K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)
Department of Science and Humanities

Batch: **A3** **Roll No.:** **16010121051**
Experiment / assignment / tutorial No.
Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE: Basic Data structure in python

AIM: Use suitable methods to get output for given input.

Expected OUTCOME of Experiment: Use of basic data structure in Python.

Resource Needed: Python IDE

Theory:

Python Collections (Arrays)

There are four collection data types in the Python programming language:

- **List** is a collection which is ordered and changeable. Allows duplicate members.
- Tuple is a collection which is ordered and unchangeable. Allows duplicate members.
- Set is a collection which is unordered and unindexed. No duplicate members.
- Dictionary is a collection which is unordered and changeable. No duplicate members.

When choosing a collection type, it is useful to understand the properties of that type. Choosing the right type for a particular data set could mean retention of meaning, and, it could mean an increase in efficiency or security.

List: Lists are used to store multiple items in a single variable. Lists are created using square brackets. e.g. mylist = ["apple", "banana", "cherry"]

List Methods

Python has a set of built-in methods that you can use on lists. L:list, e:element, i:index

Method	**Description**
L.append(e)	Adds an element at the end of the list
L.clear()	Removes all the elements from the list
L.copy()	Returns a copy of the list
L.count(e)	Returns the number of elements with the specified value
L.extend(L2)	Add the elements of a list (or any iterable), to the end of the current list
L.index(e)	Returns the index of the first element with the specified value
L.insert(i,e)	Adds an element at the specified position
L.pop(i)	Removes the element at the specified position
L.remove(e)	Removes the item with the specified value

L.reverse()	Reverses the order of the list
L.sort()	Sorts the list

Tuple

Tuples are used to store multiple items in a single variable. A tuple is a collection which is ordered and **unchangeable**. Tuples are written with round brackets.
e.g. mytuple = ("apple", "banana", "cherry")

Tuple Methods

Python has two built-in methods that you can use on tuples. T:tuple, e:element

Method	**Description**
T.count(e)	Returns the number of times a specified value occurs in a tuple
T.index(e)	Searches the tuple for a specified value and returns the position of where it was found

Set

Sets are used to store multiple items in a single variable. A set is a collection which is both ***unordered*** and ***unindexed***. Sets are written with curly brackets.
e.g. myset = {"apple", "banana", "cherry"}

Set Methods

Python has a set of built-in methods that you can use on sets.

Method	**Description**
S.add(e)	Adds an element to the set
S.clear()	Removes all the elements from the set
S.copy()	Returns a copy of the set
S1.difference(S2)	Returns a set containing the difference between two or more sets
S1.difference_update(S2)	Removes the items in this set that are also included in another, specified set
S1.discard(e)	Remove the specified item
S1.intersection(S2)	Returns a set, that is the intersection of two other sets
S1.intersection_update(S2)	Removes the items in this set that are not present in other, specified set(s)
S1.isdisjoint(S2)	Returns whether two sets have a intersection or not
S1.issubset(S2)	Returns whether another set contains this set or not
S1.issuperset(S2)	Returns whether this set contains another set or not
S.pop()	Removes an element from the set
S.remove(e)	Removes the specified element
S1.symmetric_difference(S2)	Returns a set with the symmetric differences of two sets

S1.symmetric_difference_update(S2)	inserts the symmetric differences from this set and another
S1.union(S2)	Return a set containing the union of sets
S1.update(L1)	Update the set with the union of this set and others

Dictionary

Dictionaries are used to store data values in key:value pairs. A dictionary is a collection which is **ordered (3.7 version onward)**, **changeable** and **does not allow duplicates**. Dictionaries are written with curly brackets, and have keys and values.
e.g. thisdict = {"brand": "Ford", "model": "Mustang", "year": 1964}

Dictionary Methods

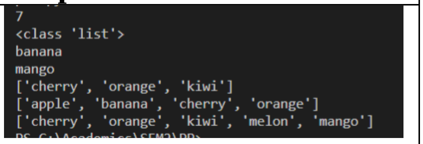
Python has a set of built-in methods that you can use on dictionaries.

