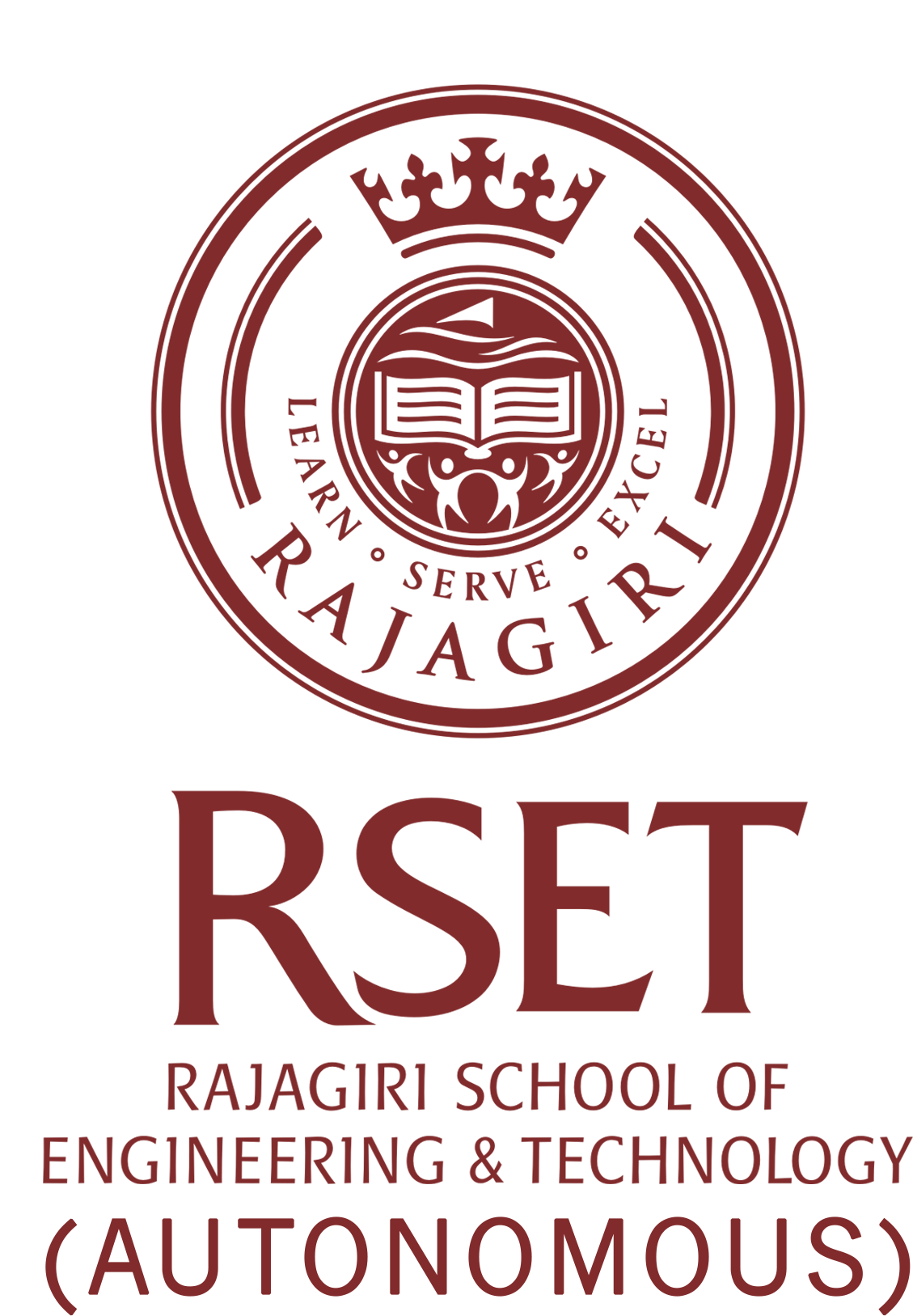
**RAJAGIRI SCHOOL OF**

**ENGINEERING & TECHNOLOGY**

**RAJAGIRI VALLEY, KAKKANAD, COCHIN-682039**



**LAB RECORD**

**101009/IT700B IT WORKSHOP – MATLAB**

**SEVENTH SEMESTER**

**Submitted By**

**Noel Mathen Eldho (U2109053)**

**(2021-2025 Batch)**

**Department of**

***Computer Science and Business Systems***

**Rajagiri School of Engineering & Technology (Autonomous)**

**(Parent University: APJ Abdul Kalam Technological University)**

**Rajagiri Valley, Kakkanad, Kochi, 682039**

**November 2024**

**RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)**

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**DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS**

