**Aim: Write a program to implement various data structures in python and their operations.**

**Source Code:**

#Array

from array import \*

arr1 = array('i', [10,20,30,40,50])

for x in arr1:

print(x)

#Accessing array elements

arr1 = array('i', [10,20,30,40,50])

print (arr1[0])

print (arr1[2])

#Insertion Operation

arr1.insert(1,60)

for x in arr1:

print(x)

#Deletion Operation

arr1.remove(40)

for x in arr1:

print(x)

#Search Operation

arr1.remove(40)

for x in arr1:

print(x)

#Update Operation

array1[2] = 80

for x in array1:

print(x)

#List Data Structure

l1 = ['physics', 'chemistry', 1997, 2000];

l2 = [1, 2, 3, 4, 5 ];

l3 = ["a", "b", "c", "d"]

#Accessing values in list

print("l1[0]: ", l1[0])

print("l2[1:5]: ", l2[1:5])

print ("l3[3:]: ", l3[3:])

#Updating List

l1[2] = 2001;

print(l1[2])

#Deleting list elements

del l2[2];

print(l2)

#Tuple data structure

# Different types of tuples

# Empty tuple

my\_tuple = ()

print(my\_tuple)

# Tuple having integers

my\_tuple = (1, 2, 3)

print(my\_tuple)

# tuple with mixed datatypes

my\_tuple = (1, "Hello", 3.4)

print(my\_tuple)

# nested tuple

my\_tuple = ("mouse", [8, 4, 6], (1, 2, 3))

print(my\_tuple)

# tuple unpacking is also possible

a, b, c = my\_tuple

# Accessing tuple elements

tup = ('p','e','r','m','i','t')

print(tup[0])

print(tup[5])

print(tup[-1])

print(tup[-6])

#Slicing in tuple

tup = ('p','r','o','g','r','a','m','i','z')

print(tup[1:4])

print(tup[:-7])

print(tup[7:])

# Concatenation

print((1, 2, 3) + (4, 5, 6))

# Repeat

print(("Repeat",) \* 3)

#deletion of tupe

del tup

# Membership test

tup = ('a', 'p', 'p', 'l', 'e',)

# In operation

print('a' in tup)

print('b' in tup)

# Not in operation

print('g' not in tup)

# Using a for loop

for name in ('John', 'Kate'):

print("Hello", name)

#Dictionary data structure

dict1 = {}

dict1 = {1: 'apple', 2: 'ball'}

# dict with mixed keys

dict1 = {'name': 'John', 1: [2, 4, 3]}

# using dict()

dict1 = dict({1:'apple', 2:'ball'})

# Retriving elements

dict1 = {'name': 'Jack', 'age': 26}

print(dict1['name'])

print(dict1.get('age'))

print(dict1.get('address'))

# Modifying Dictionary Elements

dict1 = {'name': 'Jack', 'age': 26}

# update value

dict1['age'] = 27

print(dict1)

# add item

dict1['address'] = 'Downtown'

marks = {}.fromkeys(['Math', 'English', 'Science'], 0)

print(marks)

for item in marks.items():

print(item)

print(list(sorted(marks.keys())))

# Dictionary Comprehension

squares = {x: x\*x for x in range(6)}

print(squares)

squares = {1: 1, 3: 9, 5: 25, 7: 49, 9: 81}

print(1 in squares)

print(2 not in squares)

# Dict Built-in Functions

sq = {0: 0, 1: 1, 3: 9, 5: 25, 7: 49, 9: 81}

print(all(sq))

print(any(sq))

print(len(sq))

print(sorted(sq))

Output:

10

20

30

40

50

10

30

10

60

20

30

40

50

10

60

30

40

50

10

60

30

40

50

10

20

80

50

l1[0]: physics

l2[1:5]: [2, 3, 4, 5]

l3[3:]: ['d']

2001

[1, 2, 4, 5]

()

(1, 2, 3)

(1, 'Hello', 3.4)

('mouse', [8, 4, 6], (1, 2, 3))

p

t

t

p

('r', 'o', 'g')

('p', 'r')

('i', 'z')

(1, 2, 3, 4, 5, 6)

('Repeat', 'Repeat', 'Repeat')

True

False

True

Hello John

Hello Kate

Jack

26

None

{'name': 'Jack', 'age': 27}

{'Math': 0, 'English': 0, 'Science': 0}

('Math', 0)

('English', 0)

('Science', 0)

['English', 'Math', 'Science']

{0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25}

True

True

False

True

6

[0, 1, 3, 5, 7, 9]