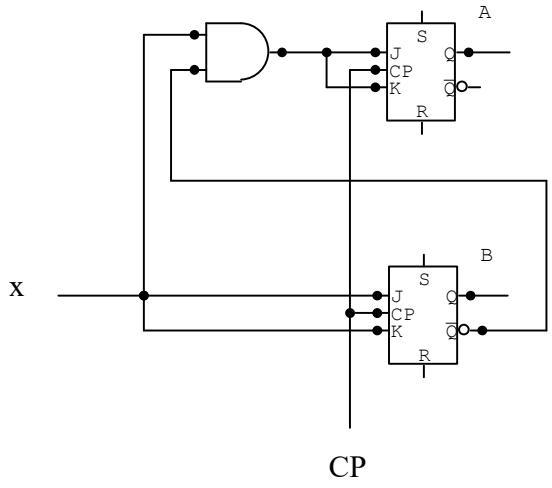
**COMPUTER ARCHITECTURE**
**EXPERIMENT– 3**

## Implementation of Synchronous Sequential Circuits

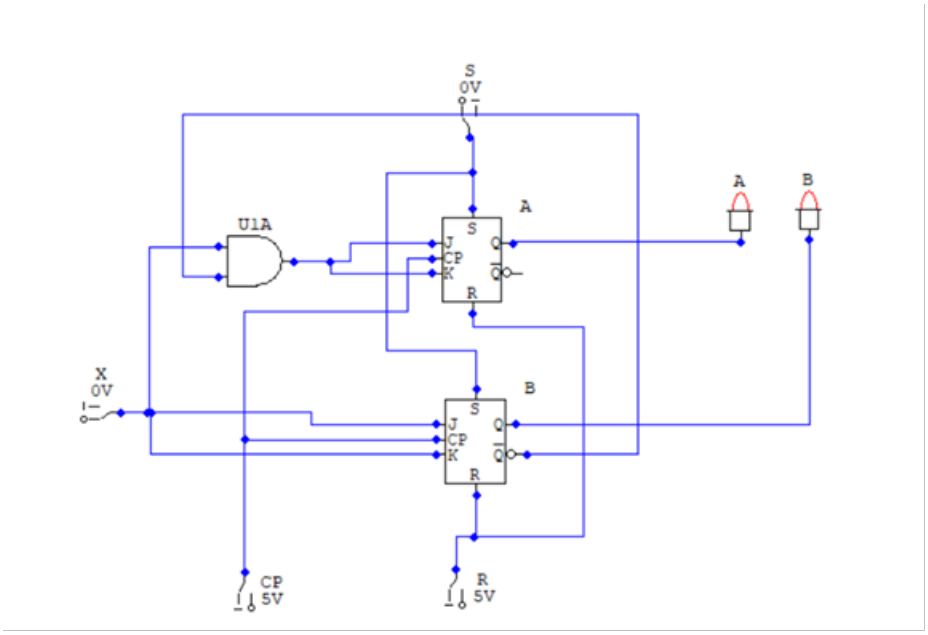
**Aim:** In this experiment, students will be introduced to the concept of sequential circuits and implement a 2-bit Counter.

### Experimental Work:

*Given the following sequential circuit:*




1. Draw the logic diagram of the given sequential circuit in Circuit Maker 6.0.
   - **a)** Implement your inputs as logic switches.
     *Devices → Hotkeys2 → logic switch*
   - **b)** Implement your circuit using logic gates and JK- Flip Flops (4027).
     (You can search devices from *devices → search*)
   - **c)** Implement your outputs as logic displays.
     *Devices → Hotkeys1 → logic display*




**2.** Run your circuit and complete the following state table:

| Present State | | | Next State | |
|---|---|---|---|---|
| A(t) | B(t) | x | A(t+1) | B(t+1) |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 0 |

**3.** Supply your flip-flop input equations:

**$T_A$=AB' $T_B$=A**

**Next State Equations:**

**Q(t+1) = T.Q'+T'Q**

**A(t+1) = AB'A'+(AB')'A**
**= AB'A'+(A'+B)A**
**= AB'A'+A'A+AB**
**= 0 +AB = AB**

**B(t+1) = $T_b$Q'+ $T_b$'Q**
**B(t+1) = AB'+ A'B**
**B(t+1) = A⊕B**

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**$J_A$= B'x $K_A$= B'x**

**$J_B$=x $K_B$=x**

**$J_A$(t+1)= B'xA' + (B'.x)'A => A'B'x + ABx'**

**$J_B$(t+1) = B'x+Bx'**