Master Theorem For Decreasing Function :

$$T(n) = a\,T(n-b) + f(n)$$

where, $a>0, b>0$ and $f(n) = O(n^k)$ st $k \geq 0$

Case 1 : If $a<1$ then $O(n^k)$ i.e $O(f(n))$

Case 2 : If $a=1$ then $O(n^{k+1})$ i.e $O(n.f(n))$

Case 3 : If $a>1$ then $O(n^k . a^{n/b})$ i.e $O(f(n).a^{n/b})$

Master Theorem For Dividing Function :

$$T(n) = a\,T(n/b) + f(n)$$

where, $a>0, b>0$ and $f(n) = O(n^k \log^p n)$

– Calculate two values : $\log_b a$ and k

Case 1 : If $\log_b a > k$ then $O(n^{\log_b a})$

Case 2 : If $\log_b a = k$ then Further three cases:

→ If $p > -1$ $O(n^k \log^{p+1} n)$

→ If $p = -1$ $O(n^k \log\log n)$

→ If $p < -1$ $O(n^k)$

Case 3 : If $\log_b a < k$ then

→ If $p \geq 0$ $O(n^k \log^p n)$

→ If $p < 0$ $\Theta(n^k)$.