Sort Question

1. How many basic data types are there in Python?
ans: integer, floating point number, boolean, string.

2. How do you create a list in Python? Provide an example.
ans: by declaring a variable and assigning values inside square bracket
ex:- a = [1, 3, 9, 7, 99]

3. How do you create a variable in Python and assign the value 15 to it?
ans: a = 15

4. What is the difference between '=' and '==' in Python?
ans: '=' is the assignment operator, used to assign a value to a variable
and '==' is the equality operator, used to compare if two values are equal.

5. How do you access the first element of a list named 'my_list'?
ans: The 1st element in a list can be accessed by indexing
ex:- x = a[0]

6. What does the 'len()' function do in Python?
ans: 'len()' is used for checking length of a string, list, tuple etc.

7. How do you write a docstring in Python?
ans: A docstring is written by enclosing text in triple quotes (""") and placed right after the function or class definition.

8. What is the difference between a list and a tuple?
ans:- list is mutable and contains only one type of elements in it
where tuple is immutable and can contain different type of elements.

9.How do you cast an integer to a string in Python?
ans:- We can convert an integer to a string by writing the integer value inside the str() function.
ex:-

```
a = 5
c = str(a)
c
```

10.What is the difference between ‘=’ and ‘==’ in Python?
ans: '=' is the assignment operator, used to assign a value to a variable
and '==' is the equality operator, used to compare if two values are equal

11.Print the output of the following code:
s = "Introduction to python"
print(s[:8:2])
print(s[::-1])
print(s[1::2])

ans:-

1. Itou
2. nohtyp ot noitcudortnI
3. nrdcint yhn

12. What is the purpose of the %timeit magic command?
ans: The %timeit magic command in IPython is used to measure the execution time of a code snippet. It runs the code multiple times and returns the average execution time.

13. What is the purpose of a Python comment, and how do you write a single-line comment
in Python?
ans: Comments are used to describe what the code does, making it easier for others (or yourself) to understand.
In puthon single line comment begins with '#'
ex:-
Tumi amake sir dakba bujso

14. What is the difference between %time and %timeit in IPython?
ans: %time runs the code one time and gives execution time,
%timeit runs the code multiple times and returns the average execution time.

15. What is the difference between List and Tuple in Python?
ans: list is mutable and contains only one type of elements in it
where tuple is immutable and can contain different type of elements.

16. How do you access the last element of a list named ‘my_list’?

ans:
```
my_list = [1, 5, 9 ,7, 99]
print(my_list[len(my_list) - 1])
```
or
```
my_list = [1, 5, 9 ,7, 99]
print(my_list[-1])
```

17. What do you mean by data type? Give examples.
ans: A data type defines the kind of value a variable can hold.

int: Integer numbers (5, 7, 10)
float: Floating-point numbers (0.54857896793, 1.0, 10.5)
str: Strings ("amake", "sir", "dakba")
bool: Boolean values (True, False)

18. What is the difference between an Array and Dictionary?
ans: array contains elements with same data type, accessed by index
dictionary contains key-value pairs, accessed by keys.

19. What is the difference between / and // in Python?
ans: if we divide an integer number with another integer if we use '/' then output will be given in floating point number
if we divide an integer number with another integer if we use '//' then output will be given in integer number

20. How do you define a function in Python? Write an example.
ans: a function is defined by using def keyword
```
def wow():
  return 'Murubbi murubbi uhmm uhmm'
wow()
```
21. How do you create a NumPy array named numbers from a list of integers [1, 2, 3, 4, 5, 6, 7, 8] and print the elements using slicing with the notation numbers[1::2]?
ans:
```
import numpy as np
numbers = np.array([1, 2, 3, 4, 5, 6, 7, 8])
print(numbers[1::2])
```

22. Explain split() and join() functions in Python?

ans: split() jplits a string into a list based on a delimiter (default is whitespace).
s = "Murubbi murubbi uhmm uhmm"
t = s.split()
t ['Murubbi', 'murubbi', 'uhmm', 'uhmm']

join() joins a list of strings into a single string, using a specified delimiter.
t = ['Murubbi', 'murubbi', 'uhmm', 'uhmm']
s = " ".join(t)
s "Murubbi murubbi uhmm uhmm"

23. How do you create a Python dictionary with the keys 'name', 'age', 'Course', and corresponding values 'Alice', 25, and 'PDS'?
ans:
L = {'name': Alice, 'age': 25, 'Course': 'PDS'}

24. What is the difference between List and Tuple?
ans: list is mutable and contains only one type of elements in it
where tuple is immutable and can contain different type of elements.

