

4. a Smallest possible # keys in T is $2^{(4+1)} - 1 = \text{31}$. This is because in a 2-3 tree, all the leaves are at the same level. The lowest # keys in the bottom level for T is 16. There are 5 levels in a B-tree of height 4. For 16 leaves, we need at least 15 ancestors. And $16 + 15 = 31$.

b

