Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH

END SEMESTER EXAMINATIONS

SUBJECT: Mathematical Problem Solving using Python [CRA 4014]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS:

Instructions to Candidates:

- Answer **ALL FIVE** questions.
- Missing data may be suitably assumed.

1A.	Write the syntax of the plot_lines function of the simpleplot module. Explain the various arguments used in it. Illustrate the same with an example of plotting a straight line y = x.	**5**
1B.	Explain the importance of docstrings in Python. Write an example code snippet to illustrate the same.	**3**
1C.	Write two Python statements to obtain the last character of a non-empty string.	**2**
2A.	Write two Python functions to find the minimum and maximum respectively in a list of numbers. Also, write relevant code to use these functions and output the minimum and maximum values in the list datalist = [18, 3, 7, -32, 123, 42, 7, 123, -9].	**5**

2B.	Consider the following function to traverse through the cells in a grid in a linear direction:
	def traverse_grid(start_cell, direction, num_steps):
	for step in range(num_steps):
	row = start_cell[0] + step * direction[0]
	col = start_cell[1] + step * direction[1]
	What values of start_cell and direction would cause traverse_grid to traverse a 4 x 4 grid in the following patterns?
	a) From upper-left corner to lower-right corner.
	b) From upper-right corner to lower-left corner.
	c) From first cell of second row to the last cell of the same row.
		3

2C.	What is the value of val2[1] after executing the following Python code snippet? val1 = [1, 2, 3] val2 = val1[1:] val1[2] = 4	**2**
3A.	Write a Python function roll_die to generate and return a random integer between 0 and 6. Write another function roll_test with an argument representing the number of rolls that calculates and returns the sum of the face values of all the rolls. Write a single-line Python code to use these	**5**

	functions to calculate and output the sum of the face values when a fair die is rolled n times. Use proper documentation using docstrings in the program.	
3B.	What is a higher-order function in Python? Explain the working of the following Python program and write the output.	**3**
3C.	Differentiate between a list and a tuple in Python.	**2**
4A.	A fair die is rolled twice. Calculate the probability of getting each of the possible sum of the two face values. Using these, calculate the expected value for the sum.	**5**
4B.	What do you mean by Growth Rate of Functions? Explain how you would compare the growth rate two functions f(n) and g(n).	**3**
4C.	Define the terms objects and references. Give an example.	**2**
5A.	What do you mean by a set? How do you create a set in Python? Write the formula for the number of distinct subsets in set containing n elements. List out all the subsets of the set containing the numbers from 2 to 5 (both inclusive).	**5**
5B.	Write a python function to accept two values n and r as arguments and calculate nCr (Use built-in function to calculate the factorial of a number). Also, write the code to use this function and output the value of 5C3	**3**
5C.	Define the terms sample space and trial with respect to Probability theory.	**2**