25. How do you print the summation of all the numbers from 1 to 101?
ans:
n = 101
x = (n *(n + 1)) // 2
print(x)

26. In Python, what is docstrings?
ans: A docstring in Python is a string literal that helps explain the purpose, functionality, and usage of the
code for other developers or users. A docstring is written by enclosing text in triple quotes (""") and placed
right after the function or class definition.

27. What is the output of print(2 * 2 ** 5)?
ans: 2 * 2 ** 5
= 2 * 32
= 64

28. How would you run a cell of code from a different file using IPython magic commands?

ans:You can use the %run magic command to execute a Python file in an IPython session.

29. What is the output of the following code?
print(bool(3!=4))
ans: True

30. How do you create a Dictionary in Python? Provide an example.
ans: A dictionary can be created by specifying key-value pairs inside curly braces {}.
L = {'name': 'Tahmid Sir', 'age': 21, 'Course': 'How to waste your time'}

31. How do you create a Third Party function in Python?
ans: A third-party function is usually defined in a module or package that is not part of the Python standard library,
such as a function from a library like numpy or pandas. You can install third-party libraries using pip and then import
them to create and use their functions.

```
import numpy as np
def my_third_party_function():
    return np.mean([1, 2, 3, 4, 5])

print(my_third_party_function())
```

32. Which one is Mutable - List or Tuple in Python?
ans: List is mutable

33. What does the %timeit magic command do in IPython?
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35. How do you create a NumPy array in Python? Give an example.

ans:
import numpy as np
a = np.array([1, 9, 2, 8, 3, 7, 4, 6, 5])
print(a)

36. Explain the difference between “is” and “==” in Python.
ans: '=' is the assignment operator, used to assign a value to a variable
and '==' is the equality operator, used to compare if two values are equal.

37. Explain the difference between mutable and immutable objects in Python.
ans: In python, we can't do any kind of mutation in immutable objects but we can repalce the value of whole object.
but we can make any kind of mutation mutable objects and also we can repalce the value of whole object.

38. What is a function in Python, and why are functions used? Give an example.
ans: A function is a reusable block of code that performs a specific task. Functions are used to avoid code repetition
and improve modularity.

```
def hujur():
    return 'ei ei Sonamoni bosho uhmm'!"

hujur()
```

Broad Question

1. Write a Python program to find the factorial of a number using recursion.

```
def wow(n):
    return 1 if n == 0 or n == 1 else n * wow(n - 1)

def lol():
    n = int(input())
    print(wow(n))
lol()
```

2. Write a Python program to find Anagram Check.

```
def wow():
    s = str(input())
    t = str(input())
    return 'YES' if sorted(s) == sorted(t) else 'NO'

print(wow())
```

3. Write a Python program using a for loop that:
   i. Prints the multiplication table for a given number ‘n’.
   ii. Calculates the factorial of a given number.

```
def wow_mul(n):
    for i in range(1, 11):
      x = n * i
      print(f"{n} x {i} = {x}")
def wow_fac(n):
    s = 1
    for i in range(1, n + 1):
      s =  s * i
    return s
def lol():
    n = int(input())
    wow_mul(n)
    print(f" Factorial of {n} is {wow_fac(n)}")

lol()
```

4. You are given a list of positive integers containing all numbers from 1 to n except one missing value x. Write a Python program to find the missing value x in the list.

```
def wow():
    n = int(input())
    v = input()

    a = [int(item.strip()) for item in v.split()]
```

```
    b = list(range(1, n + 1))

    result = [item for item in b if item not in a]
    print(result)

wow()
```

