

Unique Paper Code : 32345104
Name of the Paper : Programming using Python
Name of the Course : Computer Science: GE for Honours
Semester : I

Duration: 3 Hours

Maximum Marks: 75

Instructions: Attempt any FOUR questions. All questions carry equal marks.

Q1

- Write algorithms for the following:
 - ◆ to compute whether a number is a perfect square.
 - ◆ to determine whether a string is a palindrome.

- Which of the following are valid identifiers? If they are invalid, then mention the cause of violation.
 - ◆ #ofElements
 - ◆ No of elements
 - ◆ 3elements
 - ◆ noOfElements
 - ◆ for
 - ◆ In

- What will be the value associated with the variable name **a** on execution of the following statements? Justify your answers.
 - ◆ `b = 10`
`a *= b + 2`
 - ◆ `a = 2 + 3 ** 2 // 4 % 3`
 - ◆ `a = "32 * 76"`
 - ◆ `a = 'ho' * 5`
 - ◆ `a = 'string' > 'Strings'`

◆ a = ~-12

Q2 Write functions for the following (**n** to be passed as an argument to the function):

- display the following pattern:

```
A
B A B
C B A B C
D C B A B C D
A B C B A
A B A
A
```

Here **n** is the number of rows in the diamond shape, assume that **n** is odd and less than 52. For the above sample figure **n** is 7.

- sum of the first **n** terms of following series:

$$S = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots$$

- greatest common divisor of two numbers (in addition to **n**, another argument **m** is passed to the function)

Q3

- You are given a dictionary `priceList = {"Pen" : 10, "Pencil" : 5, "Eraser" : 5, "Ruler" : 20}`, representing products and their rates.
 - ◆ write a function `rate` that accepts this dictionary along with the name of a product and returns the price of that product. If the product does not exist in the dictionary, then it should return -1. For example, if the name of the product is `Ruler` then the function should return 20.
 - ◆ write another function `update` to modify the dictionary. The function should accept the dictionary, name of a product and new rate for it. The function should return the updated dictionary as per the following cases:
Case 1: if the rate of the product is negative or zero and the product exists in the dictionary then the product should be removed from the dictionary

Case 2: if the rate of the product is positive and the product exists in the dictionary then the rate of the product in the dictionary should be changed to the new rate that is passed to the function

Case 3: if the rate of the product is positive and the product does not exist in the dictionary then the product-rate pair should be added to the dictionary

- Which of the following fourteen statements (**Line 1** to **Line 14**) have errors? Identify all errors and justify your answers.

```
str = "Hello There"      # Line 1
str[6] = 't'            # Line 2
print(str[12])          # Line 3
print(str[-2 : -4])     # Line 4
print(str[2 : 12])      # Line 5

lst = list(str)         # Line 6
lst[3] = 'i'           # Line 7
print(lst[2 : 4])       # Line 8

s = set(str)            # Line 9
s[3] = 'i'             # Line 10
print(s[2 : 4])        # Line 11

t = tuple(s)           # Line 12
t[3] = 'i'            # Line 13
print(s[2 : 4])       # Line 14
```

Q4

- Consider the following two tuples showing games played by Ramesh and Suresh:

```
gamesRamesh = ('lawn tennis', 'cricket')
```

```
gamesSuresh = ('cricket', 'hockey', 'badminton')
```

Write the statements to compute the following:

- ◆ games played by Suresh but not Ramesh
 - ◆ games that are common to both of them
 - ◆ all the games that are played by either of them
 - ◆ games that are not common to both of them
- What will be the output produced on execution of the following code segments? Justify your answers.

```
◆ def fun(a = 0, b = 1):  
    return a * b
```

```
print(fun(5, 6))  
print(fun(6))  
print(fun(b = 5))  
print(fun())
```

```
◆ import copy  
lst1 = [13, 23, [38, 42], 52]  
lst2 = copy.deepcopy(lst1)  
lst3 = lst1  
lst2[2][0] = 78  
lst3[3] = 61  
print(lst1, lst2, lst3)
```

```
◆ def m(s):  
    ans = ''  
    for i in range(len(s)):  
        if i % 2 == 0:  
            ans += s[i]  
    return ans  
print(m('HelloWorld'))
```

```
◆ lst = [x * y for x in range(3, 9, 2) for y in range(6,
1, -1) if x * y % 2 == 0 ]
print(lst)
```

```
◆ def fn(a, n):
    try:
        print(a[n])
    except IndexError:
        print("In IndexError")
        raise ValueError("An error")
    except:
        print("Some error")
    print("Bye")
```

```
lst = [1, 2, 3]
try:
    fn(lst, 1)
    fn(lst, 3)
    fn(lst, 2)
except ValueError as msg:
    print(msg)
```

Q5

- Write a program to read three sides of a triangle and display whether the triangle is a scalene or equilateral or isosceles triangle, provided that the sides entered by the user are positive and they form a valid triangle. The program should have **assert** statements to ensure that these two conditions are satisfied.
- Write a function that accepts the name of a file as an argument and returns the number of lines in the file. The function should return -1 if the specified file does not exist.
- Write a function for linear search that accepts two arguments: a list of numbers and a number to be searched. Assume that the list can have duplicate elements. The function should return a list of all the indices corresponding to the element

being searched. If the element is not there, then the program should return the list [-1]. For example, if the list is [68, 24, 68, 68, 24, 14] and 68 is to be searched then the function should return [0, 2, 3].

Q6 Define a class `Student` that keeps a record of students. The class should contain the following:

- data members for every student: `rollNo`, `Name`, `Class`, `Section`, `marks1`, `marks2`, and `marks3`. Assume that the maximum marks for each subject are 100.
- an additional data member `count` to keep a record of the number of objects created for this class. Add appropriate statements in the code to increment the value of `count` by 1, when an object is created.
- Also define function members:
 - ◆ a constructor function to initialize the members
 - ◆ a function `grade`, that returns the overall grade of the student according to the following criteria:
 - A : if percentage ≥ 90
 - B : if percentage ≥ 80 and < 90
 - C : if percentage ≥ 70 and < 80
 - D : if percentage < 70
 - ◆ `__str__` function to display the details of a student including the overall grade of the student

Also write statements for the following:

- create an object `s1` of this class for a student Tarun of Class XII A having roll no 15 and marks in three subjects as 83, 93, 86.
- display the details of the student `s1` using `__str__` function statement.