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timescale 1ns / 1ps
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
// Company:
// Engineer:
//
// Create Date: 12/03/2020 10:25:40 PM
// Design Name:
// Module Name: Divider_ControlLogic
// Project Name:
// Target Devices:
// Tool Versions:
// Description:
//
// Dependencies:
//
// Revision:
// Revision 0.01 - File Created
// Additional Comments:
//
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

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module Divider_ControlLogic(
    input EQ, LT, CEQ, CLT, Start, Ccase,
    input [4:0] PS,
    output [4:0] NS,
    output LD, Shift, ShiftR, Add, Sub0, SubB , Q, LDR, Next
//    input [3:0] EQ,
//    input [3:0] LT,
//    input Start,
//    input [6:0] PS,
//    output [6:0] NS,
//    output LD, Shift, Q, Sub, Add, NPrime, Prime
);

wire IDLE, SHIFT, SUBB, SUB0, OUT;
wire Next_IDLE, Next_SHIFT, Next_SUBB, Next_SUB0, Next_OUT;

// Present State
assign IDLE      = PS[0];
assign SHIFT     = PS[1];
assign SUBB      = PS[2];
assign SUB0      = PS[3];
assign OUT       = PS[4];

// Next State

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assign NS[0] = Next_IDLE;
assign NS[1] = Next_SHIFT;
assign NS[2] = Next_SUBB;
assign NS[3] = Next_SUB0;
assign NS[4] = Next_OUT;

//Enter Logic
assign Next_IDLE      = IDLE&~Start|OUT;
assign Next_SHIFT     = IDLE&Start|SUBB&CLT|SUB0&CLT;
assign Next_SUBB      = SHIFT&~LT|SHIFT&EQ;
assign Next_SUB0      = SHIFT&LT;
assign Next_OUT       = SUBB&CEQ|SUB0&CEQ;

// Outputs
assign LD             = IDLE;
assign ShiftR        = SUBB&CLT|SUB0&CLT|IDLE&Start;
//assign Shift       = SHIFT;
assign Shift         = SHIFT&((~LT|EQ)|(LT))&~Ccase;
//    assign Shift    = SUBB|SUB0;
assign LDR           = SHIFT&(~LT|EQ);
assign Add           = SUBB|SUB0;
assign Q             = SHIFT&(~LT|EQ);
assign SubB          = SUBB;
assign Sub0          = SUB0;
assign Next          = OUT;

//    wire IDLE, DIVISOR, QUOTIENT, COUNT, CHECK;
//    wire Next_IDLE, Next_DIVISOR, Next_QUOTIENT, Next_COUNT, Next_CHECK;

//    // Present State
//    assign IDLE      = PS[0];
//    assign DIVISOR    = PS[1];
//    assign QUOTIENT   = PS[2];
//    assign COUNT      = PS[3];
//    assign CHECK      = PS[4];

//    // Next State
//    assign NS[0] = Next_IDLE;
//    assign NS[1] = Next_DIVISOR;
//    assign NS[2] = Next_QUOTIENT;
//    assign NS[3] = Next_COUNT;
//    assign NS[4] = Next_CHECK;

//    //Enter Logic
//    assign Next_IDLE      = IDLE&~Start|DIVISOR&~EQ[0]&~LT[0]|CHECK&EQ[3];

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//      assign Next_DIVISOR      = IDLE&Start|CHECK&~LT[3]&~EQ[3];
//      assign Next_QUOTIENT    = DIVISOR&(EQ[1]|LT[1])|COUNT&~EQ[2];
//      assign Next_COUNT       = QUOTIENT&((EQ[1]|~LT[1])|LT[1]);
//      assign Next_CHECK        = COUNT&EQ[2];

//      // Outputs
//      assign LD                = IDLE&Start;
//      assign Shift             = (DIVISOR&(EQ[0]|LT[0]))|(COUNT&~EQ[2]);
//      assign Q                 = QUOTIENT&((~EQ[1]&~LT[1])|(EQ[1]|LT[1]));
//      assign SubB              = QUOTIENT&(~EQ[1]&~LT[1]);
//      assign Sub0              =
//      assign Add               = (CHECK&~EQ[3]&~LT[3]);
//      assign NPrime            = CHECK&EQ[3];
//      assign Prime             = DIVISOR&~EQ[0]&~LT[0];
endmodule

```