PYTHON PROGRAMMING
(DSC2101)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) What will be the output after the following statements?

```
x = 27
y = 9
while x < 30 and y < 15:
        x = x + 1
        y = y + 1
print(x,y)
```

(a) 29 11 (b) 27 9 (c) 30 12 (d) 28 10

(ii) Which one of the following is a mutable data type?
(a) Tuple (b) String (c) List (d) All of these.

(iii) What is the output of the following code:

```
A,B=3,'12'
C=A*B
print ( C)
```

(a) 36 (b) 121212
(c) 123 (d) TypeError: unsupported operand type(s) for *: 'int' and 'str'

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

```
print(type(5 / 2))
print(type(-5 // 2))
```

(a) float and int (b) int and float (c) float and float (d) int and int

(v) The meta character + in regular expression means
(a) Zero or more occurrences (b) One or more occurrences
(c) Exactly one occurrence (d) No occurrence

(vi) How do you place a button widget in the Tkinter window using the pack geometry manager?
(a) button.place(pady=20) (b) button.grid(pady=20)
(c) button.pack(pady=20) (d) button.add(pady=20)

(vii) What is printed by the following statements?

```
s = "python is awesome"
print(s[2] + s[-5])
```

(a) te (b) tw
(c) o (d) Error, you cannot use the [ ] operator with the + operator.

(viii) While running the code, it will display _____?

```
import pandas as pd
pd.Series([1,2], index=['a','b','c'])
```

(a) Syntax error (b) Value error
(c) Index error (d) None of these

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

```
importnumpy as np
x = np.array([1, 2])
np.tile(x,(2,2))
```

(a) array([1, 2, 1, 2]) (b) array([1, 2])
(c) array([[1, 2, 1, 2], [1, 2, 1, 2]]) (d) None of the above

(x) What does the plt.grid() function do?
(a) Changes the color of the plot (b) Adds a grid to the plot
(c) Adjusts the plot's aspect ratio (d) Clears the plot.

Fill in the blanks with the correct word

(xi) To convert a string to an integer in Python, you use the function _____().

(xii) To access the first element of a list named my_list, you use my_list[_____].

(xiii) _____ is called exponent operator. (Fill the blank)

(xiv) SciPy is a collection of mathematical algorithms and convenience functions built on _____.

(xv) To create an identity matrix in NumPy we use _____ method.

Group - B

2. (a) With appropriate example to implement filter(), map and reduce() functions. *[(CO1)(Analyse/IOCQ)]*

(b) Write a class Point with data members x and y. Using __add__ method add two objects of the Point class. *[(CO1)(Understand/LOCQ)]*

(c) Write a Python code to check if a file exist or not and then read every line from a text file named "in-data.txt" and copy them into a file "out-data.txt". *[(CO1)(Remember/LOCQ)]*

6 + 3 + 3 = 12

3. (a) Write a program that has a class Student that stores stdid, name, and marks of three subjects, Average marks and Grade of the students. The class has two variables college_name which stores name of the college and student_count which gives information about total number of students. Display college_name, total number of students, Student information along with all marks and print Grade based on average Marks.

if(average>=90):grade='O', if(average <90 and average >=80):grade='A', if(average <80 and average >=70):grade='B', if(average <70 and average >=60): grade='C', if(average <60 and average >=50): grade='D' else: grade='F'.

[(CO3)(Analyse/IOCQ)]

(b) Write a python program to find the maximum, minimum and average of three numbers without using library functions. *[(CO2)(Understand/IOCQ)]*

8 + 4 = 12

Group - C

4. (a) Given the participant's score sheet for your College Sports Day, you are required to find the runner-up score. You are given scores. Store them in a list and find the score of the runner-up. Hint : Given list is [10,3,5,6,10,6]. The maximum score is 10, second maximum is 6. Hence, we print 6 as the runner-up score. *[(CO2)(Analyse/HOCQ)]*

(b) Write a python program to check whether a string starts and ends with the same character or not (using Regular Expression)
Input : abba, Output : Valid
Input : a, Output : Valid
Input : abc, Output : Invalid *[(CO2)(Apply/IOCQ)]*

(c) For a=['hello', 'how', [1,2,3], [[10,20,30]]]
what is the output of following statement
(i) print(a[: :]) (ii) print(a[-3][0])
(iii) print(a[2][: -1]) (iv) print(a[0][: : -1]). *[(CO2)(Understand/LOCQ)]*

4 + 4 + 4 = 12

5. (a) Write a Python Program to count the number of characters in a string using dictionaries. Display the keys and their values in alphabetical Order. *[(CO2)(Remember/LOCQ)]*

(b) Write a Python Program to count the number of times an item appears in the list. *[(CO2)(Understand/IOCQ)]*

(c) Write Python code, using (i) List comprehension method and (ii) Functional programming approach, to eliminate from a list, all the multiples of its first element. *[(CO2)(Apply/HOCQ)]*

4 + 4 + 4 = 12

Group - D

6. (a) Using Pandas data structure, create a data frame from a dictionary of marks in English, Chemistry and Mathematics of four students, as given below:

Name	English	Chemistry	Mathematics
Preetam	90	90	92
Asha	80	92	99
Lata	89	80	89
Abhijit	88	92	90

[(CO3)(Analyse/IOCQ)]

(b) Add another column showing the marks in Physics as 88, 82, 80, 79 respectively. *(CO4)(Remember/IOCQ)]*

(c) Find the Total marks of each student and show it in a new column 'Total'. *[(CO2)(Apply/IOCQ)]*

(d) Display in tabular form, the descriptive statistics of all the four subjects and the total. *[(CO3,CO7)(Understand/LOCQ)]*

3 + 3 + 3 + 3 = 12

7. (a) How do you handle missing or NaN values in a NumPy array? *[(CO3)(Remember/LOCQ)]*
   (b) What is the purpose of the numpy.dot function, and when would you use it? *[(CO3)(Understand/LOCQ)]*
   (c) What are the advantages of using NumPy arrays over Python lists in terms of performance? *[(CO3)(Understand/LOCQ)]*
   (d) How can you use NumPy to read and write array data to and from files? *[(CO3)(Apply/IOCQ)]*

3 + 3 + 4 + 2 = 12

Group - E

8. (a) Write a tkinter program to display two buttons named as "Bob" and "Alice" and print a message "Hello Bob" when "Bob" button is clicked and "Hello Alice" when "Alice" button is clicked. *[(CO4)(Analyse/LOCQ)]*
   (b) Plot the following data using a line plot:

Day	1	2	3	4	5	6	7
Tickets Sold	2000	2800	3000	2500	2300	2500	1000

Before displaying the plot display “Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday” in place of Day 1, 2, 3, 4, 5, 6, 7
Change the color of the line to ‘Magenta’. *[(CO5)(Analyse/HOCQ)]*

   (c) Compare bar() and barh() functions. *[(CO5)(Apply/IOCQ)]*

4 + 6 + 2 = 12

9. (a) Create a bar plot showing the number of products sold for three different categories: 'A', 'B', and 'C', with values 40, 55, and 30 respectively. Add appropriate labels for the x-axis and y-axis, and include a title. *[(CO5)(Apply/IOCQ)]*
   (b) How would you change the line style of a plot to a dashed line in Matplotlib? Provide a code snippet demonstrating this. *[(CO5)(Understand/LOCQ)]*
   (c) How do you create and place a button widget in a Tkinter window? *[(CO4)(Remember/LOCQ)]*

6 + 4 + 2 = 10

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	38.54	46.87	14.59