

Quiz-1Answer to the question no: 1

~~$$T_n = 2T_{n-1}$$~~

$$T_n = 2T_{n-1} + 4$$

$$T_n + 4 = 2T_{n-1} + 4 + 4$$

$$T_n + 4 = 2(T_{n-1} + 4)$$

$$\text{Let, } u_n = T_n + 4$$

$$u_{n-1} = T_{n-1} + 4$$

From (i)  $\rightarrow$ 

$$u_n = 2u_{n-1}$$

$$= 2 \cdot 2u_{n-2}$$

$$= 2 \cdot 2 \cdot 2u_{n-3}$$

$$= 2^3 \cdot u_{n-3}$$

$$= 2^{\frac{n}{4}} \cdot u_{n-n}$$

$$= 2^{\frac{n}{4}} \cdot u_0$$

$$= 2^{\frac{n}{4}} \cdot 4 \quad \left[ \because u_0 = T_0 + 4 = 0 + 4 = 4 \right]$$

~~$$\therefore T_n + 4 = 2^{\frac{n}{4}} \cdot 4$$~~

$$T_n + 4 = 2^{\frac{n}{4}} \cdot 4$$

$$T_n = 2^{\frac{n}{4}} \cdot 4 - 4$$

$$\boxed{\therefore T_n = 4 \left( 2^{\frac{n}{4}} - 1 \right)}$$

This is the formula of ~~4~~ Fourth tower of Hanoi.

Answer to the question no: 2

$$\text{Here, } n = (07 \% 4) + 11 = 14$$

$$q = (07 \% 3) + 4 = 5$$

There are 14 people and every 5th person is eliminated.

~~$$\text{Algorithm: } N = 3n = 3 \times 14 = 42$$~~

~~while  $N > n$ :~~

~~$$N = \left\lfloor \frac{N - n - 1}{2} \right\rfloor + N - n$$~~

~~Let,  $D =$~~

$$D = 1$$

while  $D \leq 4n$ :

$$D = \left\lceil \frac{5D}{4} \right\rceil$$

$$J_5(n) = 5n + 1 - D$$

$$J_5(14) = ?$$

$$D = \left\lceil \frac{5}{4} \cdot 1 \right\rceil = 2$$

$$D = \left\lceil \frac{5}{4} \cdot 2 \right\rceil = 3$$

$$D = \left\lceil \frac{5}{4} \cdot 3 \right\rceil = 4$$

$$D = \left\lceil \frac{5}{4} \cdot 4 \right\rceil = 5$$

$$D = \left\lceil \frac{5}{4} \cdot 5 \right\rceil = 7$$

$$D = \left\lceil \frac{5}{4} \cdot 7 \right\rceil = 9$$

$$D = \left\lceil \frac{5}{4} \cdot 9 \right\rceil = 12$$

$$D = \left\lceil \frac{5}{4} \cdot 12 \right\rceil = 15$$

$$D = \left\lceil \frac{5}{4} \cdot 15 \right\rceil = 19$$

$$D = \left\lceil \frac{5}{4} \cdot 19 \right\rceil = 24$$

$$D = \left\lceil \frac{5}{4} \cdot 24 \right\rceil = 30$$

$$D = \left\lceil \frac{5}{4} \cdot 30 \right\rceil = 38$$

$$D = \left\lceil \frac{5}{4} \cdot 38 \right\rceil = 48$$

$$D = \left\lceil \frac{5}{4} \cdot 48 \right\rceil = 60$$

$$\therefore J_5(14) = 5n + 1 - D$$

$$= (5 \times 14) + 1 - 60$$

$$= 11$$

(Ans)