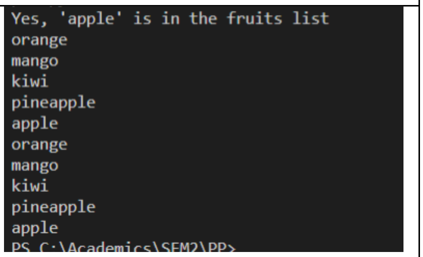
Method	**Description**
D.clear()	Removes all the elements from the dictionary
D.copy()	Returns a copy of the dictionary
D.get(k)	Returns the value of the specified key
D.items()	Returns a list containing a tuple for each key value pair
D.keys()	Returns a list containing the dictionary's keys
D.pop(k)	Removes the element with the specified key
D.popitem()	Removes the last inserted key-value pair
D.setdefault(k,v)	Returns the value of the specified key. If the key does not exist: insert the key, with the specified value
D.update({k:v})	Updates the dictionary with the specified key-value pairs
D.values()	Returns a list of all the values in the dictionary

Problem Definition:

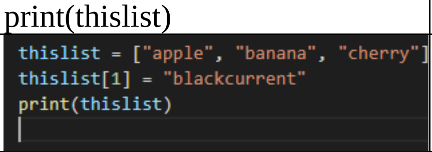
1. In below table input variable, python code and output column is given. You have to complete blank cell in every row.

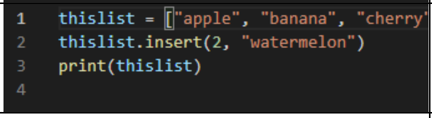
List		
Input	**Python Code**	**Output**

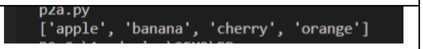
thislist=["apple","banana","cherry","orange","kiwi","melon","mango"]	print(len(thislist))
	print(type(thislist))
	print(thislist[1])
	print(thislist[-1])
	print(thislist[2:5])
	print(thislist[:4])
	print(thislist[2:])
		
		7
		<class 'list'>
		banana
		mango
		['cherry', 'orange', 'kiwi']
		['apple', 'banana', 'cherry', 'orange']
		['cherry', 'orange', 'kiwi', 'melon', 'mango']
		PS C:\Academics\SEM2\PP>

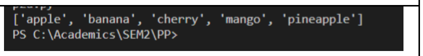
thislist = ["orange", "mango", "kiwi", "pineapple", "apple"]	if "apple" in thislist:
	    print("Yes, 'apple' is in the fruits list")
	for x in thislist:
	     print(x)
	for i in range(len(thislist)):
	      print(thislist[i])
	thislist.sort()
		
		Yes, 'apple' is in the fruits list
		orange
		mango
		kiwi
		pineapple
		apple
		orange
		mango
		kiwi
		pineapple
		apple
		PS C:\Academics\SEM2\PP>

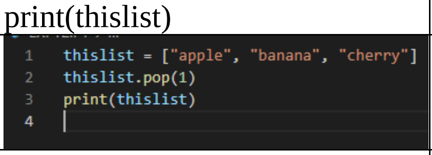
	print(thislist)	

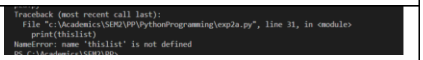
thislist=["apple","banana","cherry"]	
	thislist = ["apple", "banana", "cherry"]
	thislist[1] = "blackcurrent"
	print(thislist)
		['apple','blackcurrant','cherry']

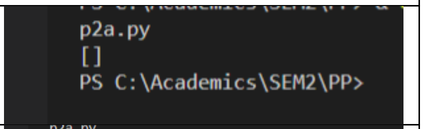
thislist=["apple", "banana", "cherry"]	
	thislist = ["apple", "banana", "cherry"
	thislist.insert(2, "watermelon")
	print(thislist)
		['apple','banana','watermelon', 'cherry']

