

Athul Robert R.B.
20BCE1610.

Design of 4-bit Ripple Counter

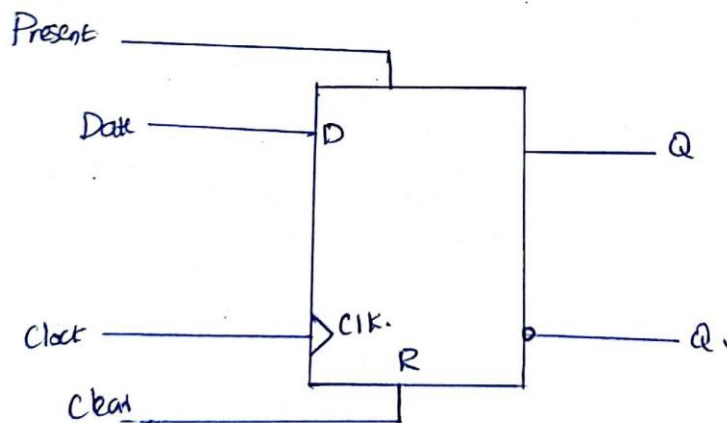
Aim:

To design a 4-bit ripple counter using D flip flop and verify its output using LT Spice.

Software Required:

LT Spice.

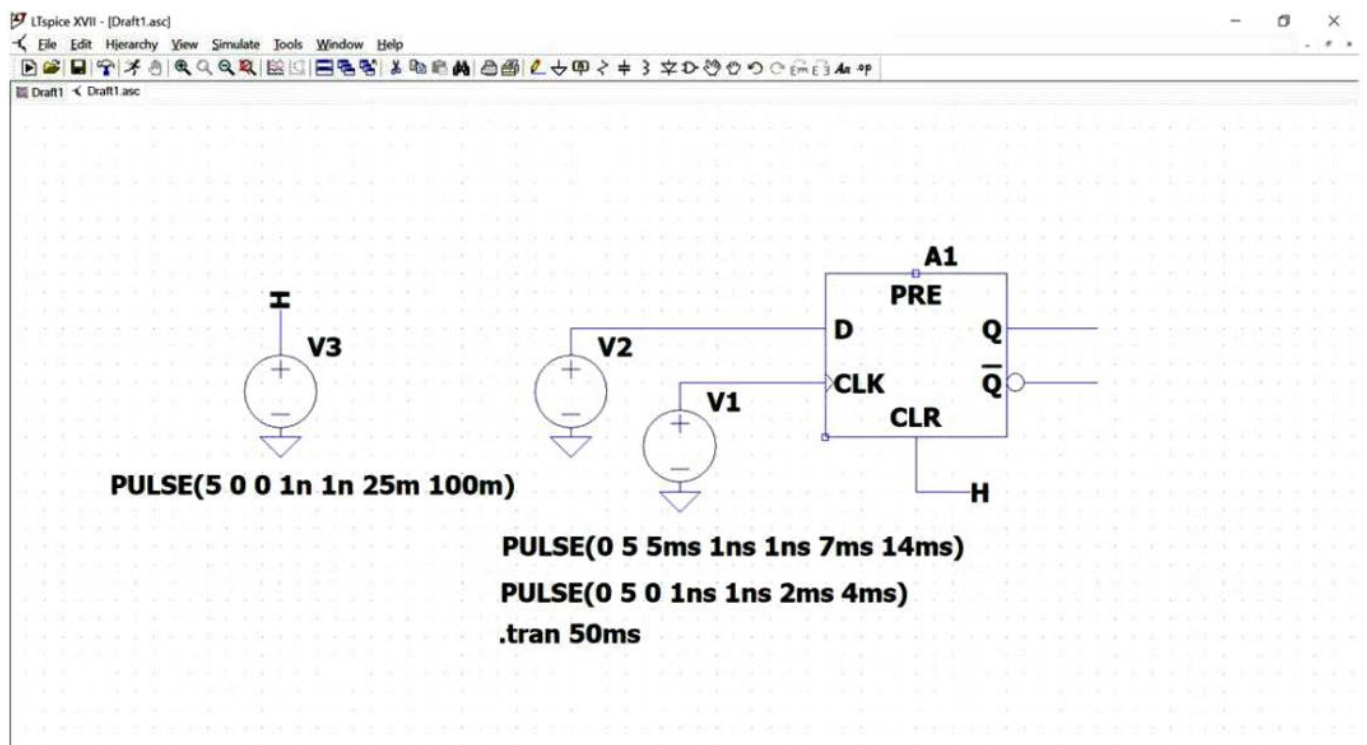
Block diagram:



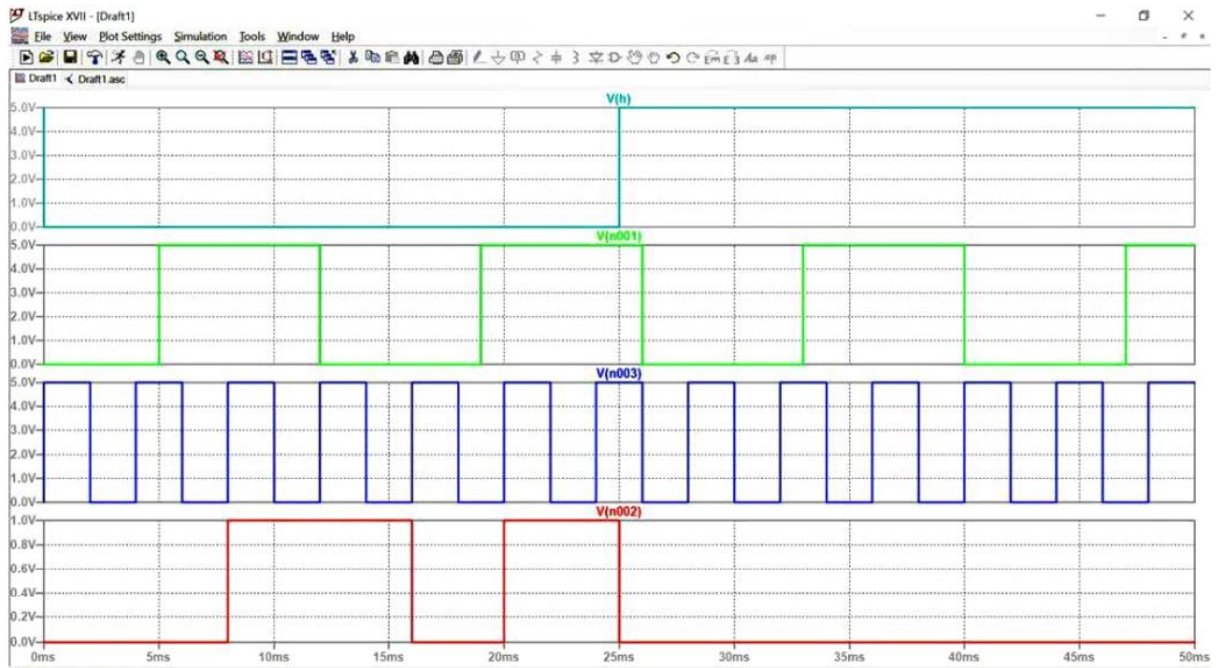
Characteristic table (D Flip Flop):

