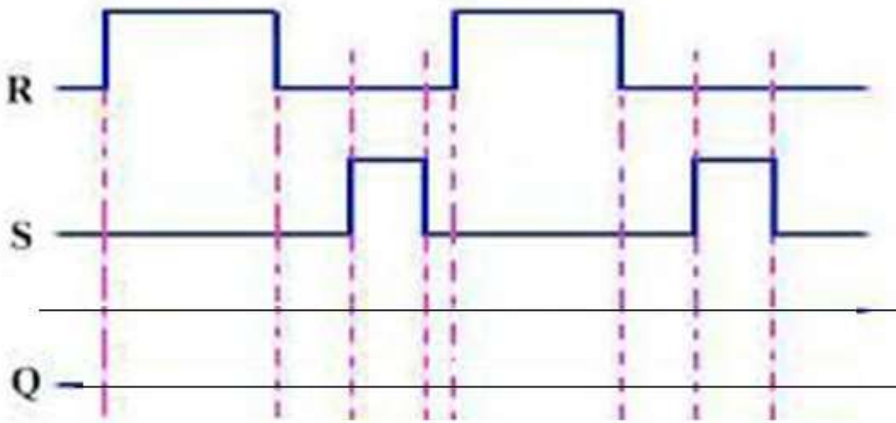


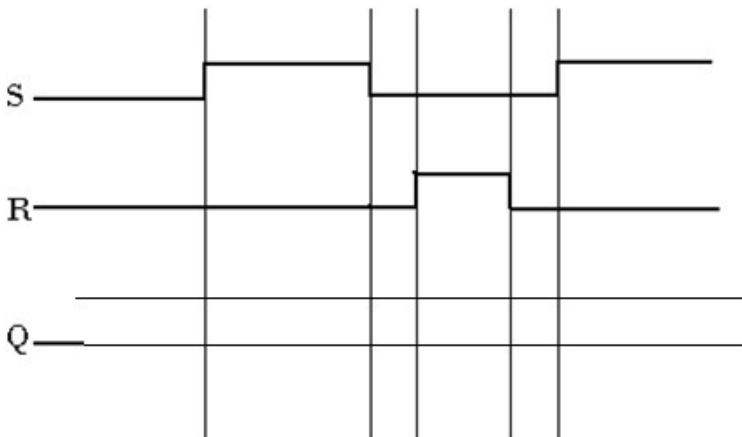
### Sequence of the series T.D N°04

**Exercise timing diagrams:** complete the timing diagrams below:

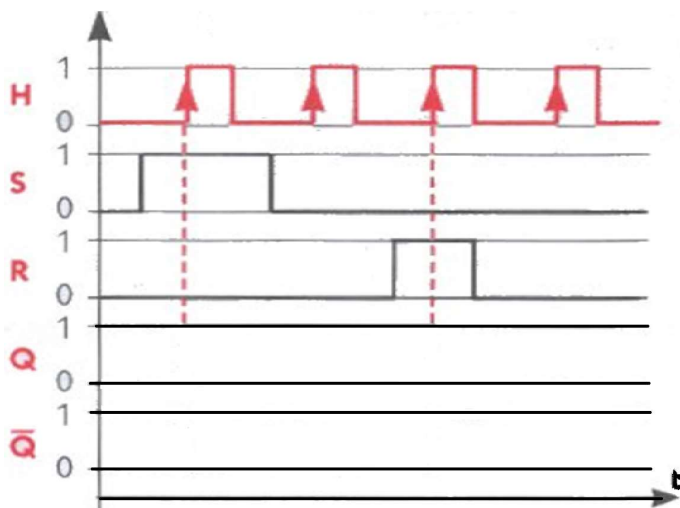
**Q 01 :** Asynchronous RS Flip-Flop:



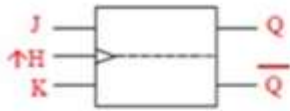
**Q 02 :** Asynchronous RS Flip-Flop:



**Q 03 :** Synchronous RS Flip-Flop:



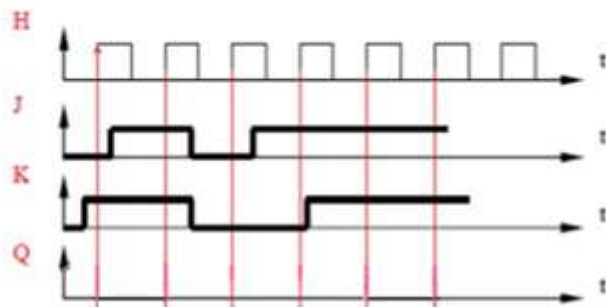
**Q 04 :** timing diagram of JK Flip-flop:



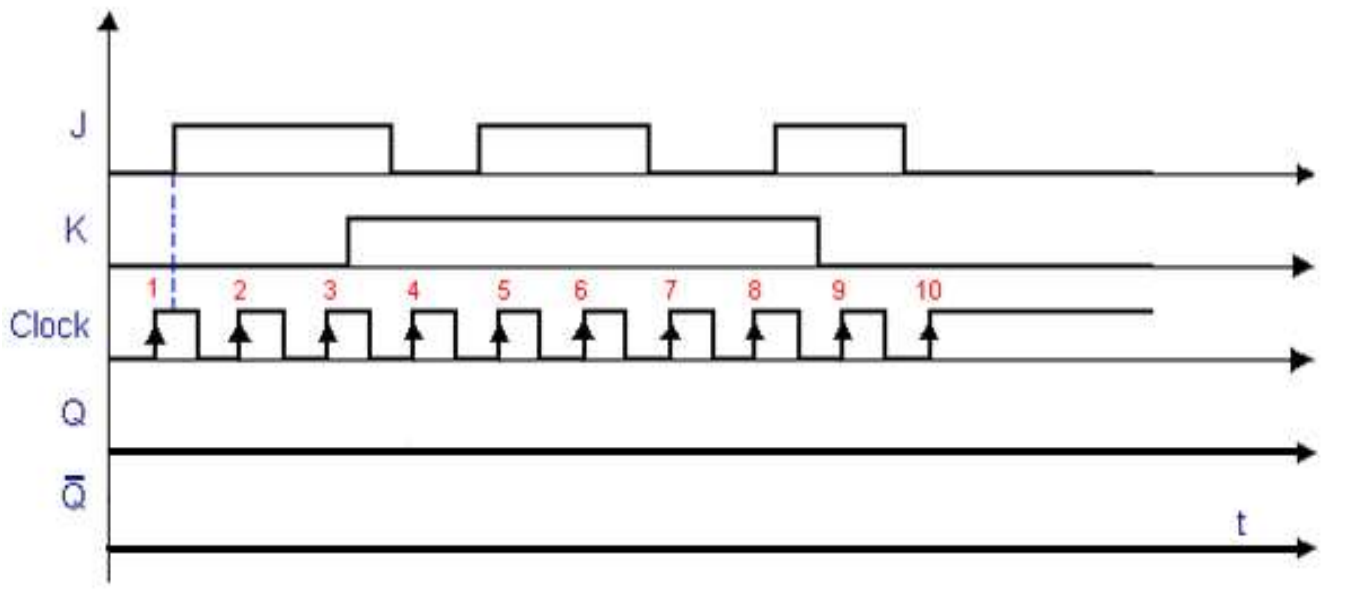
The truth table

H	J	K	Q <sub>n</sub>	$\overline{Q}_n$
0	X	X	Q <sub>n-1</sub>	$\overline{Q}_{n-1}$
↑	0	0	Q <sub>n-1</sub>	$\overline{Q}_{n-1}$
↑	0	1	0	1
↑	1	0	1	0
↑	1	1	$\overline{Q}_{n-1}$	Q <sub>n-1</sub>