**VISION**



**MISSION**

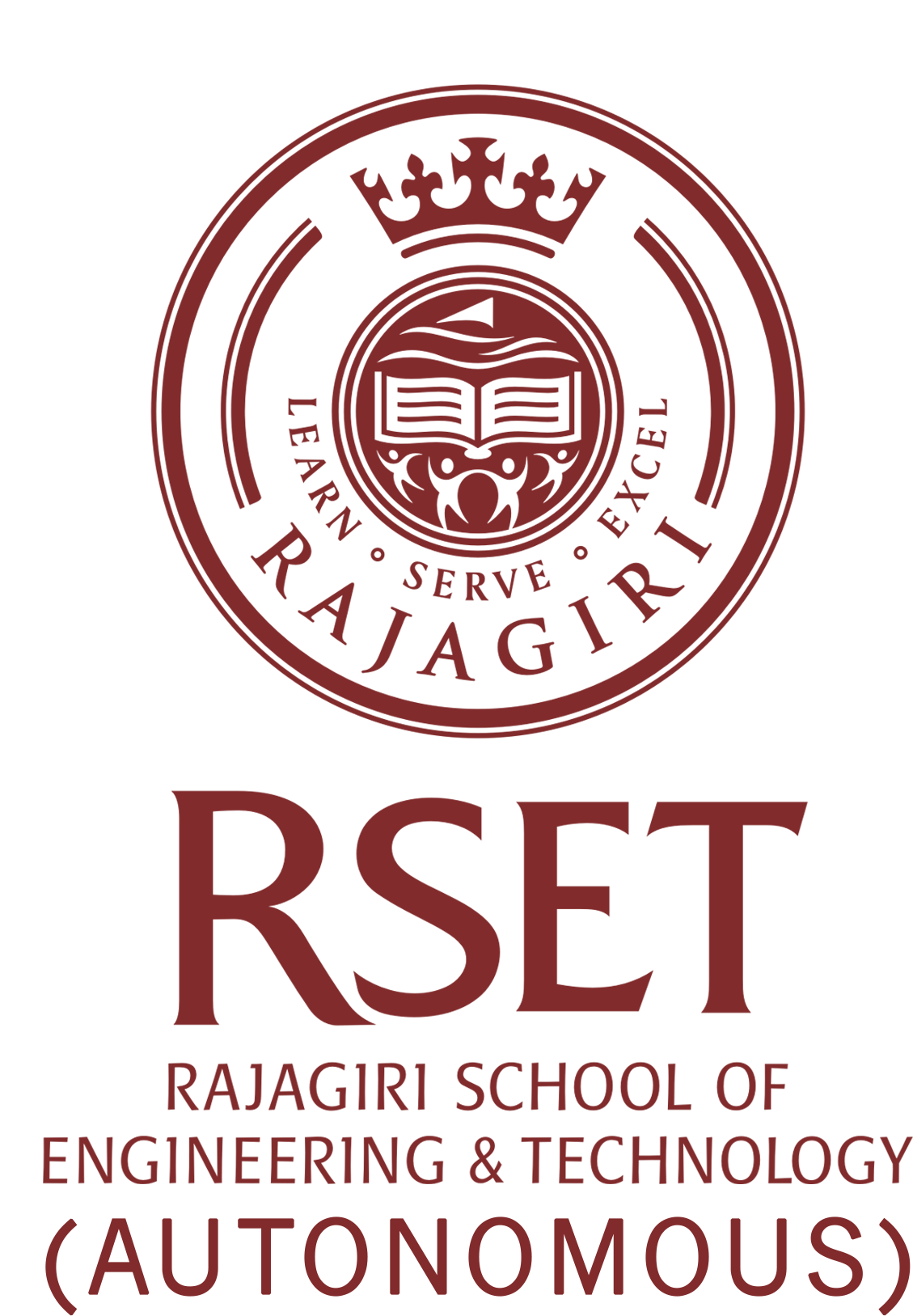


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**RAJAGIRI SCHOOL OF**

**ENGINEERING & TECHNOLOGY**

**RAJAGIRI VALLEY, KAKKANAD, COCHIN-682039**



**CERTIFICATE**

*This is to certify that this is a bonafide record of the work done by* ***Noel Mathen Eldho (U2109053),*** *in the IT WORKSHOP - MATLAB(101009/IT700B) laboratory during the semester S7 in partial fulfillment of the requirements of the degree of Bachelor of Technology (B. Tech.) in ”Computer Science and Business Systems” during the academic year 2024-2025 at Rajagiri School of Engineering & Technology (RSET) (Autonomous), Rajagiri Valley, Kochi.*

