

Question 3:

1.

Because

$$X = \begin{bmatrix} x_0 \\ x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} p_0 \\ p_1 \\ p_2 \\ p_3 \end{bmatrix} \Leftrightarrow \begin{cases} p_0 = x_2 \\ p_1 = x_4 \\ p_2 = x_5 \\ p_3 = x_6 \end{cases}$$

$$\begin{aligned} \text{So } Q_d &= \{ q_{d3}, q_{d2}, q_{d1}, q_{d0} \} \\ &= \{ q_{c6}, q_{c5}, q_{c4}, q_{c2} \} \end{aligned}$$

4. After including library file (gscl45nm.v), annotating delay using .sdf file and running simulation, the results for RTL model match with netlist. But there are some glitches in waveform of netlist because of the delay of combinational logic.