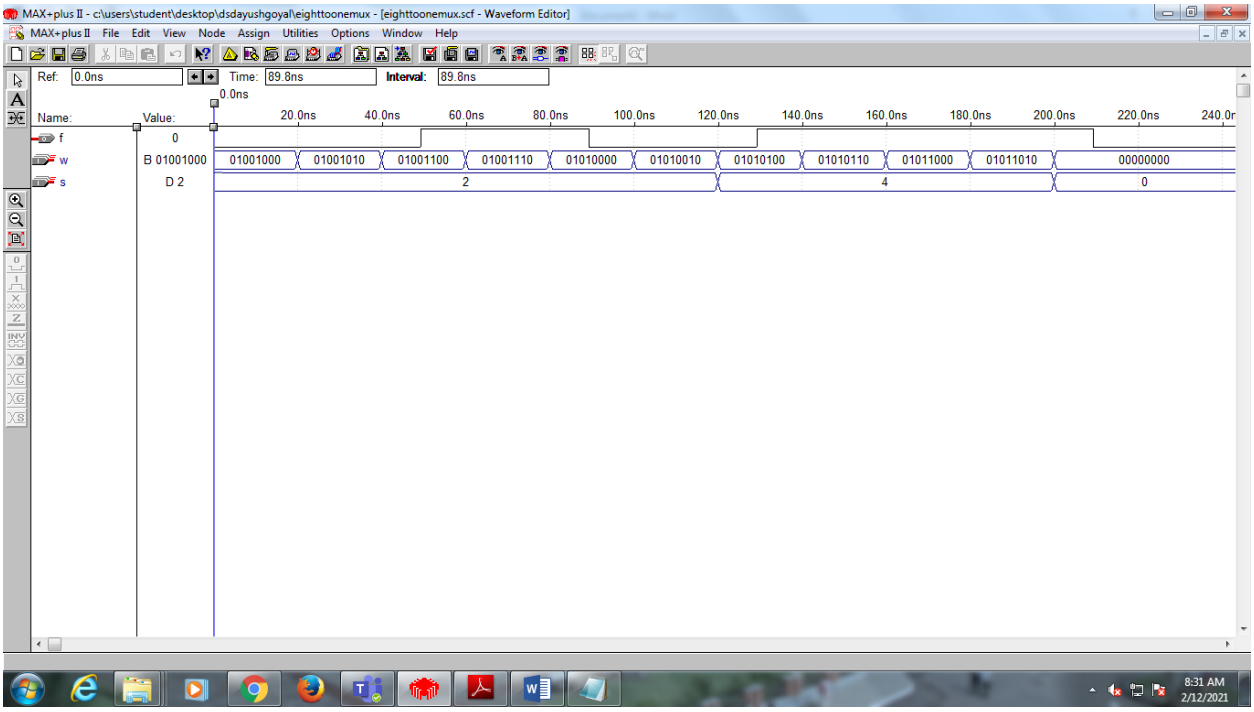
```
    or (agb,g1,d1);
    or (alb,l1,d2);
        xnor(aeb, alb, agb);
endmodule
```



Q3) i)

```
module eighttoonemux(w,s,f);
        input [7:0]w;
        input [2:0]s;
        output f;
        reg f;
        always @(w or s or f)
        begin
        case(s)
        0:f=w[0];
        1:f=w[1];
        2:f=w[2];
```

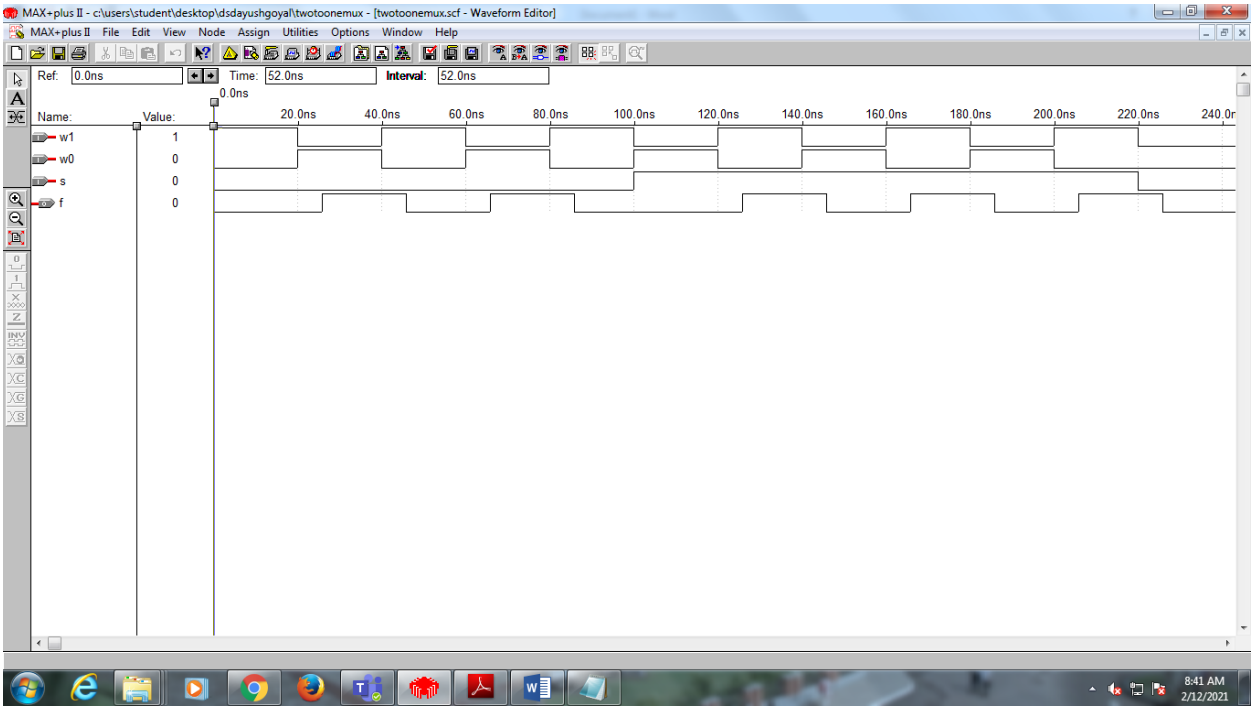
```
        3:f=w[3];
        4:f=w[4];
        5:f=w[5];
        6:f=w[6];
        7:f=w[7];
        endcase
        end
endmodule
```