5. Write a Python program to Count Words in a Sentence.

```
def wow():
    s = str(input())
    t = s.split()
    n = len(t)
    print(n)
wow()
```

6.

i. Define a function check_odd_even(n) that takes n as input and checks if it is even or odd.

ii. Define a function fibonacci(n) that takes n as input and prints the n-th Fibonacci number.

```
def check_odd_even():
    n = int(input())
    if n % 2 == 0:
      print('Even')
    else:
      print('Odd')

def fibonacci():
    n = int(input())
    m = 0
    k = 1
    for i in range(2, n):
      x = m + k;
      m = k
```

```
        k = x
        if i == n - 1:
            return x
def wow():
    check_odd_even()
    print(fibonacci())

wow()
```

7. Write a program using the ternary operator where,
    i. Given an age, determine the category of the age (i.e., child, teenager, adult).
    ii. Check if a given number is positive, negative, or zero.

```
def wow():
    n = int(input())
    return 'child' if n < 13 else 'teenager' if n < 18
else 'adult'

print(wow())
```

8. Given a dictionary of product prices:
prices = { 'apple': 30, 'banana': 10, 'orange': 60, 'grape': 55, 'mango': 20}
Write a Python program to
    i. Change the pricing of a product.
    ii. Add a new product to the inventory with its price.
    iii. Determine and print whether each product is "Expensive" or "Affordable".

```
def wow():
    prices = { 'apple': 30, 'banana': 10, 'orange': 60,
'grape': 55, 'mango': 20 }

    s = input("Enter the product name to update its
price: ")
    nPrice = int(input("Enter the new price: "))
```

```
    if s in prices:
        prices[s] = nPrice
        print(f"Price of {s} updated to {nPrice}.")
    else:
        print(f"{s} not found in inventory.")

    t = input("Enter the new product name: ")
    price = int(input("Enter the price of the new
product: "))

    if t in prices:
        print(f"{t} already exists in the inventory.")
    else:
        prices[t] = price
        print(f"Added {t} with price {price} to the
inventory.")

    max_price = int(input("Enter the price threshold: "))

    for product, price in prices.items():
        category = "Expensive" if price > max_price else
"Affordable"
        print(f"{product}: {category}")

wow()
```

9. Write a Python program to check if a given number is a perfect number. A perfect number is apositive integer that is equal to the sum of its proper divisors (excluding itself)..

```
def wow():
    n = int(input())
    s = 0

    for i in range(1, n):
```

```
        if n % i == 0:
            s = s + i
    return 'Perfect' if s == n else 'Not Perfect'
print(wow())
```

10. Write a Python program to find the maximum difference between two elements in a given list.

```
def wow():
    n = input()
    a = [int(item.strip()) for item in n.split()]

    a.sort()
    x = a[-1] - a[0]
    return x

print(wow())
```

11. write a Python program using list comprehension to create a new list that contains the squares of the numbers that are divisible by 3 but not by 5. Then, print the resulting list.

```
def wow():
    n = range(1, 101)
    sq = [x**2 for x in n if x % 3 == 0 and x % 5 != 0]
    print(sq)

wow()
```

12. Write Python code for the following tasks:
i. Create a 3x3 NumPy array filled with random integers. Compute the mean of all the elements in the array and print it.
ii. Create a 2D NumPy array with shape (4,4). Split the array into 2 equal- sized horizontal
Slices.

13. Define a function factorial(n) that takes an integer n as input and returns the factorial of n.

```
def factorial(n):
    return 1 if n == 0 or n == 1 else n * factorial(n -
1)

n = int(input())
print(factorial(n))
```

14. You are provided with the following Python code that is supposed to compute the sum of all positive integers
up to a given number n. However, the code has an error that prevents it from running correctly.

```
def sum_up_to(n):
  total = 0
  for i in range(n):
    total += i
  return total
print(sum_up_to(5))
```

