Unique Paper Code           :        42341102

Name of the Course          :        B.Sc. Prog./Mathematical Sc

Name of the paper           :        Problem Solving with Computers

Semester                    :        I

Duration: 3 Hours

Maximum Marks: 75

**Instructions for Candidates:**

**Attempt any Four Questions. All Questions carry equal marks.**

Q1
- Give the output that will be produced on execution of the following code segments:

  ```
  o  x=3
     y=2
     if x>2:
         if y>2:
             z = x+y
             print("Z is: " , z)
         else:
             print("x is: ", x)
  ```

  ```
  o  for i in range(1,5):
         j = 0
         while j<i:
             print(j, end=" ")
             j += 1
  ```

  ```
  o  d={'Name':'Alice', 'Age':7}
     print(d.get('Name'))
     print(d.get(1, 'Invalid'))
  ```

  ```
  o  float(4+int(2.39)%2)
  ```

  ```
  o  "asdf"[::-1]
  ```

  ```
  o  print(list('Hello'))
  ```

- Write a function `series_sum(n)` in Python to calculate the sum of the first `n` terms of the following series:

  $1/2 - 1/4 + 1/8 - 1/16 + 1/32 - 1/64 + \ldots$

Q2
- Write Python statements to read name and age as input from a user and print the year in which the user turns 100 years old.

- Give the output that will be produced on execution of the following code segments:

```
o  l1= [10, 22, 'x', 'y',33,44]
   print(l1[3:])

o  max(l1)

o  type(l1[2])

o  l2=[4,5]
   l1.extend(l2)

o  l1.reverse()

o  try:
       f = open("MyFile.txt", "r")
       f.write("This is my file")
   except IOError:
     print("Cant open file")
   else:
     print("Content writen")


o  list=['a',0,2]
   for x in list:
       try:
           print("The value is ", x)
           r=1/int(x)
           break
       except Exception as e:
           print(e.class, " occured")
           print("Next value")
           print()
   print("Reciprocal of ", x, " is ", r)


o  Word1= " Hello first year students"
   Word2=" Hello  second year students"
   for i in Word1:
       if i in Word2:
           print(i , end=" ")
```

Q3

- Write statements to create a file `Countries.txt` with the following rows:

```
$India$USA$Nepal$
$Indonasia$Ireland$
$Srilanka$Russia$
```

Consider the file `Countries.txt`. Give the output that will be produced on execution of the following code segment:

```
f1 = open("Countries.txt", "r")
name=f1.readline().strip("$\n")
while name:
    if name.startswith("I"):
            print(name)
    else:
            pass
    name=f1.readline().strip("$\n")
```

- Give the output that will be produced on execution of the following code:

```
def f():
   try:
        s="abc"
        print(s[3])
   except ZeroDivisionError:
        print("Divided by zero")

def main():
    try:
       f()
       print("After the function call")
    except IndexError:
       print("Index out of bound")
    except:
       print("Exception in main")

   main()
```

Q4    Apply Insertion sort scheme of sorting on the following list to sort it in ascending order:
`lst=[5,4,3,11,14,2,6,7]`
Show the list after each iteration.
How many iterations are required to sort the above list?

Apply Binary Search to search for the item 9 in the sorted list. At each step, show the index at which the value is compared with 9.

Under what circumstances, you would prefer to use *linear search* over *binary search*? Justify your answer.

Q5

- Define a class `Rectangle` having `length` and `breadth` of rectangle as the data members and the methods to do the following:

  Methods:
  - Constructor to initialize the data members `length` and `breadth`.
  - `area()` to calculate area of the rectangle.
  - `perimeter()` to calculate perimeter of the rectangle.
  - `__str__` to return string representation for displaying the data members suitably.

  Also, write Python statements to:
  - Create an object of class `Rectangle` of `length` 4 and `breadth` 3.
  - Invoke the method `area()`.
  - Invoke the method `perimeter()`.
  - Print all the data members of the class.

- Give the output that will be produced on execution of the following code segment:

```
class Abc:
    const=9
    def __init__(self,name,id):
        self.name = name
        self.id = id

Abc.const = 99
A = Abc("John",123)
B = Abc("Diana",444)
b.const = 9
c = Abc("William",222)

print("a :", a.const, "b :", b.const, "c :",c.const)
```

Q6

- Consider the following two sets:

```
setx = set(["green", "blue", "yellow", "red"])
sety = set (["blue", "yellow", "pink", "orange"])
```

Write the Python statements for each of the following operations:
- o Adding an element to the set `setx`.
- o Compute `xUy` as union of `setx` and `sety`.
- o Compute `xminusy` as set difference between `setx` and `sety`
- o Remove `"blue"` from `setx`

- Consider the following string:

```
greeting = "Good Morning. Have a Good Day!! "
```

Give the output for the following function calls:

- o `greeting.find("a")`
- o `greeting.swapcase()`
- o `greeting.istittle()`
- o `greeting.replace("Good", "Sweet")`
- o `greeting.strip()`
- o `greeting.endswith("!!")`

- Consider the tuple `t1` defined below :

```
t1 = (12, 5, 2, 4, 17, 44,7, 6, 9, 10).
```

Write a Python statement to:

- o Print first half of the values of `t1` in one line and the other half in another line.
- o Produce a list comprising all the even numbers in the tuple `t1`.