<table>
<tr><td colspan="6">Devi Ahilya Vishwavidhyalaya, Indore, India
Institute of Engineering & Technology</td><td>II Year B.Tech. (Electronics and Instrumentation Engineering)</td></tr>
<tr><td>Course Code & Name</td><td colspan="5">Instructions Hours per Semester and Credits</td></tr>
<tr><td rowspan="2">3REPC5

SOFTWARE WORKSHOP-1</td><td colspan="2">Classroom Instruction (CI)</td><td>Lab Instruction (LI)</td><td>Term Work (TW) and Self Learning (SL)</td><td>Total no. of Hours Per semester</td><td>Total Credits (Total Hours/30)</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>TW+SL</td><td rowspan="2">60</td><td rowspan="2">2</td></tr>
<tr><td>0</td><td>0</td><td>40</td><td>20</td></tr>
</table>

Course Learning Objectives:

1. To provide background and fundamentals of MATLAB tool and understand MATLAB Programming language.
2. To provide an overview of Simulink and working with continuous, discrete and Dynamics systems.
3. To understand the concept and importance of Image processing and Machine learning With the use of MATLAB.

Prerequisites:

C Language.

COURSE CONTENTS

Unit-I

MATLAB: Basics of MATLAB, Expressions and Basic Commands of MATLAB, Data Types, Variables and Operators, Decision Control Statements, Loops Control Statements, Vectors, Matrix, Arrays, Strings, Functions, Data Import and Export, Plotting a Graph, Graphics, Basic Algebra in MATLAB

Unit-II

Simulink: Simulink graphical environment, blocks and parameters, signals and scopes. Basic Algorithms: mathematical operators' logic and conditional statements. Dynamic systems, Discrete systems, continuous systems, simulation time. Practices working with math and logic Operators.

Unit-III

Image Processing: Working with images in MATLAB: import images, grey and colour images, contrast adjustment. Segmentation is the image, thresholding, intensity, and binary images. Pre and post-processing techniques like improving segmentation, fliting noise, Background subtraction, and binary morphology. Image classification and processing.

Unit-IV

Machine learning: introduction, classification workflow: import data, process, extract features build and evaluate model, Engineering features: types of signals, calculating summary statistics, finding peaks, computing derivatives, calculating correlation, and automatic features extraction, classification models: training and testing, data, machine learning models and training models.

Unit-V
Small project using based on the above learning image processing and machine learning

Course Outcomes:

CO.No.	CO
CO1	To use MATLAB commands, data types, control structures, and plotting tools for performing basic computational and graphical operations.
CO2	To model, simulate, and analyze continuous & discrete dynamic systems in Simulink using appropriate blocks and algorithms.
CO3	To apply digital image preprocessing, segmentation, enhancement, and feature extraction techniques using MATLAB.
CO4	To develop and evaluate machine-learning models using feature engineering, classification workflows, training/testing approaches.
CO5	To design a small application integrating image processing and machine learning using MATLAB/Simulink.

BOOKS RECOMMENDED:

[1]. Dr. Brijesh Bakariya , Dr. Kulwinder Singh Parmar, Fundamental Concepts of MATLAB Programming: From Learning the Basics to Solving a Problem with MATLAB, BPB Publications, August 18, 2020.
[2]. Digital Image Processing by Rafael C Gonzalez & Richard E Woods, 3rd Edition.
[3]. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2003

CO-PO-PSO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2	PSO 3
3EERL1.CO1	3	3	2	2	2	–	–	–	–	1	–	2	2	2
3EERL1.CO2	3	2	3	2	2	–	–	–	–	1	–	3	3	2
3EERL1.CO3	3	3	2	2	2	–	–	–	–	1	–	3	3	2
3EERL1.CO4	3	3	3	3	2	–	–	–	–	1	–	3	3	2
3EERL1.CO5	2	2	3	3	3	–	–	–	2	3	2	3	3	3

List Practical Assignments:

1. (a) Introduction to MATLAB environment and features.

(b) To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication.

(c)To study about control statements and user defined functions.

2. (a) Write a MATLAB program to generate a sine wave and cos wave with amplitude = 3, frequency 20Hz.

(b) Write a MATLAB program to generate exponential decaying sine plot. Plot y=e^ (-0.4 x) sinx,$0 \leq x \leq 4\pi$, taking 10, 50, and 100 points in the interval.

3. (a) To study the Simulink graphical environment, blocks, parameters, signals, and scopes.

(b) To implement basic mathematical operations using Simulink.

4. (a)To design logic and conditional operations in Simulink.

(b) To simulate continuous and discrete systems using Simulink.

5. (a) To read an image, display it, and write it into another format using MATLAB.

(b)To convert an RGB image into grayscale and binary format using MATLAB.

(c) To plot histogram of an image and perform histogram equalization using MATLAB.

6. (a) To perform morphological operations (dilation, erosion, opening, closing) in MATLAB.

(b) To perform connected component labeling and count objects in a binary image using MATLAB.

7. To understand the fundamentals of Machine Learning and its applications.

8. To perform classification workflow: Import data → Preprocess → Extract Features → Build & Evaluate Model.

9. (a) To explore different feature engineering techniques.

(b) To train and test different classification models.

10. To make Mini project integrating MATLAB/Simulink, Image Processing, and/or ML concepts.