Assignment: 4 Master's Thoman

Calculate time complisity for following recurere relation:

Case 2  $|ag_{a} > k|$   $|ag_{b} = k|$   $|ag_$ 

B1.  $T(h) = 2T(\frac{D}{2}) + h$ compair above with  $T(h) = aT(\frac{D}{b}) + f(h)$  a = 2, b = 2, k = 1, p = 0Evaluate lag<sub>b</sub>a, put values of 9/b.  $\Rightarrow lag_{2}^{2} = 1$ 

Compair lagge with  $K. \Rightarrow lag_b a = K$  case 2 will apply. Check the value of p for case 2. p is 0 which low greater than (-1) for p > (-1),

Time Complexity =  $\Theta(nK lag_p P^{+1}n)$ 

$$= \theta(n' \log^{0+1} n)$$

$$= \theta(n \log n) \qquad \underline{ANS}.$$

O2.  $2T(\frac{h}{2}) + n\log n = T(n)$ Compair above equation with  $T(n) = qT(\frac{h}{2}) + f(\frac{h}{2})$   $\Rightarrow q = 2$ , b = 2, k = 1, p = 1evaluati value of  $\log_b a \Rightarrow \log_2 2 = 1$ compair  $\log_b a$  with value of  $k \Rightarrow \log_b a = k$  was 2 applied.

Compair  $\log_b a$  with value of  $k \Rightarrow \log_b a = k$  was 2 applied.

The complemity  $= \Theta(n^k \log^{p+1} n)$ Time complemity  $= \Theta(n^k \log^{p+1} n) \Rightarrow \Theta(n \log^2 n)$  Ans.  $= \Theta(n^k \log^{p+1} n) \Rightarrow \Theta(n \log^2 n)$  Ans.

83.  $T(N) = 2T(D) + n^{2}$ compair above equation with  $T(N) = aT(D) + n^{2} \log^{2} n$   $\Rightarrow a = 2, b = 2, k = 2, p = 0$ evaluate value of  $\log_{b} a \Rightarrow \log_{2} a = 1$ compair lags a sith value of  $k \Rightarrow \log_{b} a < k$  case 3 applied compair lags a sith value of  $k \Rightarrow \log_{b} a < k$ tech value of  $p \Rightarrow p = 0 \Rightarrow p \Rightarrow p \Rightarrow p \Rightarrow 0$   $\Rightarrow Time \ \text{complexity} = \Theta(n \times \log n)$   $= \Theta(n^{2} \log^{2} n)$   $= \Theta(n^{2})$ 

 $T(n) = 8T(\frac{n}{2}) + n^2$ compairs above equation with  $T(n) = aT(\frac{n}{b}) + n^k \log^2 n$   $\Rightarrow a = 8, b = 2, k = 2, p = 0$   $\Rightarrow a = 8, b = 2, k = 2, p = 0$ evaluate value of  $\log_b a \Rightarrow \log_2 8 \Rightarrow 3$  which > k case! evaluate value of  $\log_b a \Rightarrow \log_2 8 \Rightarrow 3$  which > k applied (priority given to  $\log_b a$ ) Time Complexity  $= \theta(n^2)$  $= \theta(n^3)$