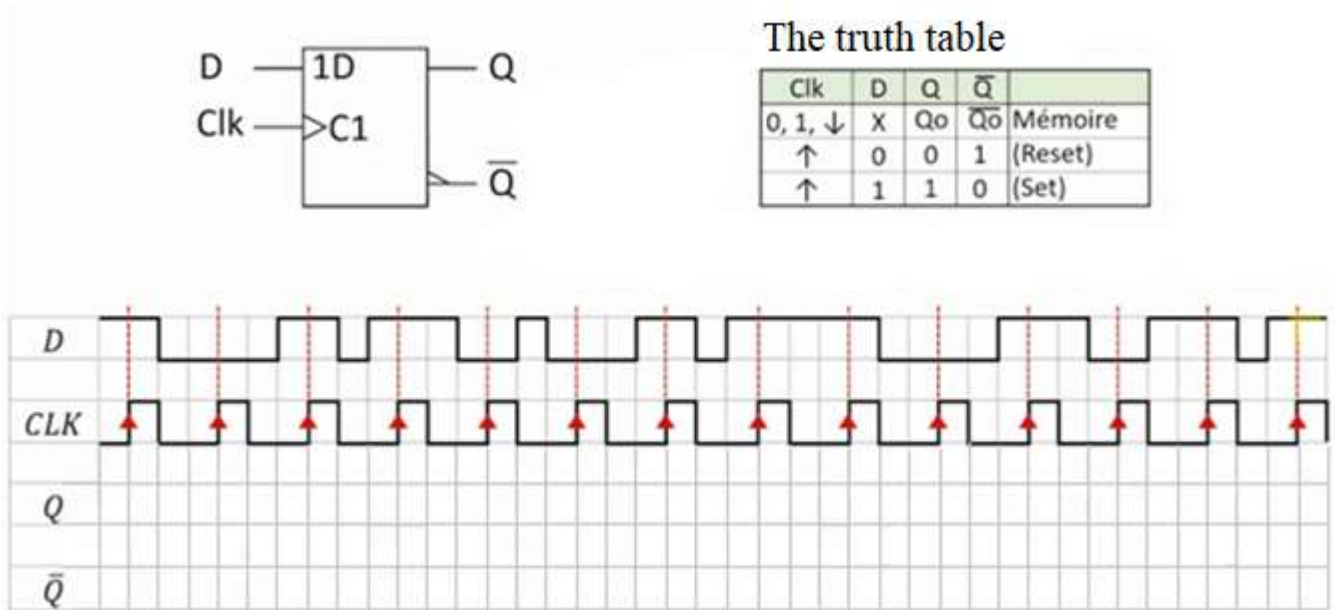
Chronogramme



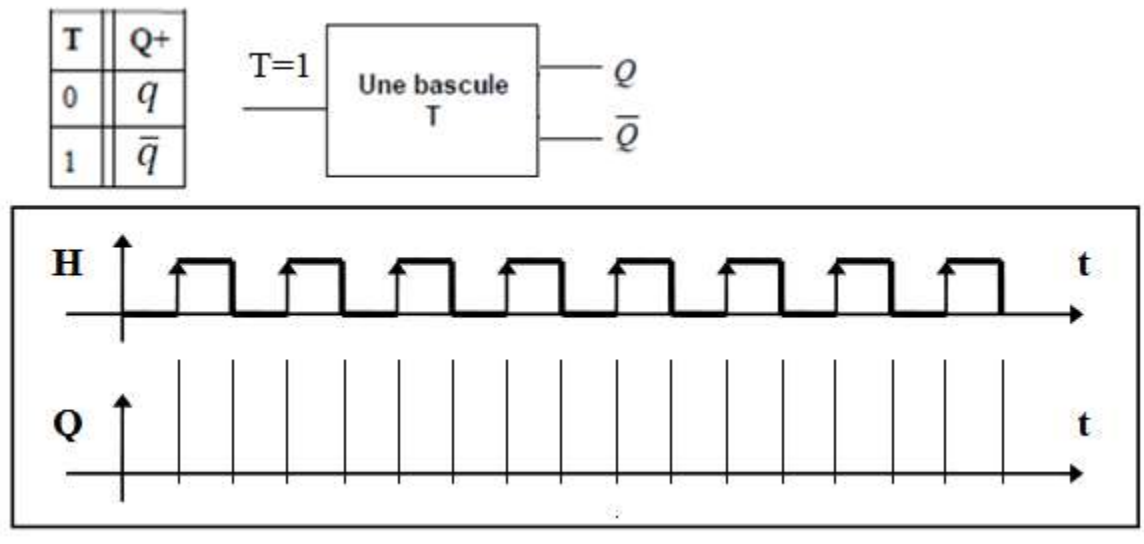
**Q 05 :** complete the timing diagrams below: (JK Flip-flop) :



