Vishwakarma Institute of Technology
Department of Engineering, Sciences and Humanities
FY : 2022-2023 : Semester II
MAR : Mechatronics and Robotics : ES1024 : Laboratory
For Lab. Batches – E1, E2 and E3 only.

IMPORTANT instructions :-

- MAR Laboratory journal is to be submitted in hard copy format in a file individually.
- All assignments will be hand written on journal papers available in stationery stores.
- Every assignment will have a front page on which following details are to be written in a box. a) Name in full, b) Division, c) Batch, d) Roll no. e) PRNo., f) Title and no. of the assignment, g) date on which assignment was performed in MAR Lab.
  (Format of Index page and front page are attached along with these instruction)

Write on the following points in details in your Lab. writeups for all assignments (except assignment no. 1).

1) **Title :** **2) Assignment no. :** **3) Date :**
4) **Theory :** Write in your own words on the features of the problem statement given / theme selected. Also write on working principle and specifications of the sensor. Refer datasheet.
5) **Electronic components required (with rating) :**
6) **Accessories and material required (with details) :**
7) **Electrical connection diagrams :** draw and label in your own hand writing for all tasks.
8) **Print of code (with comments wherever required) :** remove unnecessary gaps and blank lines.
9) **Screen shot of serial monitor output :** paste printout of image.
10) **Comments :** Important features / problems faced during solution of the assignment.
11) **Industrial applications based on the assignment :** at least 2 applications.

Assignment No. 1

- **Title : Know your Micro-Controller kit.**
- **Tasks :**
  - **A) Get introduced to the Arduino UNO kit hardware.**
  - **B) Get introduced to the features of Arduino IDE.**
- **Write on history and important features of the Arduino UNO kit hardware :** (paste image of UNO kit and label important accessories on it)
- **Write on important features of Arduino IDE and the menu :** How to set the port etc.
- **Write on construction of breadboard and its features.**

Assignment No. 2

- **Title : Interfacing of LED with Arduino UNO kit.**
- **Pre-requisite :** Information about safe voltage levels and protection of LED.
- **Problem Statement :** Interface external LEDs with the UNO kit in a variety of combinations and write a program ……
  A) to glow 5/6/7 LEDs in certain sequence…… (Write the 4 tasks you have implemented)
  i) Switch ON and OFF LEDs in a variety of modes.
  ii) running light sequence in continuous loop.

Assignment No. 3

- **Title : Simulate working of 4 road Traffic signal with Arduino UNO kit.**
- **Pre-requisite :** Information about safe voltage levels and protection of LED.
- **Problem Statement :** Simulate working of Traffic signal with minimum 12 LEDs at the junction (chowk) of 4 roads. Formulate your own theme and delay cycle. Decide the hardware required and assemble the same on a breadboard for your theme.

Assignment No. 4

- **Title : Interfacing of Ultrasonic sensor with Arduino UNO kit.**
- **Pre-requisite :** Principle of working of Ultrasonic sensor and calculation of distance.
- **Problem statement :** Interface Ultrasonic sensor with the UNO kit and write a program ……
  A) to find distance (in cm) between the sensor and a fixed surface like wall etc. Display the distance on serial monitor. Verify the distance by actual measurement.

Assignment No. 5

- **Title : Interfacing of Ultrasonic sensor with Arduino UNO kit to run a DC motor.**
- **Pre-requisite :** Principle of working of Ultrasonic sensor.
- **Problem statement :**
  1) Interface US and find the distance.
  2) Display the same on serial monitor.
  3) Distance between 15 cm to 30 cm – motor should run CW.
  4) Distance between 30 cm to 45 cm – motor should run CCW.
  5) For any other distance motor should stop.

Assignment No. 6

- **Title : Interfacing of Ultrasonic sensor with Arduino UNO kit to run a DC motor and display the readings on LCD.**
- **Pre-requisite :** Principle of working of Ultrasonic sensor and motor.
- **Problem statement :**
  A) Part 1
  1) Display “VIT” on LCD.
  2) Scroll “VIT” on LCD from left to right end of upper row.
  3) Scroll “VIT” on LCD from upper row to bottom row in zig-zag manner.

B) Part 2

1) Interface US and find the distance.
2) Display the same on serial monitor.
3) Distance between 15 cm to 30 cm – motor should run CW.
4) Distance between 30 cm to 45 cm – motor should run CCW.
5) For any other distance motor should stop.
6) Display the distance and run mode on LCD.

Assignment No. 7

- **Title : Interfacing of LDR with Arduino UNO kit.**
- **Pre-requisite :** Principle of working of LDR.
- **Problem statement :** Interface LDR with the UNO kit and write a program ……

  A) to implement Automated Street light ON / OFF system depending upon ambient light intensity. Use at least 3 LEDs as street lights.

  B) to count number of objects passing through. The system should use light source (LED) and Detector (LDR). Initially count should be zero and with every object passing it should be incremented by one. Display the count on serial monitor of the UNO simulator.

Assignment No. 8

- **Title : Interfacing of LM35 Temperature Sensor Interfacing with LCD.**
- **Pre-requisite :** Principle of working of temperature sensor LM35.
- **Problem statement :** Interface LM35 with the UNO kit and write a program ……

  Task 1 – LM35 and LCD Interfacing with UNO to get Temperature reading in degrees on serial monitor.

  Task 2 – Display the measured temperature on LCD with custom character degree symbol.

Prof. H. M. Khare
(MAR Lab. instructor for Div. E, 22-23-2)

VISHWAKARMA INSTITUTE OF TECHNOLOGY

Department of Engineering, Sciences and Humanities

FYBTech – Mechatronics and Robotics – ES1024 – Laboratory Journal

A.Y. 2022-2023 – semester 2

INDEX

Assign. No.	Date	Title	Marks	Page No.	Instructor's Sign.

The above Laboratory assignments are performed and completed by the following student.

Name of the student – _____

Roll No. – _____ Batch – _____ Division – _____ PRNo. – _____

Laboratory Instructor **Head of the Department**

(Prof.) **(Prof. Dr. C. M. Mahajan)**

MAR Laboratory Assignment No. _____

Title of the assignment – _____

Name of the student – _____

Roll No. – _____ Batch – _____ Division – _____ PRNo. – _____

Date of performance – _____