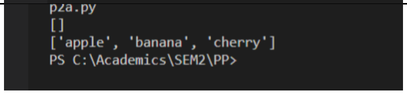
thislist=["apple","banana","cherry"]	thislist.append("orange")
	print(thislist)
		
		p2a.py
		['apple', 'banana', 'cherry', 'orange']

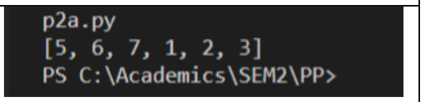
thislist=["apple", "banana", "cherry"]
tropical=["mango", "pineapple"]
	thislist.extend(tropical)
	print(thislist)
		
		['apple', 'banana', 'cherry', 'mango', 'pineapple']
		PS C:\Academics\SEM2\PP>

thislist = ["apple", "banana", "cherry"]	
	thislist = ["apple", "banana", "cherry"]
	thislist.pop(1)
	print(thislist)
		['apple', 'cherry']

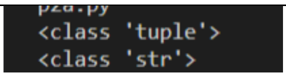
thislist = ["apple", "banana", "cherry"]	del thislist print(thislist)	 Traceback (most recent call last): File "c:\Academics\SEM2\PP\PythonProgramming\exp2a.py", line 31, in <module> print(thislist) NameError: name 'thislist' is not defined PS C:\Academics\SEM2\PP>

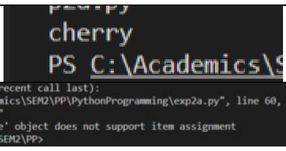
thislist = ["apple", "banana", "cherry"]	thislist.clear()
	print(thislist)
		
		p2a.py
		[]
		PS C:\Academics\SEM2\PP>

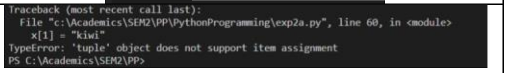
thislist = ["apple", "banana", "cherry"]	x=thislist
	y= thislist.copy()
	thislist.clear()
	print(x)
	print(y)
		
		p2a.py
		[]
		['apple', 'banana', 'cherry']
		PS C:\Academics\SEM2\PP>

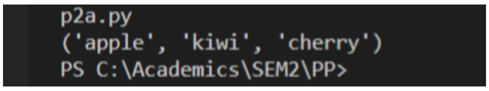
list1 = [5, 6, 7]
list2 = [1, 2, 3]
	list3 = list1 + list2
	print(list3)
		
		p2a.py
		[5, 6, 7, 1, 2, 3]
		PS C:\Academics\SEM2\PP>

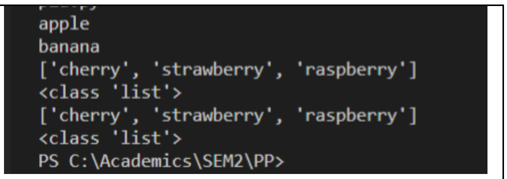
Tuple		
Input	**Python Code**	**Output**

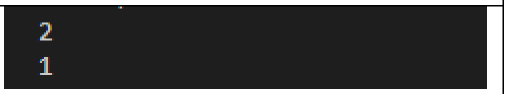
x = ("apple",)
y = ("apple")
	print(type(x))
	print(type(y))
		
		p2a.py
		<class 'tuple'>
		<class 'str'>

thistuple=("apple","banana","cherry")	print(thistuple[-1])	 p2a.py cherry PS C:\Academics\S

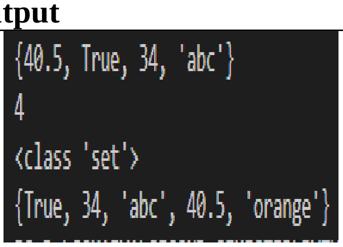
x = ("apple", "banana", "cherry")	x[1] = "kiwi"
	print(x)
		
