

This question paper contains three printed pages. Your Roll No. 22360110.5

Master of Operational Research (MOR)

SEM I, 2023-24

Course – MOR105(a), Paper Title - Python Programming

(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) Give the difference between the type casting and automatic type conversion. Also, give a suitable Python code to illustrate both. (3)

(b) Describe about; Run time errors, Syntax errors and Logical errors. (3)

(c) Describe various features of Python. (2)

(d) Write an iterative program (non-recursive) that asks the user to enter an integer and computes the factorial of that integer, usually written $n!$ in mathematics. The definition of factorial says that $0! = 1$ and for $n > 0$, $n! = 1 * 2 * 3 * \dots * n$. (2)

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

(b) Explain the main features of an object oriented programming language. (2)

(c) What advantages do NumPy arrays offer over (nested) Python lists? (2)

(d) 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])

3. (a) Looking at the below code, write down the final values of A0, A1, A2 and A3. (2)

```
A0 = dict(zip(('a','b','c','d','e'),(1,2,3,4,5)))
A1 = range(10)
A2 = {i:i*i for i in A1}
A3 = [[i,i*i] for i in A1]
print(A0)
print(A1)
print(A2)
print(A3)
```

(b) Lists and tuples are similar in many ways with one major difference; that lists are mutable and tuples are not. Elaborate this and give an example of an operation that lists support but tuples do not. Further, discuss, which data structure should be utilized under what circumstances. (3)

(c) Observe the following Python code carefully and obtain the output, which will appear on the screen after execution of it.

(i)

```
num1=2
num2=3
del num1
num2=4
num1=5
print(num1*num2)
```

(1)

(ii)

```
import re
regex = r"([a-zA-Z]+) (\d+)"
match = re.search(regex, "I was born on June 24")
if match != None:
    print("Match at index %s, %s" % (match.start(), match.end()))
    print("Full match: %s" % (match.group(0)))
    print("Month: %s" % (match.group(1)))
    print("Day: %s" % (match.group(2)))
else:
    print("The regex pattern does not match.")
```

(2)

(d) What does *args mean? Why is it used? (2)

4. (a) Create a class 'employee' for a company that should have the properties like the name of an employee, salary of an employee, employee ID and the designation. In the class, whenever an object of an employee is created, employee ID should be automatically formed. Further the class should have two functions – One function should show the details of the employees and other function should return the total number of employees.

With respect to Object Oriented Programming, is there any special type of variable highlighted in the above code. Explain how the variable is different from Instance variable. (4)

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

(c) What are Lambda functions? Describe. (2)

(d) What do you understand by local and global scope of variables? How can you access a global variable inside the function, if function has a variable with same name? (2)

(a) 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 $\frac{xyz}{xy + yz + xz}$ days where x, y, and z are given as input to the program. (2)

(b) Compare recursive and iterative techniques for problem solving. (3)

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

```
{Roll_no:[1,2,3], "Total":[350, 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. (2)

(d) 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	96.00
2020	90.00
2021	55.00
2022	70.00
2023	98.00

(3)

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

(2)

```
class A:
    def __init__(self,x):
        self.x = x
    def count(self,x):
        self.x = self.x+1

class B(A):
    def __init__(self, y=0):
        A.__init__(self, 3)
        self.y = y
    def count(self):
        self.y += 1

def main():
    obj = B()
    obj.count()
    print(obj.x, obj.y)

main()
```

(b) What is the difference between condition-controlled and counter-controlled loops? Explain with the help of an example. (2)

(c) 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)
```

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

(e) Demonstrate the utility of else clause in conjunction with if, for, and while statements. (2)