Q3) ii)

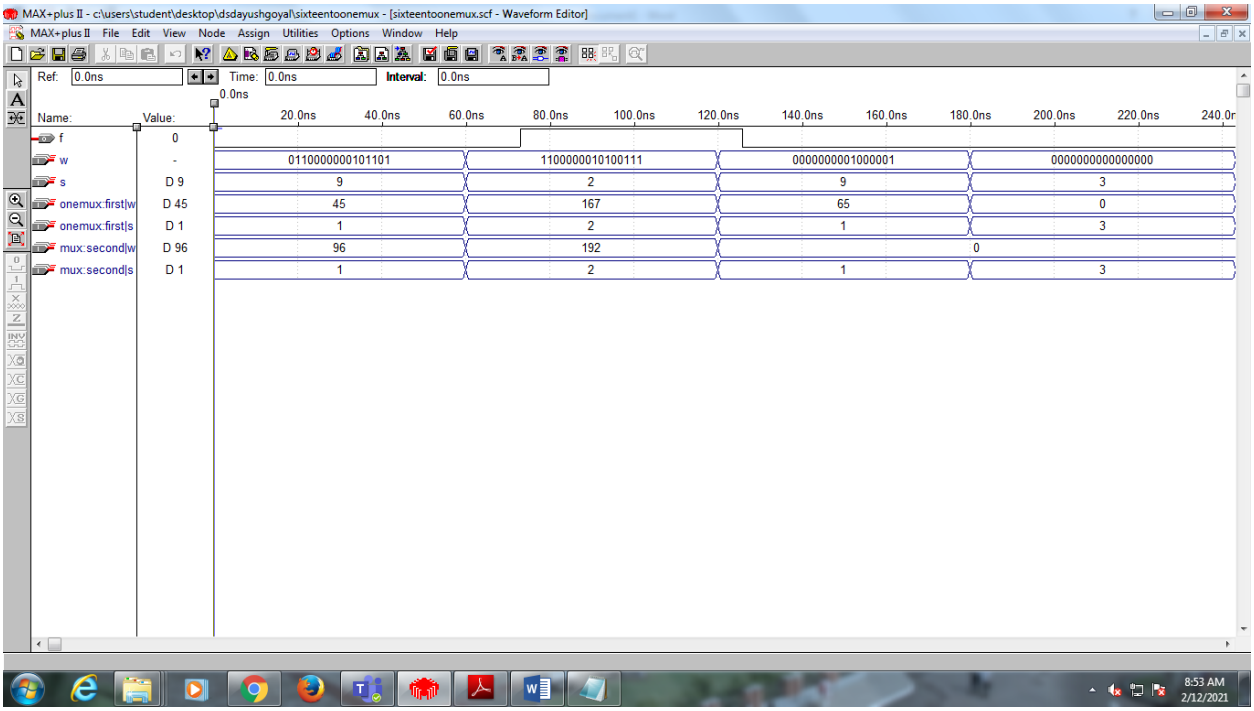
```
module twotoonemux(w0,w1,s,f);
        input w0,w1,s;
        output f;
        reg f;
        always @(w0 or w1 or s)
        begin
        if(s==0)
        assign f = w0;
```

```
        else
        assign f = w1;
        end
endmodule
```



Q3) 16to1 MUX

```
module sixteentoonemux(w,s,f);
        input [15:0]w;
        input [3:0]s;
        output f;
        reg f;
        reg s1,s2;
        eighttoonemux first(w[7:0],s[2:0],s1);
        eighttoonemux second(w[15:8],s[2:0],s2);
        twotoonemux last(s1,s2,s[3],f);
endmodule
```


MAX+plus II - c:\users\student\desktop\dsdayushgoyal\sixteentoonemux - [sixteentoonemux.scf - Waveform Editor]
MAX+plus II File Edit View Node Assign Utilities Options Window Help
Ref: 0.0ns
Time: 0.0ns
Interval: 0.0ns
0.0ns
Name:
Value:
20.0ns
40.0ns
60.0ns
80.0ns
100.0ns
120.0ns
140.0ns
160.0ns
180.0ns
200.0ns
220.0ns
240.0r
f
0
w
-
0110000000101101
1100000010100111
0000000001000001
0000000000000000
s
D 9
9
2
9
3
onemux:first|w
D 45
45
167
65
0
onemux:first|s
D 1
1
2
1
3
mux:second|w
D 96
96
192
0
mux:second|s
D 1
1
2
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8:53 AM
2/12/2021