		Traceback (most recent call last):
		File "c:\Academics\SEM2\PP\PythonProgramming\exp2a.py", line 60, in <module>
		x[1] = "kiwi"
		TypeError: 'tuple' object does not support item assignment
		PS C:\Academics\SEM2\PP>

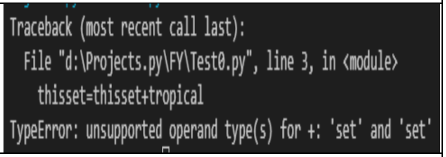
x = ("apple", "banana", "cherry")	y = list(x)
	y[1] = "kiwi"
	x = tuple(y)
	print(x)
		
		p2a.py
		('apple', 'kiwi', 'cherry')
		PS C:\Academics\SEM2\PP>

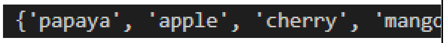
fruits = ("apple", "banana", "cherry", "strawberry", "raspberry")	(green, yellow, *red) = fruits
	
	print(green)
	print(yellow)
	print(red)
	print(type(red))
		
		apple
		banana
		['cherry', 'strawberry', 'raspberry']
		<class 'list'>
		['cherry', 'strawberry', 'raspberry']
		<class 'list'>
		PS C:\Academics\SEM2\PP>

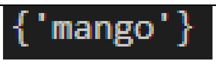
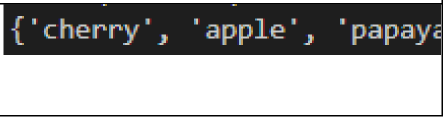
fruits = ("apple", "banana", "cherry")	mytuple = fruits * 2
	print(mytuple.count("apple"))
	print(mytuple.index("banana"))
		
		2
		1

	Set	
Input	**Python Code**	**Output**

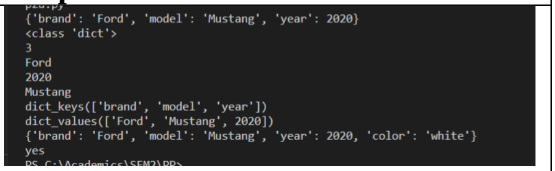
myset = {"abc", 34, True, 40.5}	print(myset)
	print(len(myset))
	print(type(myset))
	print(34 in thisset)
	myset.add("orange")
	print(myset)
		
		{40.5, True, 34, 'abc'}
		4
		<class 'set'>
		{True, 34, 'abc', 40.5, 'orange'}

thisset = {"apple", "mango", "cherry"}
tropical={"papaya", "mango"}
	thisset=thisset+tropical
	print(thisset)
		
		Traceback (most recent call last):
		  File "d:\Projects.py\FY\Test0.py", line 3, in <module>
		    thisset=thisset+tropical
		TypeError: unsupported operand type(s) for +: 'set' and 'set'

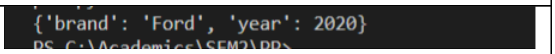
	thisset.update(tropical)
	print(thisset)
		
		{'papaya', 'apple', 'cherry', 'mango

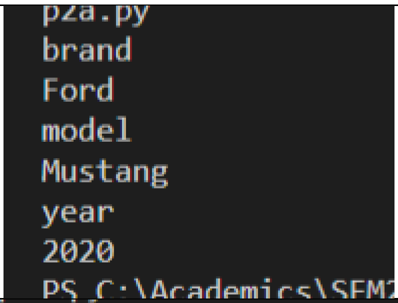
	thisset.intersection_update (tropical) print(thisset)	 {'mango'}
	thisset.symmetric_difference_update (tropical) print(thisset)	 {'cherry', 'apple', 'papaya