| Ms. Veena Rani  Faculty in Charge  Assistant Professor | Dr.Nikhila T Bhuvan  Lab in Charge  Associate Professor | Dr.Divya James  (HoD)  Associate Professor |
| --- | --- | --- |
| Dept. of CU | Dept. of CU | Dept. of CU |
| RSET | RSET | RSET |

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**2021-25 Batch-Lab Cycle**

**Course Outcomes**

**After the completion of the course the student will be able to**

* CO 1: Understand the Building and managing workspace.
* CO 2: Define and compose matrices and sub matrices to solve linear equations.
* CO 3: Display axis labels and annotations, and testing programming functions.
* CO 4: Understand how to program M-file scripts, M- file functions, Input –output Arguments and program control flow operators, loops, flow structures.
* CO 5: Use the debugging process and debugging M-files.
* CO 6: Implement various image processing techniques.

**Experiment 1. Programs using mathematical, relational expressions, and operators**

***i)Basic Mathematical Operations***Write a MATLAB script that:

* Defines two variables ‘a’ and ‘b’ with values 5 and 3, respectively.
* Computes and displays the sum, difference, product, and quotient of ‘a’ and ‘b’.
* Uses relational operators to compare ‘a’ and ‘b’ and displays the results of the comparisons (e.g., a>b, a==b, etc.).

***ii)Complex Mathematical Expressions***

Write a MATLAB script that:

* Defines three variables x=2, y=4, and z=6.
* Computes the value of the expression f(x,y,z)=x2+y2−z2+√xy and displays the result.

**Experiment 2. Vectors and Matrices: Programs using array operations and matrix operations**

***i) Vector Operations***

Write a MATLAB script that:

* Creates two vectors A=[1,2,3] and B=[4,5,6].
* Computes and displays the dot product and cross product of vectors ‘A’ and ‘B’.

***ii) Matrix Operations***

Write a MATLAB script that:

* Creates two matrices M1=[1,2;3,4] and M2=[5,6;7,8].
* Performs and displays the result of matrix multiplication M1×M2,inverse of M1,Transpose of M2,matrix concatenation, Determinant of M2

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**Experiment 3. Programs on input and output of values**

***i)User Input and Output***

Write a MATLAB script that:

* Prompts the user to enter two numbers.
* Calculates the sum, difference, product, and quotient of the two numbers.
* Displays the results in a formatted manner
* Prompts the user to enter strings and try out the string functions for Concatenation, String Comparison, Substring Operations, Case Conversion, **String Length and Splitting,** Padding and Trimming, **Pattern Matching and Replacement**

***ii)Matrix Input and Output***

Write a MATLAB script that: (don’t use loop to enter the values)

* Prompts the user to enter the elements of a 2x2 matrix.
* Displays the entered matrix and its transpose.

**Experiment 4. Selection Statements: Experiments on if statements, with else and elseif clauses and switch statements**

***i)elseif clauses***

Write a MATLAB script that:

* Prompts the user to enter a score (0-100).
* Uses if-else and elseif statements to classify the score into grades (A, B, C, D, F) and displays the corresponding grade.
* Prompts the user to enter the coefficients of the quadratic equation and calculate the roots

***ii)Using Switch Statement***

Write a MATLAB script that:

* Prompts the user to enter the choice (to calculate the area or perimeter)and the radius of the circle
* Uses a switch statement to perform the corresponding operation and displays the result.

**Experiment 5. Loop Statements and Vectorizing Code: Programs based on counted (for) and conditional (while) loops**

#### **i)Summation using For Loop**

Write a MATLAB script that:

* Computes the sum of the first ‘n’ natural numbers using a for loop, where ‘n’ is provided by the user.
* Displays the result as a matrix.

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**ii)Factorial Calculation using While Loop**

Write a MATLAB script that:

* Computes the factorial of a number ‘n’ using a while loop, where ‘n’ is provided by the user.
* Displays the result.

#### **iii)Vectorized Operations**

Write a MATLAB script that:

* Creates a vector x=[1,2,3,…,10]
* Computes and displays the square of each element in the vector using vectorized operations.