**Q 06 :** timing diagrams : (D Flip-flop) :

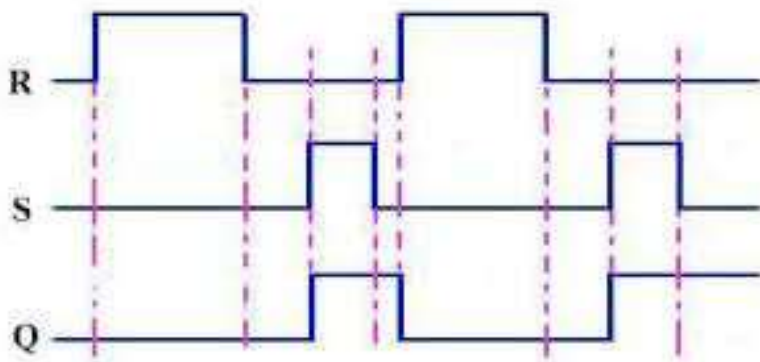


**Q 07 :** timing diagrams : (T Flip-flop) :

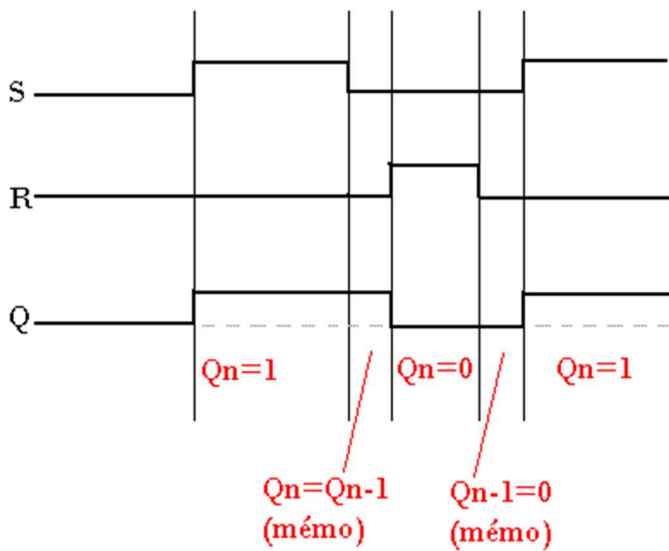


**Solutions Exercices chronogrammes :**

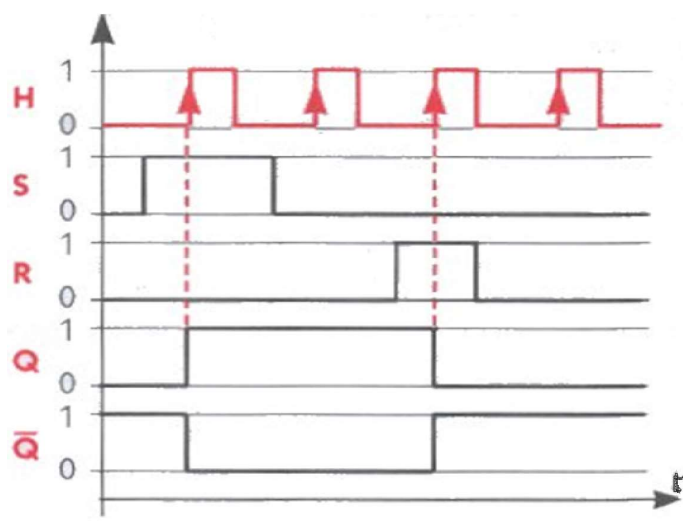
**Solution Q 01 :**



**Solution Q 02 :**



**Solution Q03 :**



**Solution Q 04 :**

**BASCULE J K (bascule synchrone)**

La bascule J K synchrone est obtenue à partir d'une bascule R S H dont les sorties sont rebouclées sur les entrées. Ceci permet **d'éliminer l'état indéterminé.**

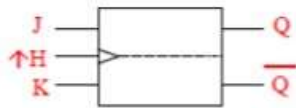
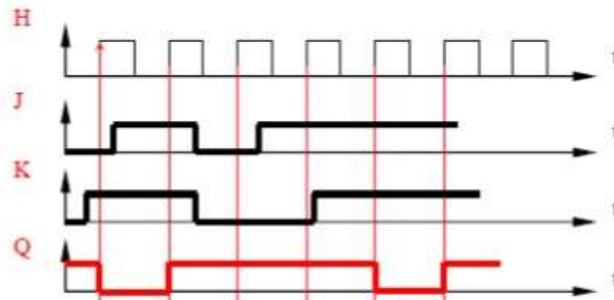