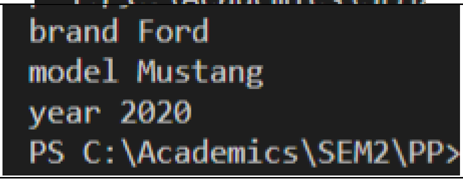
Dictionaries		
Input	**Python Code**	**Output**

thisdict={"brand":"Ford" ,"model": "Mustang","year": 1964, "year": 2020}	print(thisdict)
	print(type(thisdict))
	print(len(thisdict))
	print(thisdict["brand"])
	print(thisdict["year"])
	x = thisdict.get("model")
	print(x)
	y = thisdict.keys()
	print(y)
	z = thisdict.values()
	print(z)
	thisdict["color"] = "white"
	print(thisdict)
	if "model" in thisdict:
	      print("Yes”)
		
		p2a.py
		{'brand': 'Ford', 'model': 'Mustang', 'year': 2020}
		<class 'dict'>
		3
		Ford
		2020
		Mustang
		dict_keys(['brand', 'model', 'year'])
		dict_values(['Ford', 'Mustang', 2020])
		{'brand': 'Ford', 'model': 'Mustang', 'year': 2020, 'color': 'white'}
		yes
		PS C:\Academics\SEM2\PP>

	thisdict["year"] = 2018 print(thisdict)	

	thisdict.pop("model")
	print(thisdict)
		
		{'brand': 'Ford', 'year': 2020}
		PS C:\Academics\SEM2\PP>

	for x in thisdict:
	    print(x)
	    print(thisdict[x])
		
		p2a.py
		brand
		Ford
		model
		Mustang
		year
		2020
		PS C:\Academics\SEM2

	for x, y in thisdict.items(): print(x, y)	 brand Ford model Mustang year 2020 PS C:\Academics\SEM2\PP>

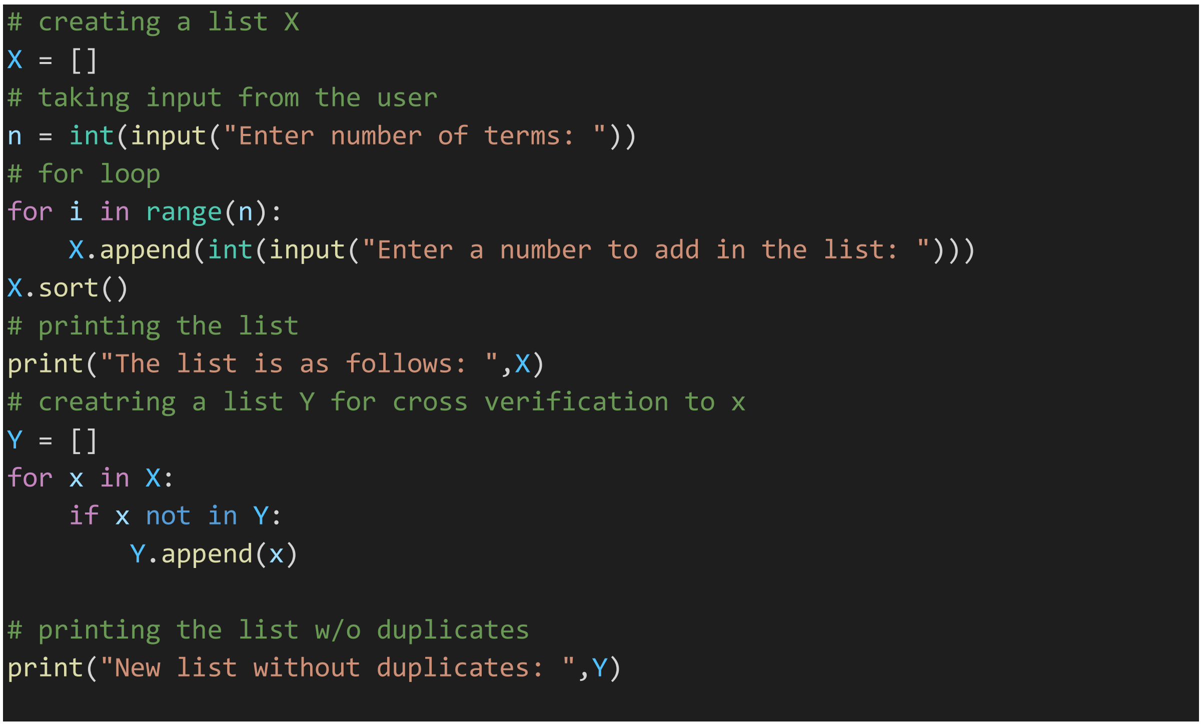
2. Write a python program to take list values as input parameters and returns another list without any duplicates.
3. Write a program that takes a string as input from user and computes the frequency of each letters. Use a variable of dictionary type to maintain the count.

