

# CS & IT ENGINEERING



DIGITAL LOGIC  
SR, JK FLIP FLOP

DPP Solution 02 Discussion

Sequential Circuit



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## TOPICS TO BE COVERED

01 Questions

02 Discussion

**Q.1**

Consider the following J-K flip-flop

In the above J-K flip-flop,  $J = \bar{Q}$  and  $K = 1$ . Assume that the flip-flop was initially cleared and then clocked for 6 pulses. What is the sequence at the Q output?

A. 010000

B. 011001

C. 010010

D. 010101



0 → 1 → 0 → 1 → 0 → 1 → 0

**Q.2**

Consider the given circuit.

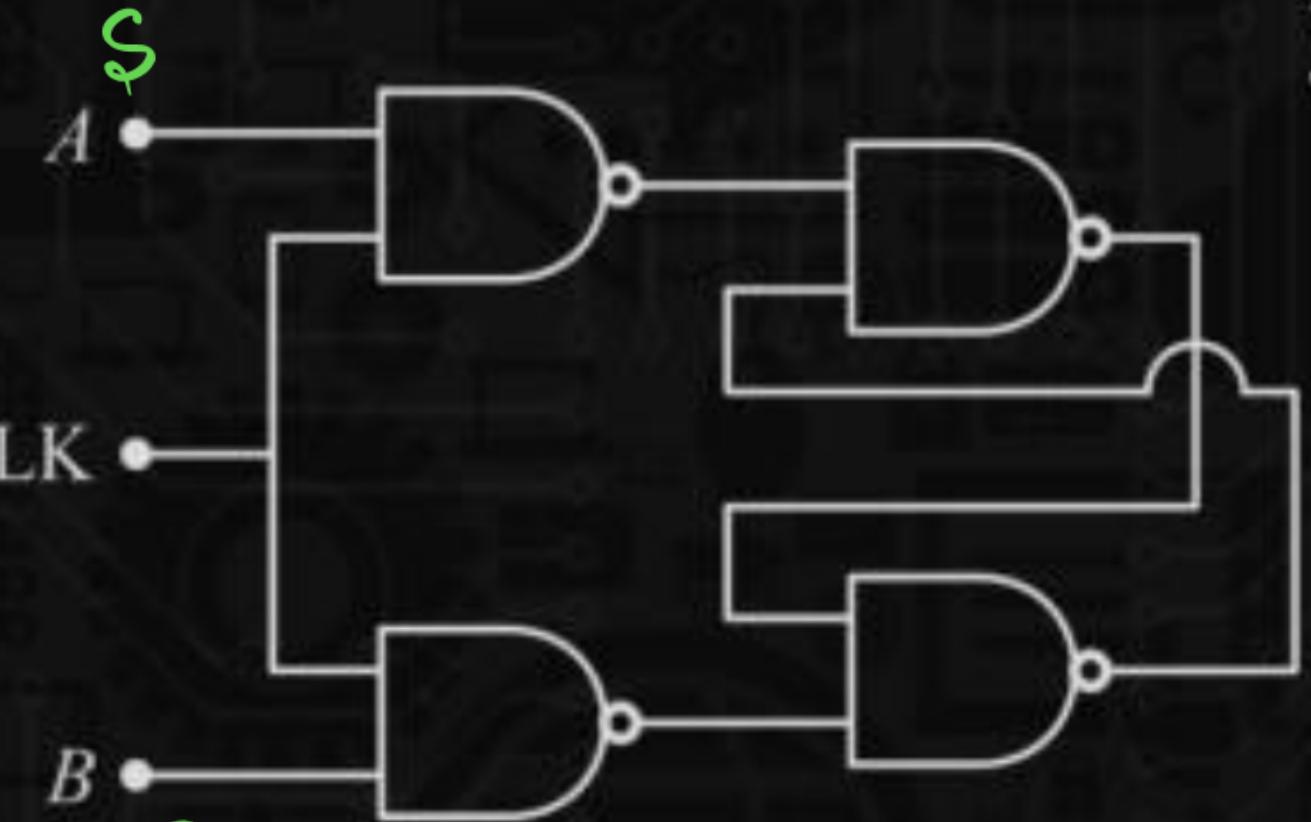
In this circuit, the race around

A does not occur.