Your task is to:
i. Use %xmode to display detailed error messages.
ii. Debug and correct the code accordingly.
iii. Provide a brief explanation of the error and your fix using Python Comments.

```
%xmode

# Incorrect code to trigger an error
def sum_up_to(n):
    total = 0
    for i in range(n):  # Mistake: This range will sum up
to n-1, not n
        total += i
    return total

print(sum_up_to(5)) # You will see a detailed traceback
if there's an error

# fixed
def sum_up_too(n):
```

```
    total = 0
    for i in range(1, n + 1):  # Corrected to sum from 1
to n
        total += i
    return total

print(sum_up_too(5))
```

15. Write a Python function that generates a list of numbers from 1 to n (inclusive) and returns a new list where each number is replaced by its classification:

i. "Even" if the number is even.
ii. "Odd" if the number is odd.
iii. "Multiple of 2" if the number is a multiple of 2.
iv. "Even and Multiple of 5" if the number is both even and a multiple of 5.

```
def wow(n):
    a = []
    for i in range(1, n + 1):
        if i % 2 == 0 and i % 5 == 0:
            a.append("Even and Multiple of 5")
        elif i % 2 == 0:
            a.append("Even")
        elif i % 2 != 0:
            a.append("Odd")
    return a

n = int(input())
print(wow(n))
```

16. Write a Python function that performs the following operations on a given list of mixed data types:

i. Convert all elements of the list to strings.
ii. Convert the list into a tuple.

iii. Create a dictionary where the keys are the indices of the tuple elements and

the values are the corresponding elements.
Instructions:
Implement the function to perform these tasks. Your function should return the list of strings, tuple and dictionary.
Test your function with a sample list: [1, 4.56, "Python",False].

```
def wow(input_list):

    list_of_strings = [str(item) for item in input_list]

    tuple_data = tuple(list_of_strings)

    dict_data = {index: value for index, value in
enumerate(tuple_data)}

    return list_of_strings, tuple_data, dict_data

a = [1, 4.56, "Python", False]
strings, tuple_data, dict_data = wow(a)

# Print the results
print("List of strings:", strings)
print("Tuple:", tuple_data)
print("Dictionary:", dict_data)
```

17. Write Python code for the following tasks:
i. Create a 4x5 array filled with 'Python'.
ii. Create a 3x3 array of random integers in the interval [5, 10).
iii. You have a 4x3 NumPy array. Use the reshape method to change its shape to 3x4.
iv. Create a 2D NumPy array with shape (3, 3). Split this array into 2 equal-sized vertical slices.
v. Given two NumPy arrays, a = np.array([4, 5, 6]) and b = np.array([7,8,9]), perform the following operations and provide the results:

Element-wise: addition of a and b, subtraction of a from b, multiplication of a and b and division of b by a.

i.

```
import numpy as np

array_4x5 = np.full((4, 5), 'Python')
print("4x5 Array filled with 'Python':")
print(array_4x5)
```

ii.

```
array_3x3_random = np.random.randint(5, 10, size=(3, 3))
print("3x3 Array of random integers in the interval [5,
10):")
print(array_3x3_random)
```

iii.

```
array_4x3 = np.arange(12).reshape(4, 3)
reshaped_array = array_4x3.reshape(3, 4)
print("Original 4x3 Array:")
print(array_4x3)
print("Reshaped 3x4 Array:")
print(reshaped_array)
```

iv.

```
array_3x3 = np.random.randint(1, 10, size=(3, 3))
slices = np.hsplit(array_3x3, 3)  # Split into 3 vertical
slices

print("3x3 Array:")
print(array_3x3)
print("Vertical Slices:")
for idx, slice in enumerate(slices):
    print(f"Slice {idx + 1}:")
    print(slice)
```

V.

```
a = np.array([4, 5, 6])
b = np.array([7, 8, 9])

addition = a + b
subtraction = b - a
multiplication = a * b
division = b / a

print("Element-wise addition of a and b:", addition)
print("Element-wise subtraction of a from b:",
subtraction)
print("Element-wise multiplication of a and b:",
multiplication)
print("Element-wise division of b by a:", division)
```

32. Write a python program to print the following pattern.

1
1 1
1 1 1
1 1 1 1
1 1 1 1 1

```
def wow():
    n = int(input())

    for i in range(n + 1):
        for j in range(i):
            print(f"{1}", end=" ")
        print()

wow()
```

