**CODES:**

**//Divider Code**

module divider(a,b,q,r);

parameter c=0;

input [3:0]a;

input [7:0]b;

integer i;

output reg [3:0] q,r;

reg [7:0]out;

reg [3:0]out1;

reg [7:0]out2;

//reg [3:0]r;

//reg temp;

reg carry;

always@(a,b) begin

out1=tens\_complement(a[3:0]);

r = 4'b1111;

carry=1'b0;

for(i=0;{carry,r}>{1'b0,a};i=i+1)

begin

$display("enter forloop %d",i);

out=MUX({3'b000,carry,r},b[7:0],carry);

out2=booth(out1,out[7:4]);

{carry,r}=bcd\_adder(out2[3:0],out[3:0],c);

$display("r=%d",r);

$display("c=\t%d",carry);

if(r==a)

begin

q=b[7:4]+4'b0001;r=0;

end

else if({carry,r}>{1'b0,out1} && (i==0))

q=b[7:4];

else q=b[7:4]+4'b0001;

$display("q=\t%d",q);

end

end

**//MUX Function**

function [7:0]MUX;

input [7:0]new,b;

input carry;

begin

MUX=carry?new:b;

$display("mux%b",MUX); // if carry 1 , new is selected else b is selected

end

endfunction

function [3:0] tens\_complement;

input [3:0]inA;

begin

tens\_complement=(4'b1001-inA)+4'b001;

$display("tc");

end

endfunction

**//Booth Multiplier**

function [7:0]booth;

input [3:0] x,y;

reg[3:0]tens;

reg[3:0]ones;

reg [7:0] z;

reg[1:0] temp;

integer i,j;

reg e1;

reg[3:0]y1;

begin

z=8'b00000000;

e1=1'b0;

for(i=0;i<4;i=i+1)

begin

temp={x[i],e1};//catenation

y1=-y;//2's complement of y

case(temp)

2'd2:z[7:4]=z[7:4]+y1;

2'd1:z[7:4]=z[7:4]+y;

default:begin end

endcase

z=z>>1;

/\*Logical rightshift by one pos\*/

z[7]=z[6];

/\*to perform arith shift where the sign of the number is preserved after the shift\*/

e1=x[i];

end

if(y==4'b1000)

begin

z=-z;

end

tens=4'b0000;

ones=4'b0000;

for(j=7;j>=0;j=j-1)

begin

if(tens>=5)

tens=tens+3;

if(ones>=5)

ones=ones+3;

tens=tens<<1;

tens[0]=ones[3];

ones=ones<<1;

ones[0]=z[j];

end

booth={tens,ones};

$display("booth %b",booth);

end

endfunction

**//BCD Adder**

function [4:0]bcd\_adder;

//declare the inputs and outputs of the module with their sizes.

//output carry;

input [3:0] a,b;

reg [3:0]sum;

reg [4:0] sum\_temp;

input c;

begin

sum\_temp = a+b+c; //add all the inputs

if(sum\_temp > 9)

begin

sum\_temp = sum\_temp+ 6; //add 6, if result is more than 9.

sum= sum\_temp[3:0];

bcd\_adder = {1'b1,sum};$display("bcd%b",bcd\_adder);

end

else begin

sum= sum\_temp[3:0];

bcd\_adder = {1'b0,sum};$display("bcd %b",bcd\_adder);

end

end

endfunction

endmodule