B. occurs when  $\text{CLK} = 0$ .

C. occurs when  $\text{CLK} = 1$  and  $A = B = 1$ .

D. occurs when  $\text{CLK} = 1$  and  $A = B = 0$ .



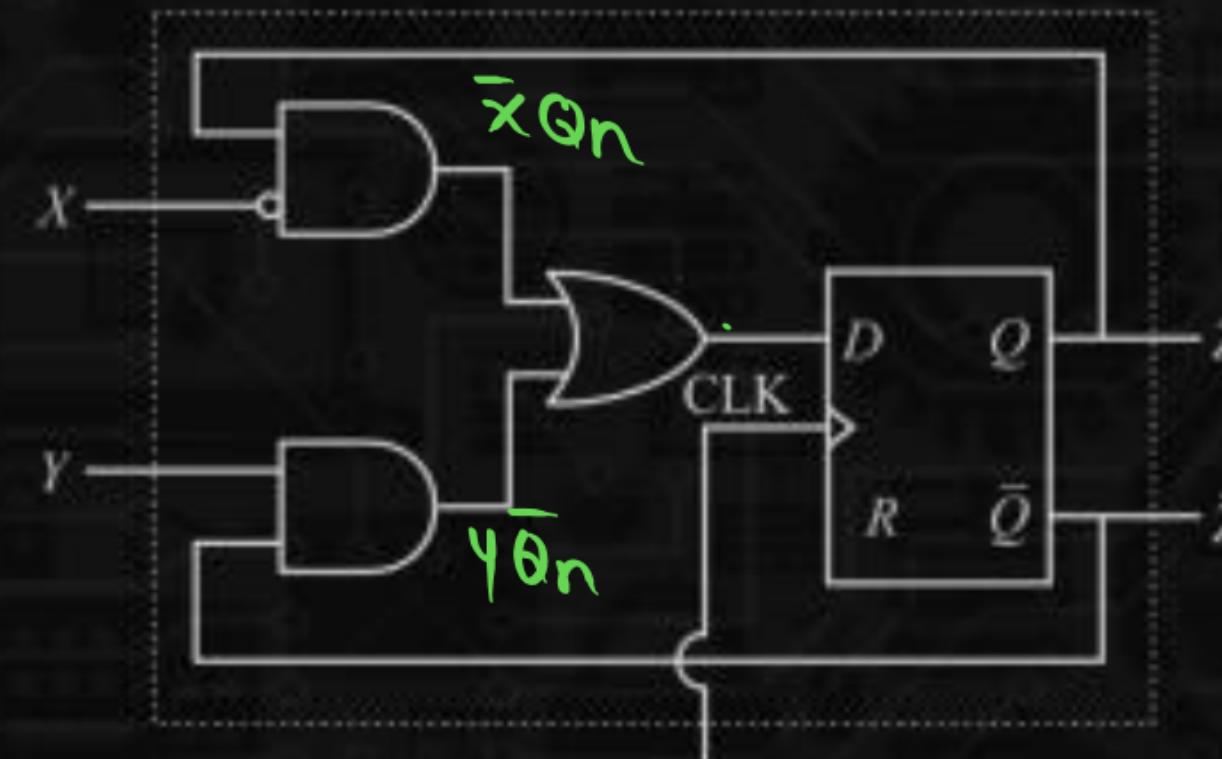
(SR)