Table de vérité

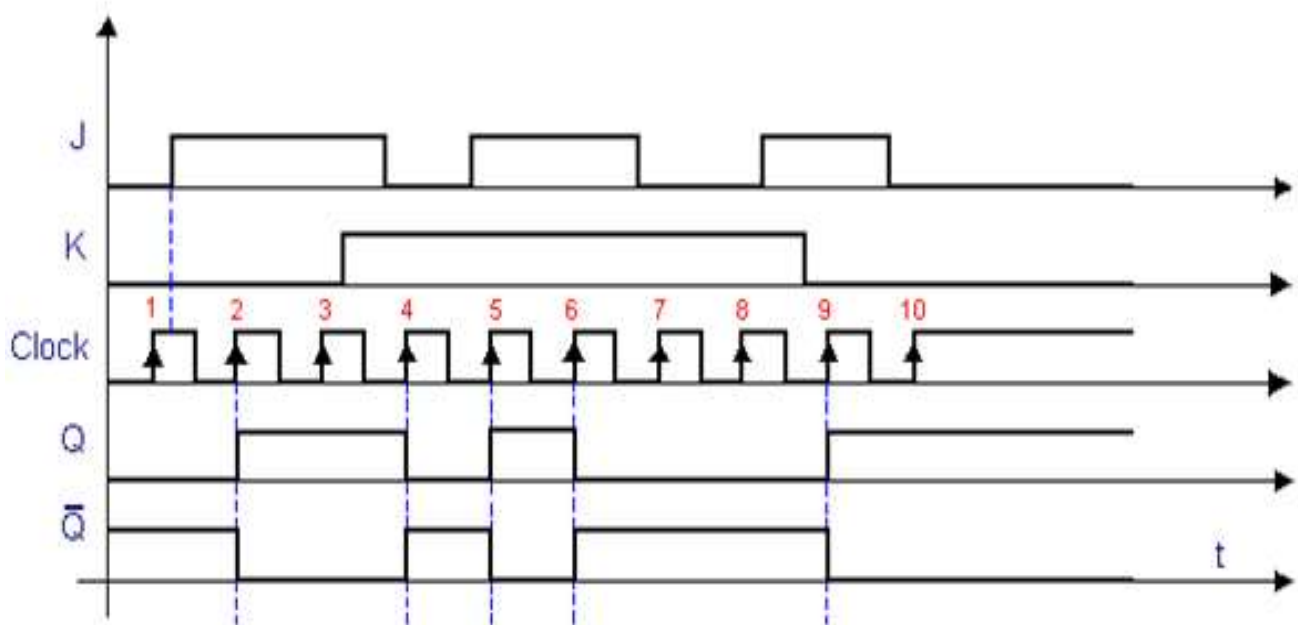
H	J	K	Q <sub>n</sub>	$\overline{Q}_n$
0	X	X	Q <sub>n-1</sub>	$\overline{Q}_{n-1}$
↑	0	0	Q <sub>n-1</sub>	$\overline{Q}_{n-1}$
↑	0	1	0	1
↑	1	0	1	0
↑	1	1	$\overline{Q}_{n-1}$	Q <sub>n-1</sub>

Chronogramme



Remarque : **Pour J = K = 1** , on dit que l'on est dans le mode basculement. Cette bascule passe à l'état opposé à **chaque front montant du signal d'horloge.**

**Solution Q 05 :**



**Solution Q 06 :**

## Bascule D - Chronogramme

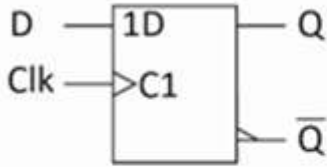
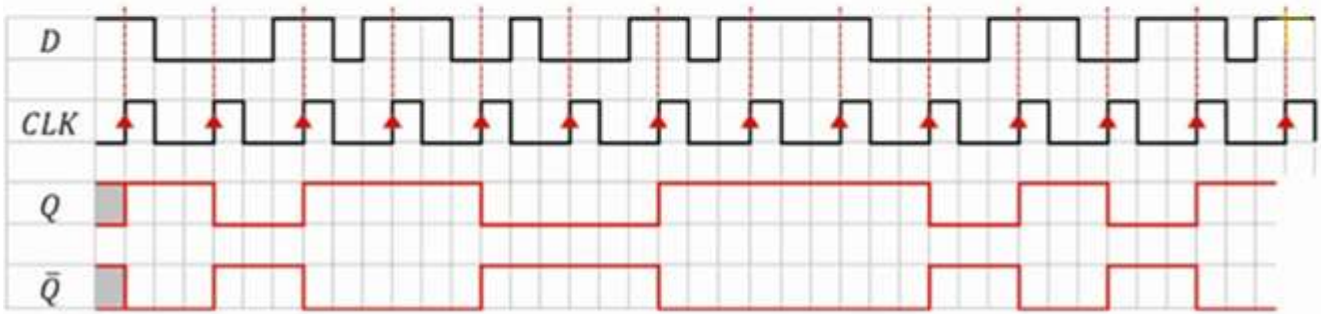


Table de vérité

Clk	D	Q	$\bar{Q}$	
0, 1, ↓	X	Q <sub>0</sub>	$\bar{Q}_0$	Mémoire
↑	0	0	1	(Reset)
↑	1	1	0	(Set)



**Solution Q 07 :**

