



Semester – IV

Subject Name: Electrical Software Skill - II

Subject Code: 09EE0405

Diploma Branches in which this subject is offered: Electrical Engineering

Objective: In a fast growing electrical world, to understanding the concepts of electrical engineering is necessary, also it is necessary to develop new things with several add-ons. To develop new thing lot of experiment and research work need to be carried out. Which is actually an expensive and time consuming process. The simulation software like MATLAB and hardware interfacing link Arduino provides an advantage in this issue. By using this software, provides nice GUI support and graphical interface, so it is easy to understand existing concepts of electrical engineering, very helpful in developing new concepts, and useful in solving the issue in the existing system. So working on this platform will enhance student’s ability for understanding, developing and problem solving in electrical engineering.

Credits Earned: 4 Credits

Course Outcomes: After learning the course the students should be able:

1. To understand fundamental of programing.
2. To understand and develop a MATLAB m-file.
3. To understand and develop a MATLAB simulation.
4. To identify different boards of Arduino.
5. To write a program for Arduino.
6. To interface different sensor with Arduino board.

Pre-requisite of course: Basic knowledge of DC Circuit, AC Circuit, Computer Fundamental Skill, Electrical DC machine and Transformer and Basic Electronics.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
0	0	4	4	00	30	20	25	25	100



Contents:

Unit	Topics	Contact Hours	Weightage (%)
1	Introduction to MATLAB <ul style="list-style-type: none">• Introduction to MATLAB• Getting started with MATLAB, Log on and off in MATLAB, Installed location on MATLAB, Accessing of MATLA, File write and save.• Default MATLAB screen, Current folder window, Workspace window, The command window• Basics of MATLAB, General commands in MATLAB, MATLAB functions, MATLAB variables, MATLAB statements	8	14
2	Programing in MATLAB <ul style="list-style-type: none">• Introduction• Variable, Array, and Matrices• Different types of MATLAB operator Arithmetic Operators, Relational Operator, and Logical Operator• Plot and Subplot Label, Title, Legends, Color, Mark and line style, Axis property, Zoom out and zoom in• MATLAB functions• Branching function, Catch/Try function, If function• Loop function For loop function, While loop function• String function, Input function, Output function	8	14
3	Simulink in MATLAB <ul style="list-style-type: none">• Introduction• Create and Save Simulink file• Commonly used blocks in Simulink Ground block, Terminal block, Bus creator, Bus selector, Sine wave block, Product, In terminal, Out terminal, Relation operator, Sum.• Logic and bit operations• Create Sub system, Comment Out• Math operations• Sink Display, Scope, Terminator, To file, To workspace, Stop simulation, Go to From• Sources• Constant, Clock, Pulse generator, Ramp, Repeating sequence, Sine wave, Step• Sim-caps• Sim-power system	14	25



4	Arduino hardware <ul style="list-style-type: none">• Introduction• Different types of Arduino board Arduino Uno, Arduino Due, Arduino Mega, Arduino Leonardo• Different types of sensors Ultrasonic module, IR infrared, Soil moisture sensor, Microphone sensor, Pressure sensor, Photo-resistor sensor, Thermal sensor, Rotary encoder, Smoke sensor, Humidity sensor, Vibration sensor, Speed sensor, Fire detection sensor, PIR sensor, Accelerometer• Different tools, Parts, and Meter for Arduino hardware Soldering iron, Multi-meter, Needle-nose plier, Wire stripper, Screwdriver set, Flush cutter, Tweezer, Breadboard, USB A-B cable, 9-v battery, Battery cap, Different color LED, Different resistor, Photo-resistor, and Jumper wire.	8	14
5	Arduino software <ul style="list-style-type: none">• Introduction to Arduino• Getting started with Arduino• Arduino IDE Downloading and installing Arduino IDE software, the main window of IDE• Setup and loop• Variables• Logical operators EQUAL operator, AND operator, OR operator, NOT operator• Conditional statement• Communication with digital and analog components	8	14
6	Interfacing with Arduino board <ul style="list-style-type: none">• Communication between PC and Arduino board• Interfacing of the push button• Interfacing of speaker• Single LED interface and blinking of LED• Multiple LED interface and blinking of LED• Interfacing different sensors with Arduino Ultrasonic module, IR infrared, Soil moisture sensor, Microphone sensor, Pressure sensor, Photo-resistor sensor, Thermal sensor, Rotary encoder, Smoke sensor, Humidity sensor, Vibration sensor, Speed sensor, Fire detection sensor, PIR sensor, Accelerometer	10	19



List of Experiments

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	I	To write m file for containing mathematical operations and take printout.	4
2	II	To write m file to plot a single graph of sinusoidal supply voltage give its title, axis label, and color and take printout.	2
3	II	To write m file to plot multiple graphs in one figure of three phase sinusoidal supply voltage and give its title, axis label, and color and take printout.	2
4	II	To write m file using different loop functions and take printout.	2
5	II	To write m file for automatic report generating using built in function of MATLAB and take printout.	2
6	III	To verify superposition theorem using MATLAB-Simulink	2
7	III	To do an analysis of single phase half wave and full wave rectifier using MATLAB-Simulink.	2
8	III	To do an analysis of three phase full wave bridge rectifier with R, RL, RC, and RLC load	4
9	III	To prepare an electrical power system in MATLAB-Simulink and study it's different parameter.	4
10	III	To perform speed control of DC motor using armature control method.	4
11	III	To perform speed control of DC motor using field control method.	2
12	V/VI	To interface LED with Arduino uno board	4
13	V/VI	To interface pressure sensor with Arduino board	4
14	V/VI	To interface speaker with Arduino uno board	3
15	V/VI	To control the brightness of LED with Arduino uno board	3
16	V/VI	To achieve automatic on-off of LED using LDR with Arduino uno board	4
17	V/VI	To interface speed sensor with Arduino board	2
18	V/VI	To interface temperature sensor and display with Arduino.	6



References:

1. Rudra pratap, “*Getting started with MATLAB 7*”, Oxford university press. 2008
2. Agam kumar tyagi, “*MATLAB and Simulink for engineers*”, Oxford university press. 2012
3. Roland premier, “*MATLAB for electrical and coputer engineering students and professionals with Simulink*”, scitech publishing. 2013
4. S.C.Chakravarty, “*Technology and engineering applications of Simulink*”, Intech. 2012
5. Jody culkin, Eric hagan, “*Make: learn electronics with arduino*”, shroff publishers and distributors pvt. ltd. 2017
6. Michael margolish, “*Arduino cookbook*”, Oreilly. 2011

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by the black board may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory.
- c. Practical examination will be conducted at the end of the semester for an evaluation of the performance of students in the laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
- e. Show video or animation of MATLAB SIMULATION and Application of Arduino

Supplementary Resources:

1. <https://in.mathworks.com/examples/>
2. <https://in.mathworks.com/support/learn-with-matlab-tutorials.html>
3. <https://www.arduino.cc/en/Main/Tutorials>
4. <https://www.tutorialspoint.com/arduino/>
5. <https://hackr.io/tutorials/learn-arduino>
6. <https://learn.adafruit.com/category/learn-arduino>
7. <https://www.makerspaces.com/arduino-uno-tutorial-beginners/>