Books/ Journals/ Websites referred:

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, Oxford University Press, First Edition 2017, India
2. Sheetal Taneja and Naveen Kumar, *Python Programming: A modular Approach*, Pearson India, Second Edition 2018,India

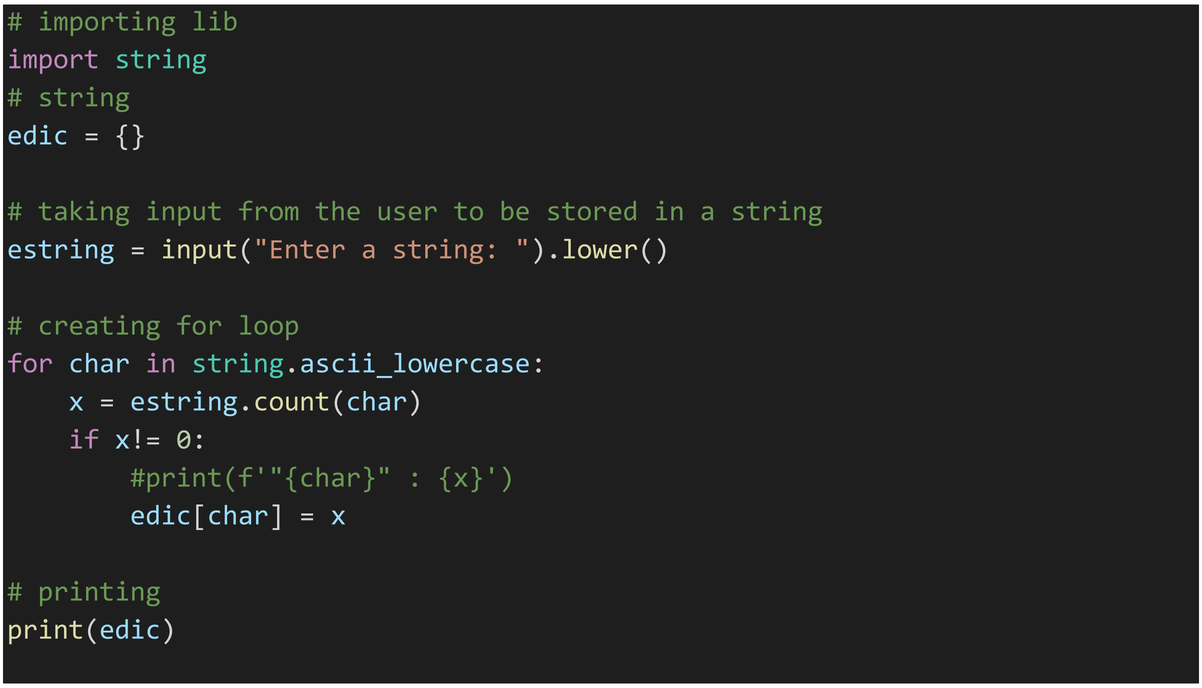
Implementation details:

2)



```
# creating a list X
X = []
# taking input from the user
n = int(input("Enter number of terms: "))
# for loop
for i in range(n):
    X.append(int(input("Enter a number to add in the list: ")))
X.sort()
# printing the list
print("The list is as follows: ",X)
# creatring a list Y for cross verification to x
Y = []
for x in X:
    if x not in Y:
        Y.append(x)

# printing the list w/o duplicates
print("New list without duplicates: ",Y)
```

