**DERIVATION OF TIME COMPLEXITY FOR MERGESORT**

Given,

t (n) = 2t+7n

t(1)=1

t (n) = 2[2t+ 7] + 7n

t (n) = 22t + 7n +7n

t (n) = 22t + (2×7n)

t (n) = 23t + (3×7n)

………………………………

t (n) = 2jt + (j×7n)

as 1 ,

j= log2n

t (n) = 2jt + (j×7n)

By replacing the value of j in the above equation we get,

t (n) = t + × 7n

t(n) = nt +( × 7n) [∵= b]

t(n) = nt(1) + 7n[∵ t(1)=1]

t(n) = n + 7n