



DAY-5

#100DAYSOFRTL

Aim:- Implementation of minimized boolean expression using 6-Variable K-map and Verilog code.

$F(A,B,C,D,E,F) = \text{Minterms of } (0,5,7,8,9,12,13,23,24,25,28,29,37,40,42,44,46,55,56,57,60,61);$

Minimized

Expression = $BC'E + AC'E + A'BC'F + B'CDEF + B'CDEF + A'B'CDF + A'B'D'E'F$

RTL CODE:-

```
1  //DATE:-05/01/2023
2  //Minimization using a 6-Variable Kmap
3  module Day_5(input A,B,C,D,
4  E,F, output Y); //Min terms (0,5,7,8,9,12,13,23,24,25,28,29,
5  //37,40,42,44,46,55,56,57,60,61);
6  wire [6:0] W;
7  and g1(W[0],B,C,(~E));
8  and g2(W[1],(~A),C,(~E));
9  and g3(W[2],A,(~B),C,(~F));
0  and g4(W[3],B,(~C),D,E,F);
1  and g5(W[4],(~B),(~C),D,E,F);
2  and g6(W[5],(~A),(~B),(~C),D,F);
3  and g7(W[6],~A,~B,~D,~E,~F);
4  assign Y=W[0]| W[1]| W[2]| W[3]| W[4]| W[5]| W[6];
5  endmodule
```

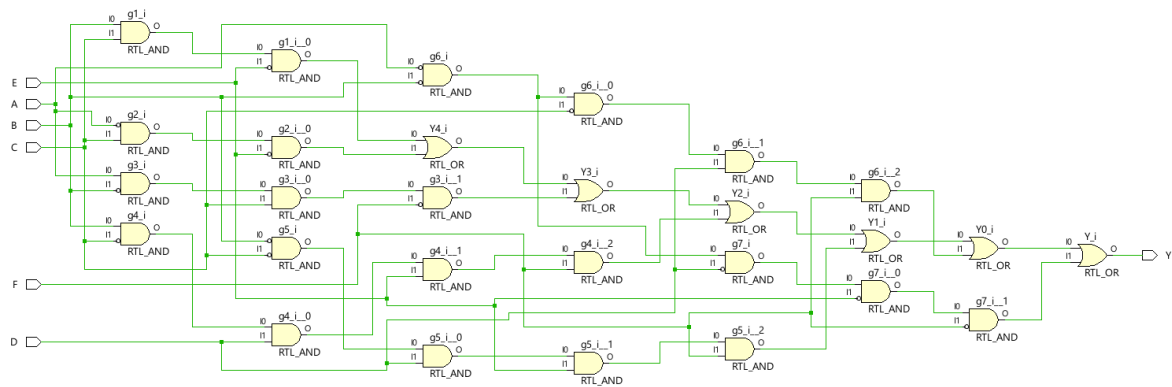
TESTBENCH:-

```
//////DATE:-05/01/2023
////Minimization using a 6-Variable Kmap
////Min terms (0,5,7,8,9,12,13,23,24,25,28,29,
//37,40,42,44,46,55,56,57,60,61);
module Day_5_tb();
reg A,B,C,D,E,F;
wire Y;
Day_5 dut(A,B,C,D,
E,F,Y);
initial begin
A=0;B=0;C=0;D=0;E=0;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=0;C=0;D=0;E=0;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=0;C=0;D=0;E=0;F=1;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=0;C=0;D=0;E=1;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=0;C=0;D=1;E=0;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=0;C=1;D=0;E=0;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=0;B=1;C=0;D=0;E=0;F=0;
#10;
$display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
A=1;B=0;C=0;D=0;E=0;F=0;
#10;
34 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
35 | A=1;B=1;C=0;D=0;E=0;F=0;
36 | #10;
37 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
38 | A=1;B=1;C=1;D=0;E=0;F=0;
39 | #10;
40 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
41 | A=1;B=1;C=1;D=1;E=0;F=0;
42 | #10;
43 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
44 | A=1;B=1;C=0;D=1;E=1;F=0;
45 | #10;
46 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
47 | A=0;B=0;C=1;D=0;E=1;F=0;
48 | #10;
49 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
50 | A=0;B=0;C=1;D=0;E=1;F=1;
51 | #10;
52 | $display("A=%b,B=%b,C=%b,D=%b,E=%b,F=%b,Y=%b",A,B,C,D,E,F,Y);
53 | end
54 | initial begin
55 | #200;
56 | $finish();
57 | end
58 | endmodule
```

OUTPUT:-

A=0, B=0, C=0, D=0, E=0, F=0, Y=1
 A=0, B=0, C=0, D=0, E=0, F=0, Y=1
 A=0, B=0, C=0, D=0, E=0, F=1, Y=0
 A=0, B=0, C=0, D=0, E=1, F=0, Y=0
 A=0, B=0, C=0, D=1, E=0, F=0, Y=0
 A=0, B=0, C=1, D=0, E=0, F=0, Y=1
 A=0, B=1, C=0, D=0, E=0, F=0, Y=0
 A=1, B=0, C=0, D=0, E=0, F=0, Y=0
 A=1, B=1, C=0, D=0, E=0, F=0, Y=0
 A=1, B=1, C=1, D=0, E=0, F=0, Y=1
 A=1, B=1, C=1, D=1, E=0, F=0, Y=1
 A=1, B=1, C=0, D=1, E=1, F=0, Y=0
 A=0, B=0, C=1, D=0, E=1, F=0, Y=0
 A=0, B=0, C=1, D=0, E=1, F=1, Y=0

SCHEMATIC:-



WAVEFORMS:-

