

Unique Paper Code : 42341102
Name of the Course : B.Sc. Prog./Mathematical Sc
Name of the Paper : BSCS01 Problem Solving Using Computers
Semester : I
Year of Admission : 2019 onwards

Duration: 3 hours

Maximum Marks: 75

Instructions for Candidates:

- All questions carry equal marks. Attempt any **Four** out of **Six** questions.
- All the coding/error/output statements are based on Python programming language.

Q1. Write a function `series_sum(n)`, which accepts an integer and calculates and returns the sum of the first n terms of the following series:

$$1 - 4 + 9 - 16 + 25 - 36 + \dots$$

Write a function that accepts a string as an argument and returns a string such that the first character appears once, second character twice and so on, with a space in between them. For example, if the argument is 'hello' then the function should return: 'h ee ll ll ll oo oooo'.

Which of the following are valid identifiers? If they are invalid, then mention the violation.

- a)Employee9
- b)3elements
- c)@Askforhelp
- d)_fun_
- e)from

Q2. What will be the outputs on the execution of the following code segments? Justify your answers.

a)

```
x = 1
print(True and (x > 4))
print(not (x > 0) and (x > 0))
print((x != 1) == (not x == 1))
```

b)

```
list1 = ['cat', 'dog', 19, 20]
print(list1[-3:-9])
list1[2] = 200
del list1[2]
print(list1[2])
print(list1)
```

c)

```
def f(n):
    if n % 5 == 0:
        return n * 10
    else:
        return n + 10

def display(m = 5):
    for i in range(0, m):
        print(f(i), end = '$')
    print('\n')

display(7)
display()
display(3)
```

d)

```
def fn(s):
    try:
        print(s[5])
    except IndexError:
        print("Trying to access something beyond valid index")
        raise ValueError("Some error")
        print("Working properly")

try:
    fn("Friend")
    fn("Tom")
    fn("Karishma")
except ValueError as msg:
    print(msg)
```

e)

```
def r(s):
    if s == "":
        return s
    else:
        return r(s[1:]) + s[0].upper()
print(r("Hello"))
```

Q3. Define a class Employee that keeps track of the record of employees in an organization.

The class should contain the following instance data members:

Eno: Employment number

Name: Employee's name

gradePay: Grade pay of the employee

The class should support following methods:

__init__ for initializing the data members

empPost() that returns an employee's designation based on his/her grade pay:

Grade Pay	Designation
6400	Officer
4800	Assistant
2800	Clerk

empInfo() to display the information about an employee including the designation of the employee

Write statements/mathematical expressions for the following:

a) $n(n - 1) / 2$

b) $\sqrt{a + b}$

c) using list comprehension, create a list of all the common factors of the three variables x, y and z.

- Q4. Write a function that accepts two lists: Keys and Values; and returns a dictionary with the elements in the list Keys forming the keys of the dictionary and the corresponding entries of Values act as the values in the dictionary. In case the number of the elements in the two lists is not same, raise an assertion error. For example, if Keys = [10, 20, 30] and Values = ['Ten', 'Twenty', 'Thirty'], then the function should return {10: 'Ten', 20: 'Twenty', 30: 'Thirty'}

Write a function to display the reverse of every word in the string passed to it as argument. For example, if the argument is 'Hello There!' then the output should be 'olleH !erehT'.

- Q5. Write a function that accepts two arguments: name of a file and a string. The function should return the number of occurrences of the string in the file. It should return -1 if the file does not exist.

Write a function that accepts two integers x and y , and returns a dictionary where the keys are the numbers between x and y , and the values are square of keys. Consider both the cases where $x \geq y$ or $x \leq y$.

Q6. Apply insertion sort to arrange the elements of the following list in ascending order:

List = [27, 23, 18, 19, 20, 02, 9, 10]

Show all the intermediate steps of each pass. Determine the number of passes to sort the entire list.

Apply binary search to search key value 20. Show all the comparisons performed during the search.