

Reg No : Name :

MARATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM

(Govt. Aided Autonomous Institution)

First Semester B.Tech. Degree (SAY) Examination, February, 2026

Course Code: B24ES1T01B

Course Name: PROBLEM SOLVING AND PROGRAMMING TECHNIQUES (B)

Max. Marks: 100

Duration:3 Hours

PART - A: 30 Marks (10 Qns x 3 Marks)**Answer all questions**

1. Define a low-level programming language and give an example.
2. List three common data types in Python and give an example for each.
3. Develop a program implementing logical operators that checks if the year entered is a leap year
4. Define the operations used to add and remove elements in order to stack a data structure.
5. Define the random module and state its significance.
6. What does the str() function do in Python?
7. Discuss the implications of using 'wb' mode compared to 'w' mode when writing to a file.
8. How does the except block handle exceptions that occur within the try block?
9. Create a NumPy array and demonstrate the result of both multiplication and division of the array by a scalar value.
10. Discuss the role of python in data visualization with an example.

PART - B: 70 Marks (5 Qns x 14 Marks)**Answer any one question from each module****Module 1**

11. Discuss the installation process for Python on different operating systems (Windows, macOS, Linux). Include details on verifying the installation and setting up the environment.

OR

12. Write a Python program that demonstrates the use of different variable types (integer, float, string) and performs a calculation with them. Explain the role of each variable in your program.

Module 2

13. a) Write a program that uses a while loop to iterate through a list of numbers and print only the odd numbers. (7 marks)

b) Write a program to list the Prime numbers within the range 1 to 100. (A prime number is a natural number greater than 1 that has no factors other than 1 and itself) (7marks)

OR

14. a) Write a program that prints all unique combinations of 1, 2 and 3 using **for** loop. For example (1,2,3), (1,3,2), (2,1,3). (8 marks)

b) Write the output of the following program: (6 marks)

```
for alpha in range(65, 91):
```

```
print(chr(alpha), end=',')
```

```
print()
```

```
for alpha in range(122,96,-1):
```

```
print(chr(alpha), end=',')
```

Module 3

15. Illustrate the use of Matplotlib for plotting graphs with an example.

OR

16. Discuss the potential drawbacks of using default arguments in functions. When should they be avoided?

Module 4

17. Write a program to read the first n lines from an existing text file. If the file does not exist, handle the error using try and except.

OR

18. Describe the process of reading data from a file in Python. Include examples of using methods like read(), readline(), and readlines(), and discuss specific use cases for each method.

Module 5

19. a. Explain the significance of indexing in Pandas. How does it differ from indexing in NumPy? Discuss the built-in methods for data selections provided by Pandas? (7 Marks)

b. You are provided with a CSV file named `sales_data.csv`. The dataset contains the following columns: OrderID, date, CustomerID, Product, Quantity, Price. Load the file and Create a new column called Total_Sales, which should be calculated as the product of Quantity and Price. Identify the top 5 products based on total revenue and display their details. (7 marks)

OR

20. a. What are the advantages of using special arrays like ones(), zeros(), and random() in scientific computing? Provide examples to illustrate your points. (7 Marks)

b. Write a Python program that generates a list of 100 random values ranging from 0 to 1. After converting this list into a NumPy array, explain how you would access the last 10 elements using negative indexing. Additionally, calculate the mean of these last 10 elements. (7 marks)
