

## Cyclic Sort :-

When given numbers from range 1 to N  $\rightarrow$  use cyclic sort

eg:-

$\begin{matrix} 0 & 1 & 2 & 3 & 4 \\ 3 & 5 & 2 & 1 & 4 \end{matrix}$

Q. What is cyclic sort and how it works?

$\begin{matrix} 3 & 5 & 2 & 1 & 4 \end{matrix} \rightarrow \{ \text{Here the no.'s are jumbled. but are from 1 to 5} \}$   
 let say  $N=5$

When the array is sorted in that case all the numbers are going to be at their correct indices.

$\begin{matrix} 0 & 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 & 5 \end{matrix}$  - Here after sorting index will become value - 1!

$\text{Index} = \text{value} - 1$  - {using this we gonna sort the array}

Why?

Ans

Because index starts from 0

CHECK - SWAP - MOVE

Q. might be :- you have given the array find the missing & number

a. you're given no. from 1 to n. find the duplicate no.

\* worst case

Eg



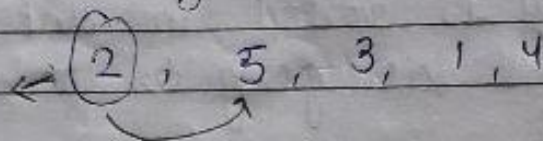
- ① - Check if 3 is at the correct index if not do  $3-1=2$  (index = value - 1) the swap with correct index.

∴ 2, 5, 3, 1, 4

After swapping we know that 3 is at correct position now, but we do not know whether the other numbers that came at the position of 3 is correct or not. So, check again.

②

If 2 is at correct

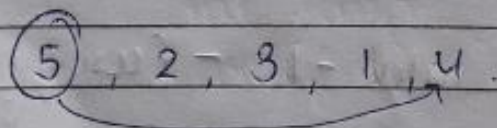


position no

it's not

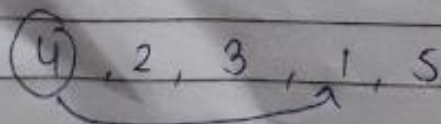
So again swap it, because it should be at index no 1. but it's at no. 0. So swap it with index

③



- Same theory as above

④



- Same

⑤

1, 2, 3, 4, 5

Now we'll check if 1 is at the correct position, if it is then move forward and so on, hence it'll be our ans.



- \* We know that every unique item is only getting swapped once.
- \* Here we are not incrementing  $i$  when we are swapping so that might result in more than  $n$  iterations of the loop.
- \* Worst Case :-  $N-1$  (swap)  
 $(N-1) + N$   
 $= (2N-1)$   
 $\therefore O(n)$  linear.

3

2

3