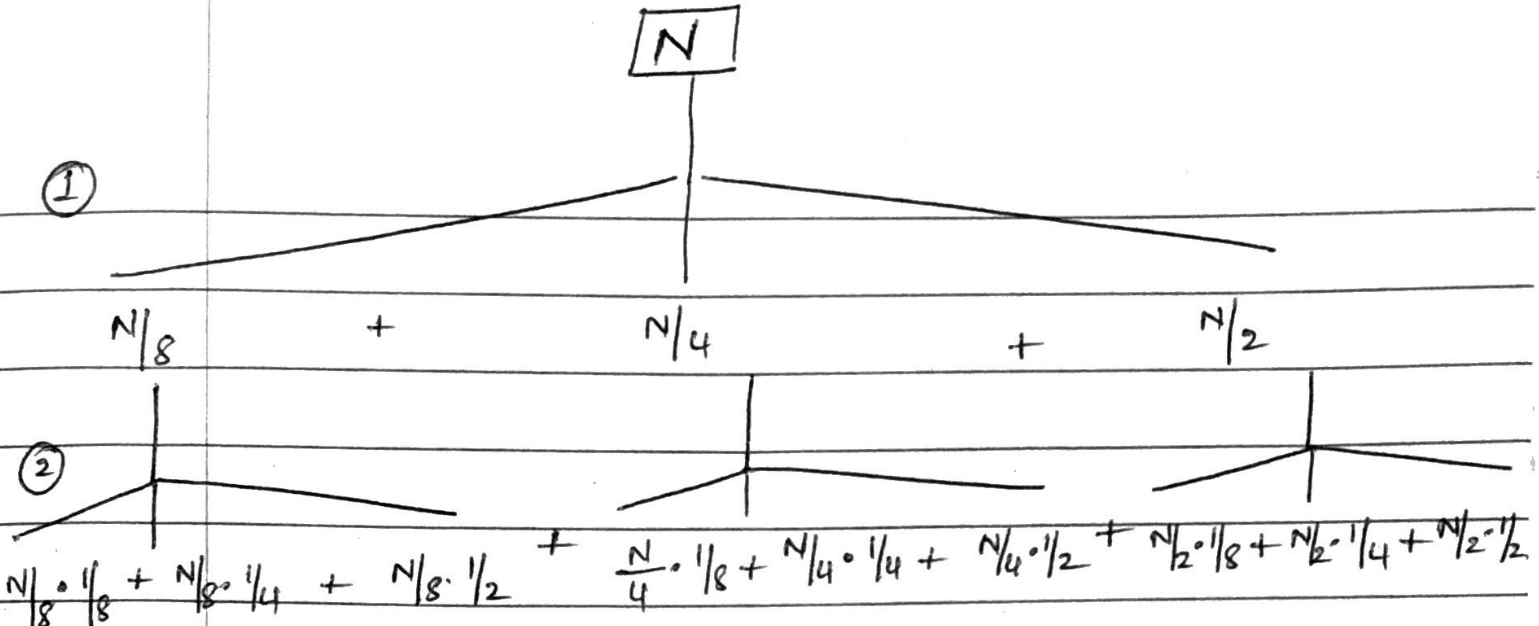

At step - ① - depth of the tree = $\frac{7N}{8}$

At step - ② - $= \left(\frac{7}{8}\right)^2 N$

At step - ③ $= \left(\frac{7}{8}\right)^3 N$

⋮

At x step - depth of tree = $\left(\frac{7}{8}\right)^x N$

The height of the tree at x^{th} step :

$x = \log N$ [∴ As the base is not counted]

$T(N) = T(N/8) + T(N/4) + T(N/2)$

$\Rightarrow \frac{7}{8}N + \left(\frac{7}{8}\right)^2 N + \left(\frac{7}{8}\right)^3 N + \cdots + \left(\frac{7}{8}\right)^{\log N} N$

$\left(\frac{7}{8}\right) N \left[1 + \frac{7}{8} + \left(\frac{7}{8}\right)^2 + \cdots + \left(\frac{7}{8}\right)^{\log N - 1} \right]$

Geometric progression sum = $\frac{1}{1-r} = \frac{1}{1 - 7/8} = 8$

$\left(\frac{7}{8}\right) N [8]$

$\boxed{7N} = O(n)$

∴ Time complexity of recursion relation is <u>linear complexity</u>