PROGRAMMING WITH PYTHON
(MCAP 1102)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) What will be the output of the following Python code snippet?

```
x = "MCA"
y = 1
print(x + y)
```

(a) MCA1 (b) 4 (c) NCA (d) TypeError

(ii) Which among the following statements is NOT TRUE?

(a) Square brackets can be used to access individual elements of a string.
(b) Strings in Python are arrays of bytes representing unicode characters.
(c) We cannot loop through the characters in a string, with a for loop.
(d) Since Python does not have a character data type, a single character is simply a string with a length of 1.

(iii) When will the else part of try-except-else be executed?

(a) Always (b) When an exception occurs
(c) When no exception occurs (d) When an exception occurs in except block.

(iv) Which among the following statements is TRUE?

(a) List is a collection which is ordered, changeable, and allow duplicate members
(b) Tupleis a collection which is ordered, changeable, and allow duplicate members
(c) Setis a collection which is unordered, changeable, and allow duplicate members
(d) Dictionaryis a collection which is unordered, changeable, and allow duplicate members.

(v) Given x = 5, y = 4, what will be the value of the following expression?

```
x % y // x
```

(a) 1.0 (b) 0.0 (c) 0 (d) 1.

(vi) What will be the output from the following Python code snippet?

```
from math import *
a = 3.99
b = 3.99
c = -3.99
print(int(a), floor(b), ceil(c))
```

(a) 3 3 -4 (b) 3 3 -2 (c) 3 3 -3 (d) 3 4 -3

(vii) What will be the output of the following Python code snippet?
```
print(type(7 / 2)
print(type(7 // 2)
```
(a) float float (b) float int (c) int int (d) int float.

(viii) What will be the output of the following Python code snippet?
```
week = ["Sunday", "Monday", "Tuesday", "Wednesday"]
print(week[-3:-1])
```
(a) ['Sunday', 'Monday'] (b) ['Monday', 'Tuesday']
(c) ['Tuesday', 'Wednesday'] (d) ['Wednesday', 'Sunday']

(ix) What is the use of tell( ) method in python?
(a) Used to get the current position within a file stream
(b) Used to know whether end position within the file is reached or not
(c) Used to know whether file is opened or not
(d) Used to know whether the file is readable or not.

(x) How to fetch and display only the keys of a Dictionary *mystock* in Python?
(a) print(mystock.keys( )) (b) print(mystock.key( ))
(c) print(keys(mystock)) (d) print(key(mystock)).

Group – B

2. (a) Which of the following are legal Python variable names? If a name is not legal, state the reason.
mca1, 1mca, his_name, her-name, pass, _pass [(CO1)(Understand/LOCQ)]

(b) Explain the output from the following Python code snippet
```
str1 = 'MCA students'
str2 = 'HITK'
print(str1[:4])
print(str1*2)
print(str1[:-1] + str2 + str1[-1])
```
[(CO2)(Analyze/IOCQ)]

(c) What advantages do tuples have over lists? [(CO2)(Analyze/IOCQ)]

(d) Compare and contrast sets with dictionaries in Python. [(CO2)(Analyze/IOCQ)]

3 + 3 + 3 + 3 = 12

3. (a) Write a Python script to accept a string from the command line and display the string in reverse with all repeated characters (except for their first occurrence) and punctuations removed. Use proper import statement.
Sample INPUT: *Have a nice day!*, ***OUTPUT:*** *ydcin evaH* [(CO1,CO2)(Apply/IOCQ)]

(b) When are dictionaries more useful than list? [(CO2)(Analyze/IOCQ)]

(c) Write a Python script to rotate the elements of a list such that the element at the first index moves to second index, the element in the second index moves to the third index, …, and the element in the last index moves to the first index.
[(CO1,CO2)(Apply/IOCQ)]

6 + 2 + 4 = 12

Group – C

4. (a) With a suitable example show how a function in Python can return multiple values. [(CO3)(Understand/LOCQ)]

   (b) A positive integer n > 1 is called a Mersenne prime if n is a prime number and $n = 2^k-1$ for some positive integer k. For example, 3, 7 and 31 are all Mersenne primes. Write a Python script to evaluate the smallest Mersenne prime > p where p >1 is taken from keyboard. [Thus, if p = 25, your program should output 31.] [(CO1,CO3)(Apply/IOCQ)]

   (c) Consider the following recursive function. Assume that both p and q are positive.

```
def fun(p, q):
    if q == 0:
      return 0
      if q % 2 == 0:
      return fun(p + p, q/2)
       return fun(p + p, q/2) + p
```

   What value will be returned by fun(3,4)? Show step by step execution of the function. [(CO3)(Evaluate/HOCQ)]

2 + 6 + 4 = 12

5. (a) Explain the output generated from the following Python code snippet

```
basket = ['orange', 'apple', 'orange', 'pear', 'apple', 'banana']
for fruit in sorted(set(basket)):
print (fruit)
```

   [(CO2, CO3)(Analyze/IOCQ)]

   (b) Write a function is Palindrome which takes a string as parameter and returns True if the string is a palindrome, and False otherwise. [(CO1, CO3)(Apply/IOCQ)]

   (c) Explain with a suitable example the use of range( ) function in Python. [(CO3)(Apply/IOCQ)]

3 + 6 + 3 = 12

Group – D

6. (a) What is the use of the keyword super? Is it absolutely necessary to use super? [(CO4)(Understand/LOCQ)]

   (b) What happens when a sub-class object is assigned to a super class object reference? Explain with an example. [(CO4)(Understand/LOCQ)]

   (c) In what order are constructors invoked along the inheritance chain when a derived class object is created? [(CO4)(Understand/LOCQ)]

4 + 4 + 4 = 12

7. (a) How is aggregation differs from association? Elucidate with proper example(s). [(CO4)(Understand/LOCQ)]

   (b) Which keywords are used in Python to handle exceptions? Explain how exception handling mechanism can be used for debugging a program. [(CO4)(Understand/LOCQ)]

   (c) Show that an inner class has access to the private elements of its outer class. Determine whether the reverse is true. [(CO4)(Analyze/IOCQ)]

4 + 4 + 4 = 12

Group – E

8. (a) Write code in python to implement the followings:
   (i) Find out the most frequent value in a NumPy array.
   (ii) Replace negative values with zeroes in a NumPy array. [(CO6)(Apply/IOCQ)]
   (b) Write a Python program to count the number of upper-case alphabets present in a text file "PYTHON.TXT". [(CO5)(Apply/IOCQ)]

6 + 6 = 12

9. (a) Create a 2-D array called myarray4 using arange() having 14 rows and 3 columns with start value = -1, step size 0.25. Split this array row wise into 3 equal parts and print the result. [(CO6)(Apply/IOCQ)]
   (b) Define pickling and unpickling in python. Explain serialization and deserialization of Python objeet. [(CO5)(Understand/LOCQ)]
   (c) Collect data about colleges in a university of your choice and number of courses they run for science, commerce and humanities. Store it in a CSV file and present it using a bar plot. [(CO6)(Apply/IOCQ)]

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	30.2	65.6	4.2

Course Outcome (CO):

After the completion of the course students will be able to

1: Develop simple Python programs using Python statements and expressions.
2: Demonstrate use of lists, tuples, sets and dictionaries to represent compound data.
3: Explain control flow and functions in Python for solving problems.
4: Articulate object-oriented programming concepts such as encapsulation, inheritance and polymorphism as used in Python.
5: Illustrate the commonly used operations involving file systems handling in Python.
6: Explore Python libraries like NumPy, Matplotlib for mathematical functions and visualization.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question