Day 1 to Day 5 – Python DSA Full Concepts (Job Ready Foundation)

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Goal: Build strong Python + DSA foundation for job interviews.

Day 1 – Python Basics for DSA

Definition: Data Structures and Algorithms (DSA) means using proper data structures and efficient logic to solve problems.

Concepts: variables, input-output, loops, conditions and functions are the base of all algorithms.

```
def add(a, b):
    return a + b

print(add(3, 5))
```

```
arr = [1, 2, 3]
for x in arr:
    print(x)
```

Interview Note: Without strong loops and functions, you cannot implement algorithms.

Day 2 – Python Built-in Data Structures

List: ordered and mutable collection.

```
arr = [10, 20, 30]
arr.append(40)
print(arr)
```

Tuple: ordered but immutable.

```
t = (1, 2, 3)
```

Set: stores only unique values.

```
s = {1,2,2,3}
print(s)
```

Dictionary: key-value mapping, heavily used for counting.

```
freq = {}
arr = [1,1,2,3]
for x in arr:
    freq[x] = freq.get(x, 0) + 1
print(freq)
```

Day 3 – Time and Space Complexity

Time complexity tells how execution time grows as input size increases.

O(1): constant time, O(n): linear time, O(n^2): quadratic time, O(log n): logarithmic time.

```
arr = [1,2,3]
print(arr[0])  # O(1)
```

```
for x in arr:
    print(x)   # O(n)
```

Space complexity measures extra memory used by the algorithm.

Day 4 – Python Tricks for DSA

enumerate gives index and value together.

```
arr = [10,20,30]
for i,v in enumerate(arr):
    print(i,v)
```

zip combines multiple lists.

```
a = [1,2,3]
b = [4,5,6]
for x,y in zip(a,b):
    print(x,y)
```

Sorting using key and slicing are common interview tools.

```
arr = [(1,3),(2,1),(4,2)]
print(sorted(arr, key=lambda x: x[1]))
```

Day 5 – First DSA Practice

Reverse an array using two pointers.

```
arr = [1,2,3,4]
l = 0
r = len(arr)-1
while l < r:
    arr[l], arr[r] = arr[r], arr[l]
    l += 1
    r -= 1
print(arr)
```

Sum of elements.

```
total = 0
for x in arr:
    total += x
print(total)
```

Find maximum element.

```
mx = arr[0]
for x in arr:
    if x > mx:
        mx = x
print(mx)
```