DAY - 27:

(1). Find duplicated (*only for elements in range) [With O(n) time and O(1) space]

(i) Algorithm:-

→ Traverse the array from start to end.

→ For every element, take its absolute value and

if the abs(array[i])'th element is positive,

this element has not encountered before,

else if negative → the element has been encountered before.

print the absolute value of current element.

Code:-

```
def finduplicate:-
    for i in range(0, len(arr)):
        if arr[abs(arr[i])] >=0:
            arr[abs(arr[i])] =
                -arr[abs(arr[i])]
        else:
            print(abs(arr[i]),, end=' ')
```

(20) Find Missing Number.

- given list of n-1 integers.
- in range of 1 to n.

Algorithm:

→ Calculate the sum of first n natural numbers as
Sumtotal = n*(n+1)/2

→ Create a variable sum to store the sum of array elements.

→ Traverse the array.

→ Update the value of sum as sum = sum + array[i]

→ print the missing number as sum total - sum.

Implementation:-

```
def missingNum(arr):
    n = len(arr)
    total = (n+1)*(n+2)/2
    sum_of_arr = sum(arr)
    return total - sum_of_arr
```

(3) Array Rotation:-

* Function to rotate (arr[], d, n) that rotates arr[] of size n by d elements.

With, O(n) time and O(d) space.

Simple Approach Using Temp Array:

→ Store the first d elements in the temp array.
→ Just append temp with the rest of a original one.

arr = ['p', 'i', 'k', 'a', 'c', 'h', 'u']

d = 3

temp = ['p', 'i', 'k']

result = ['a', 'c', 'h', 'u']

result.append(temp).