### **Experiment 6. Programs on Built-in text manipulation functions and conversion between string and number types**

#### **i)Text Manipulation**

Write a MATLAB script that:

* Prompts the user to enter a string.
* Converts the string to uppercase and lowercase.
* Displays the results.

#### **ii)String to Number Conversion**

Write a MATLAB script that:

* Prompts the user to enter a numerical string.
* Converts the string to a number.
* Performs an arithmetic operation (e.g., adds 10 to the number) and displays the result.

#### **iii) Counting Vowels in a String**

Write a MATLAB script that:

* Prompts the user to enter a string.
* Uses built-in functions to count the number of vowels (a, e, i, o, u) in the string.
* Displays the count of each vowel.

### **Experiment 7. Programs based on scripts and user-defined functions**

#### **i)Simple Script and Function**

Write a MATLAB script that:

* To read the range
* Print all the prime numbers within a range.

Write a MATLAB script that:

* Reads a number
* Check of the number is a Pythagorean triplet using function

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* *Hint:The set of numbers (3, 4, 5) is called a Pythagorean triple, meaning the three positive integers satisfy the equation: a2+b2=c2*

#### **ii)Function to Compute Fibonacci Sequence**

Write a MATLAB script that:

* Defines a function fibonacci to compute the first ‘n’ terms of the Fibonacci sequence.
* Prompts the user to enter ‘n’, calls the function, and displays the sequence

### **Experiment 8. Programs based on Advanced Plotting Techniques**

#### **i)Subplots**

Write a MATLAB script that:

* Creates a figure with two subplots, the first subplot, plots a sine wave, the second subplot, plots a cosine wave.
* Represent the sine and Cosine waves as two graphs in the same figure
* Adds titles, labels, and legends to the plots.

#### **ii)3D Plotting**

Write a MATLAB script that:

* Generates a mesh grid of ‘x’ and ‘y’ values.
* Computes z=sin(√(x2+y2)).
* Creates a 3D surface plot, line and scatter plot of ‘z’.
* Adds titles, labels, and color bar.

Write a MATLAB script that:

* Plots a sphere [x(t,s),y(t,s),z(t,s)]=[cos(t)cos(s),cos(t)sin(s),sin(t)] where [t,s]=[0,2pi]
* Adds titles, labels, and proper titles.

### **Experiment 9. Programs based on two main data structures: cell arrays and structures**

#### **i)Cell Array Manipulation**

Write a MATLAB script that:

* Has the cell array C = {3.14, 'MATLAB', true; 7, [1 2 3], 'hello'}
* Access and display the second element of the first row.
* Replace the third element of the second row with a new matrix [4 5 6].
* Modify the content of the first cell to store a structure containing information about a student (name, age, GPA). Display the updated cell array.

**ii)Structures**

Write a MATLAB script that:

* Defines a structure array to store information about three students, including fields for Name, Age, and marks of 4 subjects.
* Adds data for each student.
* Computes and displays the average grade of each student along with name. Generate a rank list and store it in another structure and display it.

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**Experiment 10. Programs based on Advanced Functions**

#### **i)Anonymous Functions and Function Handles**

Write a MATLAB script that:

* Defines an anonymous function to compute the square of a number.
* Creates a function handle to the anonymous function.
* Uses the function handle to compute and display the square of a user-provided number.

#### **ii)Nested Functions**

Write a MATLAB script that:

* Defines a main function to compute the area of a rectangle.
* Within the main function, defines a nested function to compute the perimeter of the rectangle.
* Prompts the user for the length and width of the rectangle.
* Call the nested function to compute the perimeter and the main function to compute the area, then display both results.

### **Experiment 11. Programs based on image processing**

### ***i)Basic Image Manipulation***

Write a MATLAB script that:

* Read an image file.
* Converts the image to grayscale.
* Displays the original and grayscale images side by side.

#### **ii)Edge Detection**

Write a MATLAB script that:

* Read an image file.
* Converts the image to grayscale.
* Applies a different edge detection algorithm to the image.
* Displays the original image and all the edge-detected image side by side.

#### **iii)Image scaling**

Write a MATLAB script that:

* Read an image file.
* Converts the image to grayscale.
* Implement a custom function that processes the image pixel by pixel and computes the average of the neighboring pixels replacing each pixel of an image with the average value of its four nearest neighbors (top, bottom, left, and right).
* The border pixels need not be processed because they do not have four neighbors.

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