

ASSIGNMENT

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Section - M

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Q2:- for $i=1$ to n
 $\{i = i * 2\}$

$$1 \quad 2 \quad 4 \quad 8 \quad \dots \quad n$$

$$2^{k-1} = n$$

$$(k-1) \log_2 2 = \log_2 n$$

$$k = \log_2 n + 1$$

Time complexity = $O(\log_2 n)$

Q3:- $T(n) = 3T(n-1) \quad n > 0$

~~$T(n) = 3T(n-1) - 1$~~

$$T(n) = 3T(n-1) - 1$$

$$T(n-1) = 3T(n-2)$$

$$T(n) = 3T(n-2)$$

$$T(n) = 9T(n-2)$$

$$T(n-2) = 3T(n-3)$$

$$T(n) = 27T(n-3)$$

$$T(n) = 3^k T(n-k)$$

$$n-k=0$$

$$n=k$$

$$T(n) = 3^n \times 1$$

$$T(n) = 3^n \text{ Ans}$$

$$O(3^n)$$

Q4:- $T(n) = 2T(n-1)$

$$T(n-1) = 2T(n-2)$$

$$T(n) = 4T(n-2)$$

$$T(n-2) = 2T(n-3)$$

$$T(n) = 8T(n-3)$$

$$T(n) = 2^k T(n-k)$$

$$n-k=0$$

$$T(n) = 2^n \text{ Ans}$$

$$O(2^n)$$

Q5:-

$i=1$ $s=1$ The value of i increases by 1 at each interval. $n=k(k+1) \Rightarrow k=\sqrt{n}$

~~$O(n)$~~

& $T(n) = O(\sqrt{n})$

Q6:-

$$i^2 \leq n \Rightarrow i \leq \sqrt{n}$$

$O(\sqrt{n})$ Ans

Q7:-

For 1st loop $\rightarrow n/2$

For 2nd loop $\rightarrow \log n$

For 3rd loop $\rightarrow \log n$

$O(n(\log n)^2)$ Ans

Q8:-

n^2 + Recurrence.

$$T(n) = T(n-3)$$

$$T(n-3) = T(n-6)$$

$$T(n) = T(n-9)$$

$$T(n) = T(n-9)$$

$$T(n) = T(n-3^k)$$

$$n-3^k = 0$$

~~$n = 3^k$~~

$$n = 3^k$$

$$\log n = k \log 3$$

$$k = \log_{\log 3} n$$

$$As n^2 > \log n^3$$

Time complexity :- $O(n^2)$

Q9:-

~~$O(n^2)$~~