Q.3

A sequential circuit using D Flip-Flop and logic gates is shown in figure, where X and Y are the inputs and Z is the output. The circuit is

$$Q_{n+1} = S + \bar{R}Q_n \quad X$$

$$Q_{n+1} = J\bar{Q}_n + \bar{K}Q_n$$



$$D = \bar{x}Q_n + y\bar{Q}_n$$

$$Q_{n+1} = D$$

$$Q_{n+1} = \bar{x}Q_n + y\bar{Q}_n$$

$$Q_{n+1} = \bar{k}Q_n + j\bar{Q}_n$$

$$x = k$$

$$y = j$$

A. S-R Flip-Flop with inputs X = R and Y = S.

B. S-R Flip-Flop with inputs X = S and Y = R.

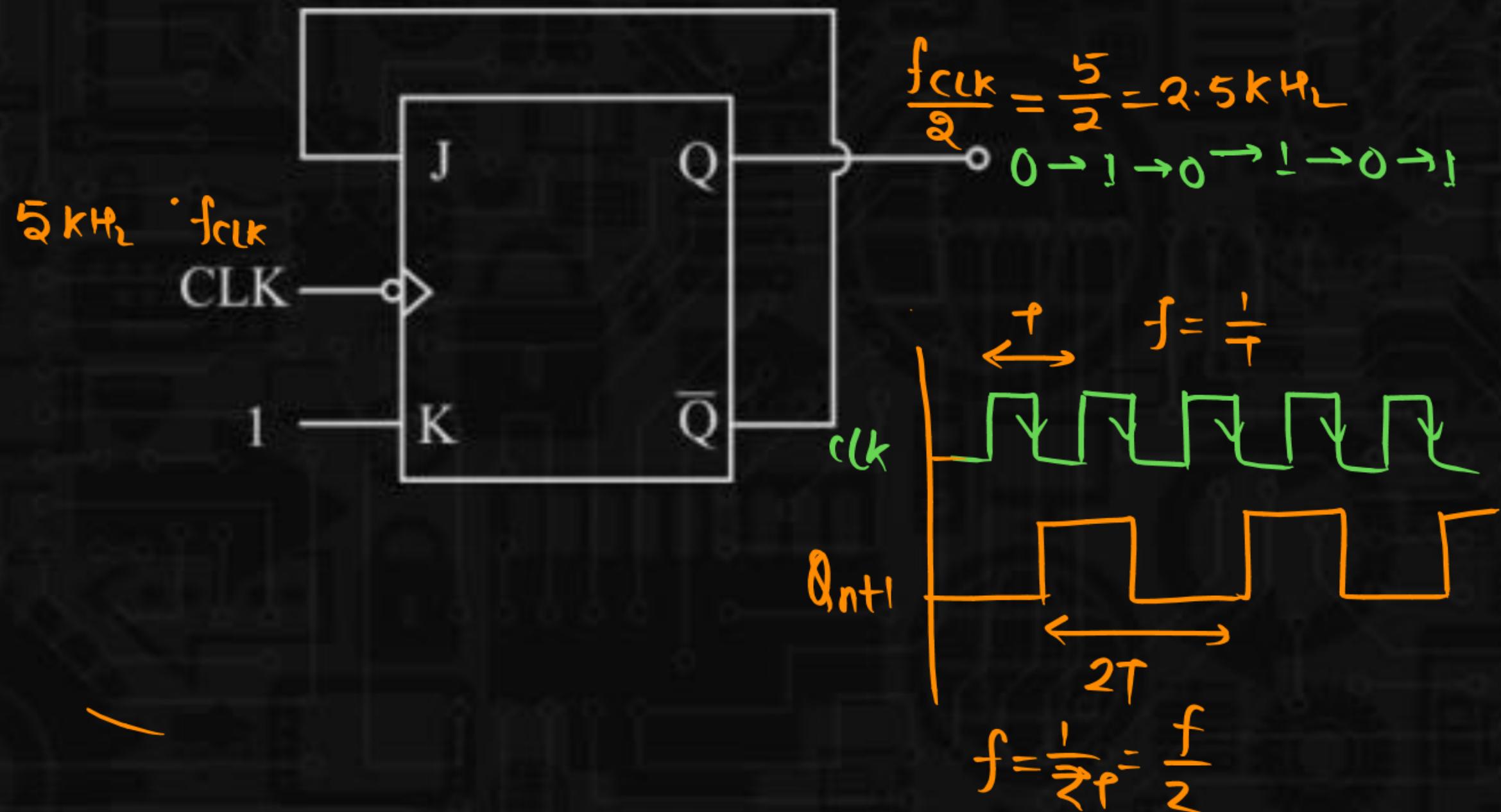
C. J-K Flip-Flop with inputs X = J and Y = K.

