9-Dec

DELD Assignment 08

21110

Title: Ripple Counter Circuit

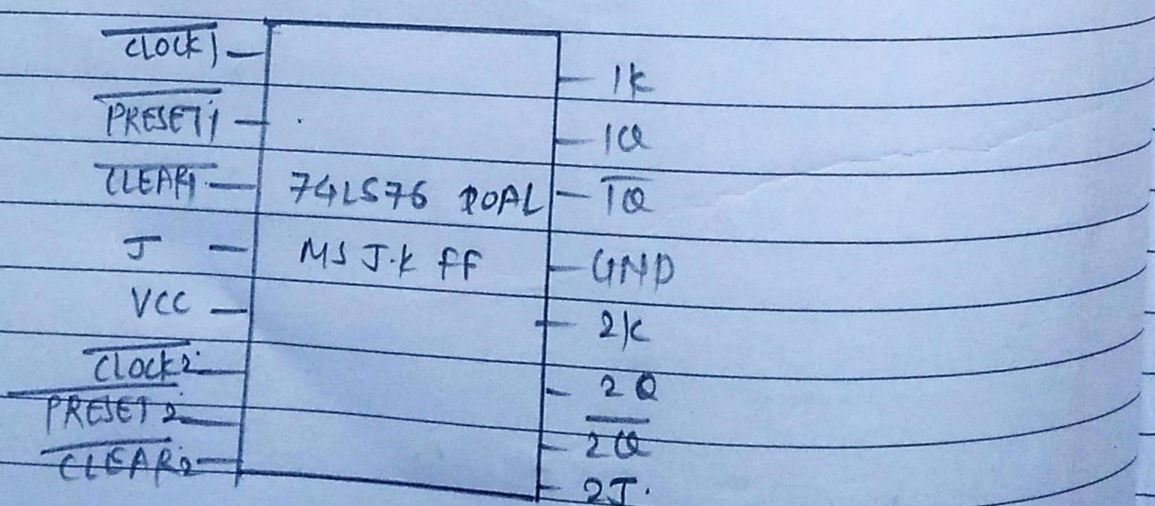
Objective: Design & implement 3-bit asynchronous (Ripple) UP/DOWN counter circuit using IC 74LS76.

Apparatus: Digital Board, GP-4 Patch Chords, IC 74LS76, IC 74LS32, IC 74LS04/IC-74LS08 & required logic gates if any.

Theory:

1) Counter is sequential logic device which counts no. of pulses given to circuit.
2) Counter is classified in two categaries Synchronous & Asynchronous.
3) In Asynchronous counter output of first flip-flop goes ~~back~~ to the clock of next & so on., and input of all flip-flop is connected to vcc for IC-74LS76.
4) All set & reset pins are connected to Vcc.

Pin diagram:



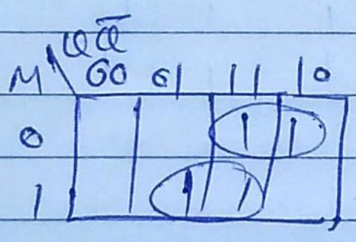
procedure:

1) make the connections as per the logic circuit of 3-bit ripple up counter circuit using IC-74LS76 & verify its TT.
2) Make the connections as per the logic of 3-bit ripple down counter circuit using IC 74LS76 & verify its TT.

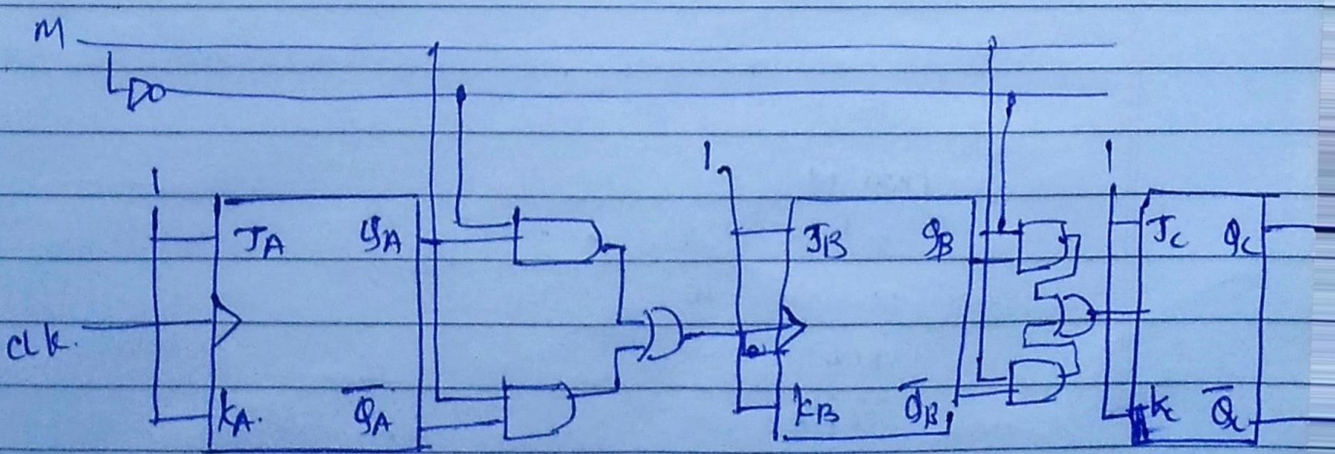
Design of 3-bit Asynchronous UP/DOWN-Counter:

Logic Diagram:

M	Q	$\bar{Q}$	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1



$Y = M\bar{Q} + \bar{M}Q$



up counter ⇒ $Q_A Q_B Q_C$

DOWN Counter ⇒ $\bar{Q}_A \bar{Q}_B \bar{Q}_C$

Observation Table

Clock Pulse	UP			DOWN		
	Q_A	Q_B	Q_C	$\overline{Q}_A$	$\overline{Q}_B$	$\overline{Q}_C$
0	0	0	0	1	1	1
1	0	0	1	1	1	0
2	0	1	0	1	0	1
3	0	1	1	1	0	0
4	1	0	0	0	1	1
5	1	0	1	0	1	0
6	1	1	0	0	0	1
7	1	1	1	0	0	0

Logic gates / MSI Device required for implementation:

Sr. No.	Title	Name of the IC	No. of gates	IC req.
01	3-bit ripple up/ down counter	JK FF 7476	3	2
		AND 7408	4	1
		OR 7432	2	1
		NOT 7404	1	1

Conclusion

Designed & implemented 3-bit Asynchronous (Ripple) UP counter circuit using IC 7476.