



**CAT I Key**

**1. Online calculator: Huffman coding**

W-1 e-4 a-6 r-4 y-2 l-4 n-4 g-3 t-3 o-3 l-3 d-2 s-3 f-1 h-1 m-1

**Based on the above online calculator for the above frequency answer is**

A-101 l-1111 r-1110 n-010 e-001 s-1100  
T-1001 g-1000 l-0111 o-0110 d-11011 y-11010  
F-00011 w-00010 m-00001 h-00000

**2. Watch the steps of Karatsuba in Karatsuba algorithm**

3. Let  $T(n) = 2T(n/4) + \sqrt{n} + 42$ . What are the parameters?

$a = 2$

$b = 4$

$d = 1/2$

Therefore, which condition applies?

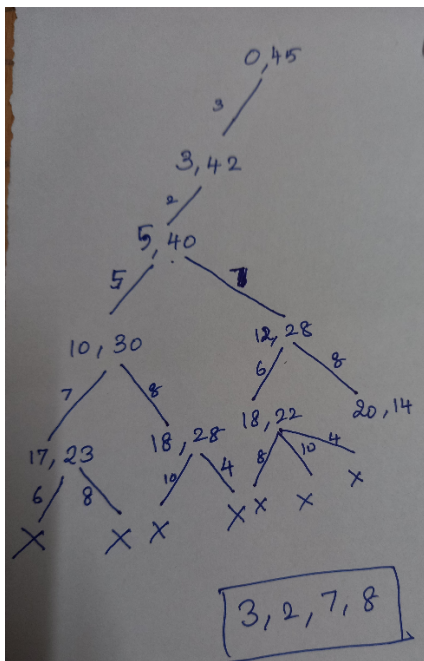
$2 = 4^{1/2}$ , case 2 applies

- We conclude that

Example:  $T(n) = 2T(n/2) + n \lg n$

$$\begin{aligned} T(n) &= n \lg n + 2 \cdot \frac{n}{2} (\lg n - 1) \\ &+ 4 \cdot \frac{n}{4} (\lg n - 2) + 8 \cdot \frac{n}{8} (\lg n - 3) \\ &+ \dots + n \cdot \frac{n}{n} (\lg n - \lg n) \\ &= n \sum_{i=0}^{\lg n} (\lg n - i) = n \frac{\lg n (\lg n + 1)}{2} \\ &= \Theta(n \lg^2 n). \end{aligned}$$

4. MCM – Mark distribution – Recurrence formula – 2, steps – 6, Final parentization



5.