

QUESTION: 1 (A) :-

PART: i :-

SOLUTION:-

Consider the recurrence relation?

⇒ The characteristics of equation is

$$a_n = 2n - 1$$

Put $n = 1$

$$a_1 = 2(1) - 1 = 2 - 1 = 1$$

$$\text{for } n = 2 \Rightarrow a_2 = 2(2) - 1 = 4 - 1 = 3$$

$$\text{for } n = 3 \Rightarrow a_3 = 2(3) - 1 = 6 - 1 = 5$$

$$\text{for } n = 4 \Rightarrow a_4 = 2(4) - 1 = 8 - 1 = 7$$

$$\text{for } n = 5 \Rightarrow a_5 = 2(5) - 1 = 10 - 1 = 9$$

Thus General Solution is 1, 3, 5, 7, 9, 11, 13, 15, 17

PART (ii) :-

The Area of a dot in Each tile = $\frac{11}{2}$ Unit²

Total area dot's in pattern 20

$$\text{is} = 20 \times 2 + 1$$

$$= 40 + 1$$

$$\boxed{= 41}$$

QUESTION: 1 (B):-
PART (i):-

The Lucas Number L_n $L_0 = 2, L_1 = 1$

$$L_{n+2} = L_{n+1} + L_n \quad n \geq 0$$

Consider;

$$L_{n+2} = L_{n+1} + L_n$$

$$\text{for } n=0: L_{0+2} = L_{0+1} + L_0 = L_1 + L_0 = 1 + 2 = 3$$

$$\Rightarrow L_2 = 3$$

for $n=1$:

$$L_3 = L_2 + L_1 = 3 + 1 = 4$$

$$L_3 = 4$$

for $n=2$:

$$L_4 = L_3 + L_2 = 4 + 3$$

$$L_4 = 7$$

for $n=3$

$$L_5 = L_4 + L_3$$

$$= 7 + 4$$

$$L_5 = 11$$

$$L_n = L_{n+1}$$

QUESTION: 1 (B):-

PART (ii):-

15th Lucas Number :-
 $L_0 = 2; L_1 = 1$

$$L_{n+2} = L_{n+1} + L_n$$

for $n=0$: $L_2 = L_1 + L_0$
 $L_2 = 1 + 2 = 3$

for $n=1$: $L_3 = L_2 + L_1$
 $L_3 = 3 + 1 = 4$

for $n=2$: $L_4 = L_3 + L_2$
 $L_4 = 4 + 3 = 7$

for $n=3$: $L_5 = L_4 + L_3$
 $L_5 = 7 + 4 = 11$

for $n=4$:
 $L_6 = L_5 + L_4$
 $L_6 = 11 + 7 = 18$

$\Rightarrow L_7 = L_6 + L_5$
 $L_7 = 18 + 11 = 29$

$\Rightarrow L_8 = L_7 + L_6$
 $L_8 = 29 + 18 = 47$

$\Rightarrow L_9 = L_8 + L_7$
 $L_9 = 47 + 29 = 76$

$$\Rightarrow L_{10} = L_9 + L_8$$

$$L_{10} = 76 + 47 = 123$$

$$\Rightarrow L_{11} = L_{10} + L_9$$

$$L_{11} = 123 + 76 = 199$$

$$\Rightarrow L_{12} = L_{11} + L_{10}$$

$$L_{12} = 199 + 123 = 322$$

$$\Rightarrow L_{13} = L_{12} + L_{11}$$

$$L_{13} = 322 + 199 = 521$$

$$\Rightarrow L_{14} = L_{13} + L_{12}$$

$$L_{14} = 521 + 322 = 843$$

$$\Rightarrow L_{15} = L_{14} + L_{13}$$

$$L_{15} = 843 + 521 = 1364$$

So

$$\boxed{L_{15} = 1364}$$