D. J-K Flip-Flop with inputs X = K and Y = J.

**Q.4**

The frequency of the clock signal applied to the negative going edge triggered JK flip flop shown below is **5 kHz**.  
What is frequency of signal available at Q ?

- A. 2.5 kHz
- B. 5 kHz
- C. 10 kHz
- D. 1.25 kHz

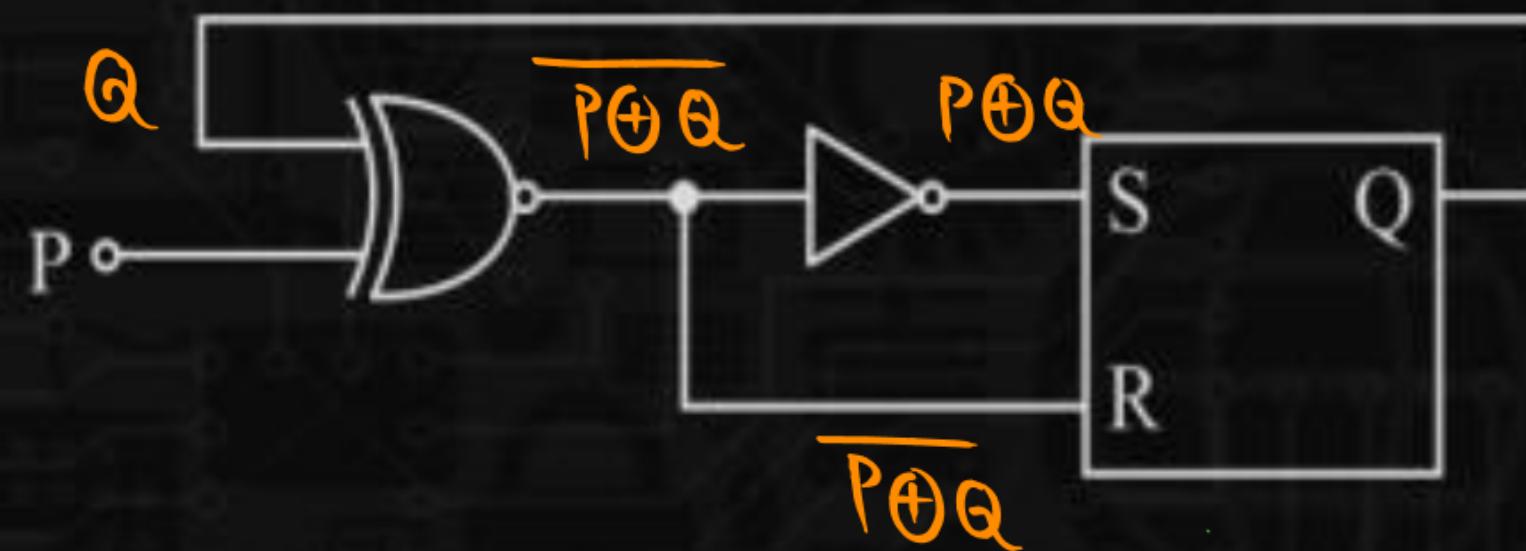


**Q.5**

The RS flip flop is modified so as to realize a flip flop with single input P. The characteristic equation of a new flip-flop will be