| D | Q(t+1) |
|---|---------|
| 0 | 0 reset |
| 1 | 1 set |

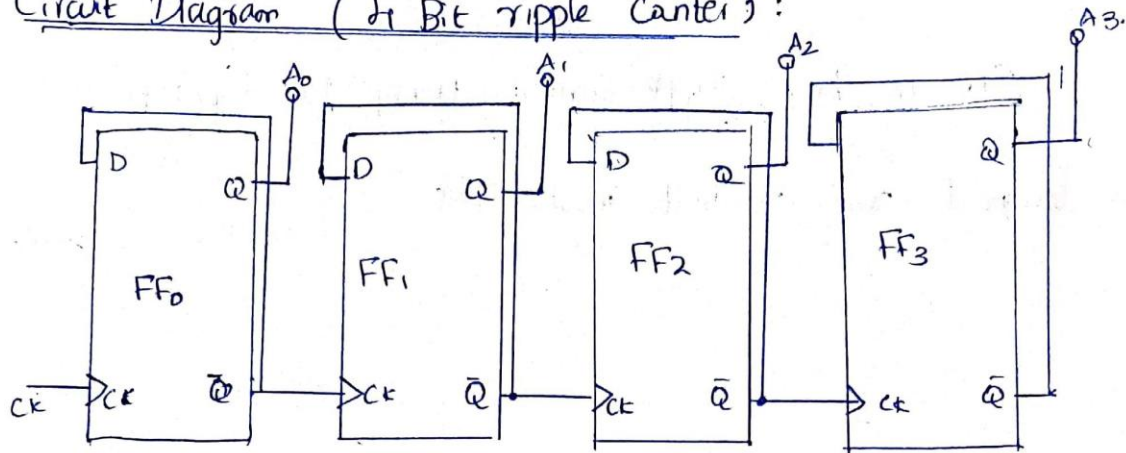
D Flip-flop circuit(with clear input):



D flip- flop waveforms(with clear input):



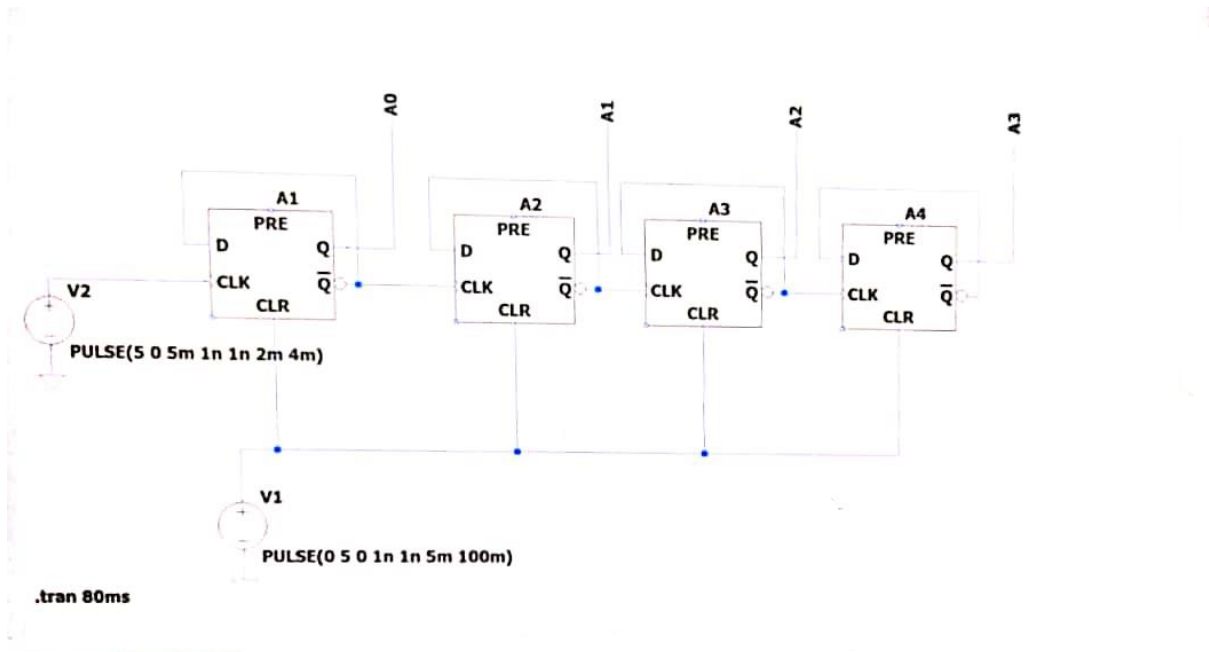
Circuit Diagram (4 Bit ripple Counter):



