Master of Operational Research (MOR)
SEM I, 2023
Course – MOR105(a), Paper Title - Python Programming (UPC:223601105a)
(N.C.: - Admission of 2019 and onwards)

Time: 3 Hours

Maximum Marks: 50

(Write your Roll No. On the top immediately on the receipt of this question paper)

(Answer any five questions.)

1. (a) Explain the significance of "Sequence" in python. Further explain, why is Dictionary not considered as a sequence? (2)

(b) Explain binary left shift and binary right shift operators. Explain the same for number 29 when it is left shifted by 2 and right shifted by 2. (1)

(c) Write the salient features of python programming language. (2)

(d) What are negative indexes and why are they used? (1)

(e) Differentiate between the following. (2)
    i.   re.search () and re.match ()
    ii.   find () and index ()

(f) When to use tuples in Python. Give some examples of programming situations mentioning its usefulness. (2)

2. (a) What is the significance of NumPy library in Python? What advantages do NumPy arrays offer over (nested) Python lists? (3)

(b) Write a program to calculate in how many days a work will be completed by three persons A, B and C together. A, B, C take x days, y days and z days respectively to do the job alone. The formula to calculate the number of days if they work together is xyz/(xy + yz + xz) days where x, y, and z are given as input to the program. (2)

(c) Find the error(s)
(i) (1)

```
def f () :
    var=100
        print (var)
f ()
print (var)
```

(ii) (1)

```
def findValue( val1 = 1.1, val2, val3):
        final = (val2 + val3)/ val1
        print(final)
findvalue()
```

(d) Differentiate between syntax error, logical error or runtime error with the help of examples. (2)

(e) What is the significance of a "pass" statement? Demonstrate its usage. (1)

3. (a) Describe the relationship between a class and object? Write a program which shows how to define a class, how to access member functions and how to create and access objects in python programming.

(3)

(b) With the help of an example, differentiate between Series and DataFrame in context of Panadas. Explain your answer.

(2)

(c) Find the output of the following code:

(2)

```python
var = 7
while var > 0:
    print('Current variable value:', var)
    var = var - 1
    if var == 3:
        break
    else:
        if var == 6:
            var = var - 1
            continue
print("Good bye!")
```

(d) Consider the following string mySubject:

mySubject = "Operational Research"

(3)

What will be the output of the following string operations?

```
i.   print(mySubject[0:len(mySubject)])
ii.  print(mySubject[::2])
iii. print(mySubject[len(mySubject)-1])
iv.  print(mySubject[::-2])
v.   print(mySubject[:3] + mySubject[3:])
vi.  print(mySubject.swapcase())
```

4. (a) What will be the output of the following Python code?

(2)

```python
i=0
while i<10:
    i=i+1
    if (i==5 or i== 6):
        print("\n Continuing with", i)
        continue
    if (i==9 and i== 10):
        print("\n Breaking on", i)
        break
    print(i, end = " ")
print("\n Done")
```

(b) What are Lambda functions? Describe.

(2)

(c) Explain the working of the following code and find the output.

(2)

```python
num = input('Enter a non-zero value: ')
while num == 0:
    num = input('Enter a non-zero value: ')
```

(d) Explain the usage of recursion and iteration as two separate and yet connected approaches of problem solving.

(3)

(e) What is a zip function? Explain it using an example.

(1)

5. (a) Explain the following code and find the output

(2)

```
class Time:
    def __init__(self, hours, minutes, seconds):
        self.hours = hours
        self.minutes = minutes
        self.seconds = seconds

    def add_time(self, duration):
        opera_hours = self.hours + duration.hours
        opera_minutes = self.minutes + duration.minutes
        opera_seconds = self.seconds + duration.seconds
        while opera_seconds >= 60:
            opera_seconds = opera_seconds - 60
            opera_minutes = opera_minutes + 1
        while opera_minutes >= 60:
            opera_minutes = opera_minutes - 60
            opera_hours = opera_hours + 1
        print(f"Opera ends at {opera_hours}:{opera_minutes}:{opera_seconds}")

def main():
    opera_start = Time(10, 30, 30)
    opera_duration = Time(2, 45, 50)
    opera_start.add_time(opera_duration)

if __name__ == "__main__":
    main()
```

(b) Write the output of the following code.

(2)

```
import numpy as np
b = np.array([9,11,19,1,17,5,2,4])
print(b)
bool_arr = b > 9
print(bool_arr)
new_arr = b[bool_arr]
print(new_arr)
```

(c) Write a program that will generate a random password. The program should take input as number of letters, symbols and digits one would like to keep in the password, and then the code will generate a random password each time the user inputs the arguments.

(4)

(d) With the help of an example explain the significance of the __init__ method.

(1)

(e) Following information about three students is provided in the form of dictionary of lists;

{Rollno":[1,2,3], "Total":[350.5,400,420], "Percentage":[70,80,84] }

Create a dataframe and write the required set of statements in order to have this information in a tabular manner. Write the output as well. (1)

6. (a) Write a program to plot a bar chart in python to display the pass percentage of Department of Operational Research for five consecutive years for the given data: -

Year	Pass Percentage
2019	98.50
2020	70.25
2021	55.20
2022	90.50
2023	96.58

(2)

(b) How multiple inheritance is different from multi-level inheritance? Explain with the help of example. (2)

(c) Write a menu-driven python program to perform various list operations, such as: (4)
   i. Append an element
   ii. Insert an element
   iii. Append a list to the given list
   iv. Modify an existing element
   v. Delete an existing element from its position
   vi. Delete an existing element with a given value
   vii. Sort the list in ascending order
   viii. Sort the list in descending order

   (Hint: Say your list has 5 elements: [24, 3, 86, 15, 7])

(d) What is the purpose of using function in python programming? Give the syntax of defining a function in python. (2)