P  
W

- A.  $Q(t+1) = P \oplus Q$
- B.  $Q(t+1) = \overline{P \oplus Q}$
- C.  $Q(t+1) = P + Q$
- D.  $Q(t+1) = P$



$$Q_{n+1} = S + \bar{R} Q_n$$

$$= (P \oplus Q_n) + (P \oplus Q_n) Q_n$$

$$= P \oplus Q_n [1 + Q_n]$$

$$S = P \oplus Q_n$$

$$R = \overline{P \oplus Q_n} = P \otimes Q_n = \overline{P} \otimes Q_n + P \otimes Q_n$$

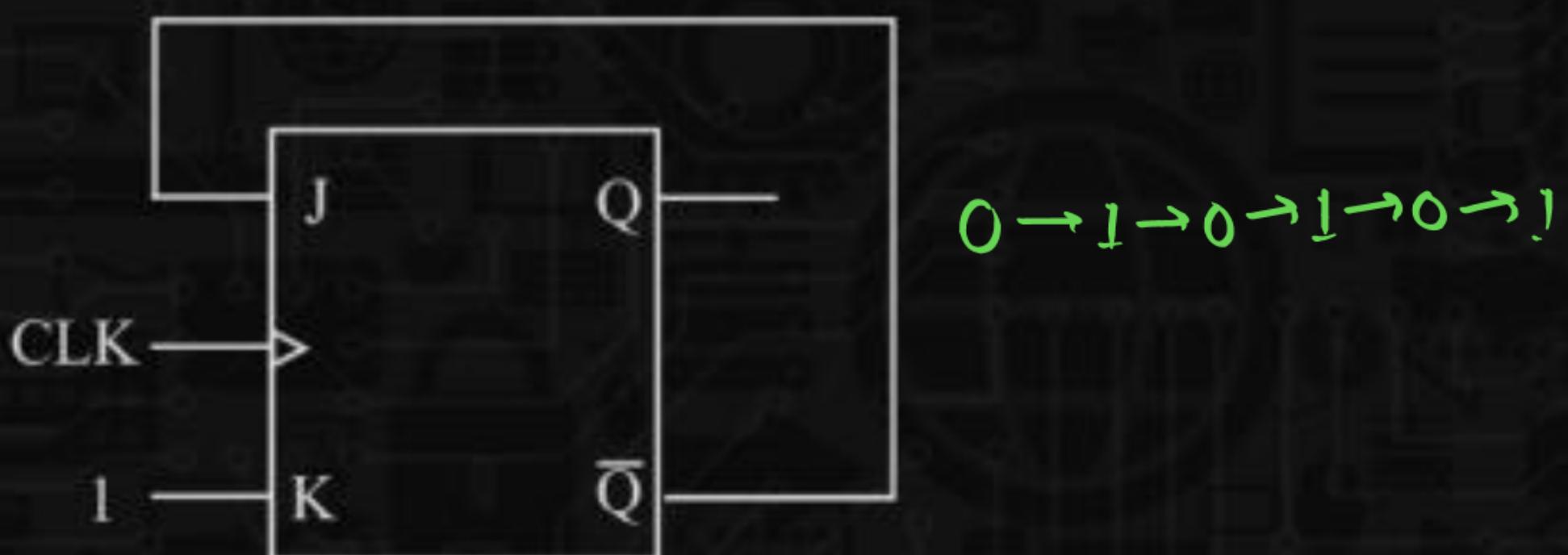
$$\bar{R} = P \oplus Q_n$$

$$\underline{P \oplus Q_n}$$

**Q.6**

The J-K FF shown below is initially cleared and then clocked for 5 pulses, the sequence at the Q output will be

- A. 010000
- B. 011001
- C. 010010
- D. 010101



**Q.7**

For a J-K flip-flop, J input is tied to its own  $\bar{Q}$  output and its K input is connected to its own Q output. If the flip-flop is fed with a clock of frequency 1 MHz, its Q output frequency (in MHz) will be 0.5 ✓

P  
W