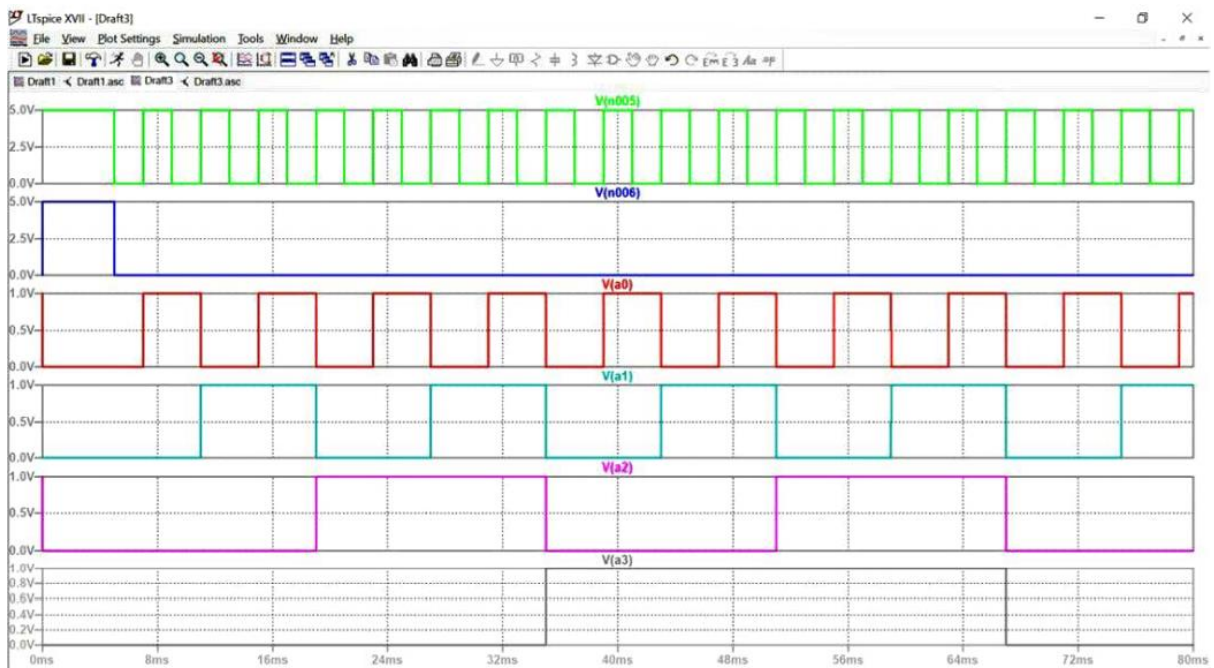
Truth table (4 Bit ripple Counter).

| CK | A ₃ | A ₂ | A ₁ | A ₀ |
|----|----------------|----------------|----------------|----------------|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 2 | 0 | 0 | 1 | 0 |
| 3 | 0 | 0 | 1 | 1 |
| 4 | 0 | 1 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 |
| 6 | 0 | 1 | 1 | 0 |
| 7 | 0 | 1 | 1 | 1 |
| 8 | 1 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 |
| 10 | 1 | 0 | 1 | 0 |
| 11 | 1 | 0 | 1 | 1 |
| 12 | 1 | 1 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 |
| 14 | 1 | 1 | 1 | 0 |
| 15 | 1 | 1 | 1 | 1 |

4 Bit ripple counter circuit:



4 bit ripple counter waveforms:



Result:-

The 4-bit ripple counter using D flip flop is designed and verified in LT Spice.