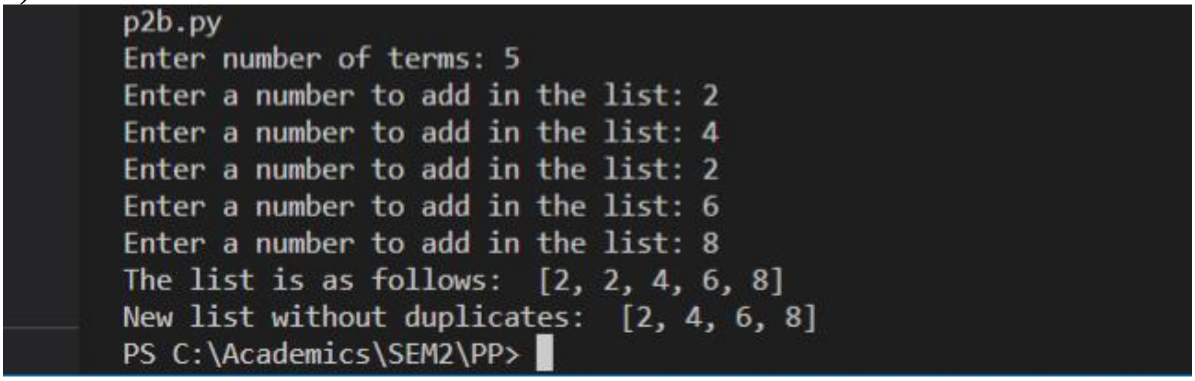
3)



```
# importing lib
import string
# string
edic = {}

# taking input from the user to be stored in a string
estring = input("Enter a string: ").lower()

# creating for loop
for char in string.ascii_lowercase:
    x = estring.count(char)
    if x!= 0:
        #print(f'"{char}" : {x}')
        edic[char] = x

# printing
print(edic)
```

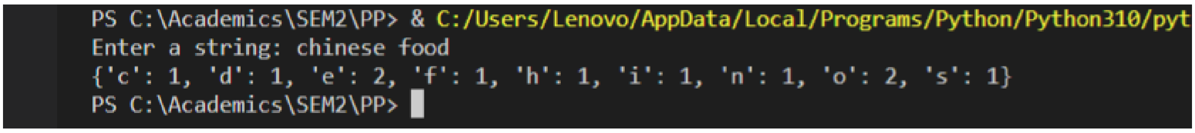
Output(s):

2)



```
p2b.py
Enter number of terms: 5
Enter a number to add in the list: 2
Enter a number to add in the list: 4
Enter a number to add in the list: 2
Enter a number to add in the list: 6
Enter a number to add in the list: 8
The list is as follows:  [2, 2, 4, 6, 8]
New list without duplicates:  [2, 4, 6, 8]
PS C:\Academics\SEM2\PP>
```

3)



```
PS C:\Academics\SEM2\PP> & C:/Users/Lenovo/AppData/Local/Programs/Python/Python310/pyt
Enter a string: chinese food
{'c': 1, 'd': 1, 'e': 2, 'f': 1, 'h': 1, 'i': 1, 'n': 1, 'o': 2, 's': 1}
PS C:\Academics\SEM2\PP>
```

Conclusion:

Learned different Use cases and operations that can be performed on the different data types of python that are Lists, Tuples, Sets and Dictionary.

Post Lab Descriptive Questions

1. List out Mutable and Immutable Data Types in Python.

   Mutable:

   List, Set, Dictionary and User defined Classes.

   Immutable:

   Int, float, tuple, decimal, bool, string and range.

2. What do you mean by indexed and ordered data type in python?

Ans

Strings, Lists and tuples are ordered and indexed data type in python while sets and dictionaries are unordered. Every element in an ordered data type is given a positive integer number as its index which can be used to call that specific element with They maintain their order when operations such as append() are performed upon them.

Date: ______________ **Signature of faculty in-charge**