33. Write a Python program that accepts user inputs.

```
def wow():
    s = []

    while True:
        n = input("Enter something (type 'stop' to end):
")

        if n.lower() == 'stop':
            break

        s.append(n)

    print("You entered:")
    for item in s:
        print(item)

wow()
```

34. Write a loop in Python that prints only the even numbers from 1 to 10.

```
def wow():
  for i in range(1, 11):
    if i % 2 == 0:
      print(f"{i}", end = " ")
wow()
```

35. Write a Python function to calculate the average of two integers.

```
def wow():
  n = int(input())
  m = int(input())
  print(f"{(n + m) / 2}")

wow()
```

36. Write a Python program that keeps on accepting a number from the user until the user enters ‘-1. Display the sum and average of all the numbers.

```
def wow():
    s = 0
    c = 0

    while True:
        number = float(input())

        if number == -1:
            break

        s = s + number
        c = c + 1

    if c == 0:
        print("No numbers were entered.")
    else:
        average = s / c
        print(f"Sum of numbers: {s}")
        print(f"Average of numbers: {average}")
wow()
```

37. Write a Python program that reverses a given list without using the built-in reverse()
method. Print the reversed list.

```
def wow():
    n = input()
    a = [int(item.strip()) for item in n.split()]
    print(a[::-1])
wow()
```

38. Write a Python program that finds and prints the common elements between two lists

```
def wow():
    n = input()
```

```
    m = input()
    a = [int(item.strip()) for item in n.split()]
    b = [int(item.strip()) for item in m.split()]
    common_elements = set(a).intersection(set(b))
    print(common_elements)
wow()
```

39. Write a Python program that uses a loop to iterate over a range of numbers. The range should start from 0 and decrease by 2 each time until it reaches a number less than -10. For each number in the range, print whether it is an even number or an odd number.

```
def wow():
    for i in range(0, -11, -2):
      if i % 2 == 1:
        print(f"{i} is odd")
      else:
        print(f"{i} is even")
wow()
```

41. Write a loop in Python that prints the numbers from 1 to 10.

```
def wow():
    for i in range(1, 11):
      print(f"{i}", end = " ")
wow()
```

42. How do you create a dictionary in Python? Provide an example.

ans: Creating a dictionary in Python is straightforward. You can create a dictionary using curly braces {} with key-value pairs separated by colons :. Each key-value pair is separated by a comma.

```
person = {
    "name": "John",
    "age": 30,
    "city": "New York",
    "is_student": False
}

print(person)
```

```
print("Name:", person["name"])
print("Age:", person["age"])
```

43. Write a Python code snippet that checks if a number is even or odd. The number will be provided

```
def wow():
    n = int(input())
    if n % 2 == 1:
      print(f"{n} is odd")
    else:
      print(f"{n} is even")
wow()
```

44. Write a Python program that prints the multiplication from 1 to 10.

```
def wow():
    m = 1
    for i in range(1, 10 + 1):
        m = m * i
    print(m)
wow()
```

45. Write a Python code snippet that checks if a number is even or odd.

```
def wow():
    n = int(input())
    if n % 2 == 1:
      print(f"{n} is odd")
    else:
      print(f"{n} is even")
wow()
```

46. What is the output of the following code?

```
for num in range(10):
    if num % 2 == 0:
      continue
print(num)
9
```

47. What is the output of the following code?

```
s = "Welcome"
print(s)
s = s + " to"
print(s)
s += " Python!"
print(s)
s = s[:16]
print(s)
s = s.replace("Welcome", "introduction")
print(s)
```

1. Welcome
2. Welcome to
3. Welcome to Pytho
4. introduction to Python!

48. What is the output of the following code?

```
x = "introduction to Python"
movie = "Inception"
book = "Sherlock Holmes"
poem = "the sun rises over the quiet town"

print(x.islower())
print(x.isupper())
print(movie.startswith("inception"))
print(movie.endswith("Journey"))
print(book.istitle())
print(poem.istitle())
print(book[-11:-4])
```

1. False
2. False
3. False
4. False
5. True

```
6. False
7. lock Ho
```