

GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Electrical Engineering				
Semester	IV	Version	1.0.0.0		
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025		
Course code	1EE4103	Course Name	Micro controller and IOT Applications		

I. TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course code	Course Title	Teaching & Learning Scheme							Examination Scheme									
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1EE4103	Micro controller and IOT Applications	2	0	2	4	2	0	4	2	8	40	60	100	60	40	100	20	220

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	SLA - Self Learning Assessment	SA - Summative Assessment
	CE – Continuous Evaluation		SEE – Semester End Examination

II. PRE-REQUISITES

Basic knowledge of Microprocessor and Digital electronics.

III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES

The purpose of this course is to help the student to learn about the Microcontroller and IOT concepts and its implementation in real life.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1. Interpret architecture of 8-bit microcontrollers.

CO2. To understand Arduino architecture and able to build devices using it.

CO3. Distinguish microcontrollers, PLC and SCADA based control systems.

CO4. Understand the concept of IOT and its applications.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours

<p>Unit-1 Introduction of Microcontroller 8051 & 8255</p>	<p>TLO1.1 Microcontrollers and microprocessors TLO1.2 Pin diagram of 8051 microcontrollers TLO1.3 Internal RAM, ROM and Special function Registers in 8051chip TLO1.4 I/O ports TLO1.5 Counters and Timers TLO1.6 Interfacing with external memory TLO 1.7Different types of memories: ROM, RAM, PROM, EPROM, EEPROM TLO1.8Schematic diagram of memory chips decoder, memory interfacing. TLO 1.9 Memory I/O data transfer Scheme for 8255. TLO 1.10 Interfacing of switches and LEDs</p>	<p>1.1Compare microcontrollers and microprocessors 1.28051 architectures with block diagram 1.3Function of each pin of 8051 chip 1.4Registers and their functions of 8051 1.5Program the I/O ports for data transfer 1.6Program the timer and counter for required time delay generation. 1.7Program the I/O ports for interfacing external memory. 1.8 Compare various types of semiconductor memories 1.9Interfacing of microprocessor with memory 1.10 Describe function of 8255 with the help of suitable block diagram 1.11 Use of microcontroller for switch and LEDs control.</p>	<p>24</p>	<p>13</p>
<p>Unit-2 Introduction of Arduino</p>	<p>TLO 2.1Introduction to Arduino TLO 2.2Pin configuration and architecture. TLO 2.3Device and platform features. TLO 2.4Concept of digital and analog ports. TLO 2.5Arduino Interfacing Board</p>	<p>2.1 Build simple IOT devices using Arduino hardware</p>	<p>12</p>	<p>6</p>
<p>Unit-3 Basic of PLC and SCADA System</p>	<p>TLO3.1PLC: CPU, I/O modules, bus system, power supplies and remote I/Os, counter, timer. TLO3.2Different PLC's available in the market. TLO3.3Selection of a PLC. TLO 3.4 SCADA-Concept and Application</p>	<p>3.1 Working of each module of PLC 3.2Criteria for the selection of PLC for the given application. 3.3Functions of SCADA</p>	<p>14</p>	<p>6</p>

Unit-4 Basics of Internet of Things (IoT)	TLO 4.1 Describe the architecture of the IoT system. TLO 4.2 List types of IoT systems. TLO 4.3 Illustrate Physical and logical design of IoT systems.	4.1 Basics of IoT: need, history, definition, characteristics, architecture of IoT with block diagram, IoT applications 4.2 Types of IoT system 4.3 Physical and logical design of IoT	10	5
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VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 Interface a seven-segment LED display with the 8051-microcontroller kit.	Interface seven segment LED display with 8051 kit.	CO1
2	LLO 2.1 Interface an LCD display with the 8051-microcontroller kit.	Interface LCD display with 8051 kit.	CO1
3	LLO 3.1 Control the speed of a stepper motor using the 8051-microcontroller kit.	Control speed of stepper motor using 8051 kit.	CO1
4	LLO 4.1 Use arithmetic functions of a PLC for a typical industrial application.	Use the arithmetic function of PLC for a typical application.	CO3
5	LLO 5.1 Use timer functions of a PLC to introduce time delay in a typical application.	Use the timer function of PLC for a typical application (introduce delay).	CO3
6	LLO 6.1 To understand the basics of Arduino.	Introduction of Arduino.	CO2
7	LLO 7.1 To understand the basics of simulating circuits using the Tinkercad platform.	Introduction of Tinkercad	CO4
8	LLO 8.1 Interface an LED using Arduino through the Tinkercad simulation environment.	Interfacing of LED using Arduino/Tinkercad.	CO2, CO4
9	LLO 9.1 Interface a push button using Arduino through the Tinkercad platform.	Interfacing of Push Button using Arduino/Tinkercad.	CO2, CO4
10	LLO 10.1 Interface a relay using Arduino through the Tinkercad simulation tool.	Interfacing of Relay using Arduino/Tinkercad.	CO2, CO4
11	LLO 11.1 To interface an ultrasonic sensor using Arduino through Tinkercad.	Interfacing of ultrasonic sensors using Arduino/Tinkercad.	CO2, CO4
12	LLO 12.1 Interface an IR sensor using Arduino through the Tinkercad platform.	Interfacing of IR sensor using Arduino/Tinkercad.	CO2, CO4
13	LLO 13.1 To interface a humidity sensor using Arduino through Tinkercad.	Interfacing of humidity with humidity sensor using Arduino/Tinkercad.	CO2, CO4
14	LLO 14.1 To interface a temperature sensor using Arduino through Tinkercad.	Interfacing of temperature with temperature sensor using Arduino/Tinkercad.	CO2, CO4
15	LLO 15.1 To interface a DC Motor using Arduino through Tinkercad.	Interfacing of DC Motor using Arduino/Tinkercad.	CO2, CO4

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Study the architecture and pin configuration of commonly used microcontrollers and Arduino.
- Design simple interrupt-based programs to understand real-time event handling in microcontrollers.
- Study basic security concepts such as authentication and data protection in IoT systems.

Mini projects

- Design and implement an LED/ traffic light control system using a microcontroller.
- Develop an IoT-based energy monitoring system/ weather monitoring/smart home system.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

1	Microcontroller 8051 kit with necessary accessories.
2	Kit for add on cards for performing different applications of PLC
3	Power supply for above kits and applications
4	Hardware tools- Arduino, Different Sensors (IR, ultrasonic, temperature sensor etc.)
5	Software tools- Arduino IDE (open Source)& Tinkercad online source

IX. LIST OF REFERENCE BOOKS

Sr.No.	Title	Author	Publication
1	The 8051 Microcontroller	Ayala Kenneth J	Thomson Delmar Learning
2	Microcontroller: Theory and Application	Deshmukh Ajay V	McGraw Hill
3	Microcontrollers: Principle and Application	Pal Ajit	PHI Learning
4	Microcontroller and Applications	Chattopadhyay Santanu	All India Council for Technical Education
5	Internet of things Architecture and Design Principles	Raj Kamal	McGraw Hill Education (India) Private Limited

X. LINK OF LEARNING WEB RESOURCE

1	https://studytronics.weebly.com/8051microcontroller.html
2	https://www.dnatechindia.com/Interfacing-LCD-to8051.html
3	https://archive.nptel.ac.in/courses/108/105/108105102/
4	https://www.tinkercad.com/projects?subject=Arduino&sort=view
5	https://www.arduino.cc/en/software

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Introduction of Microcontroller 8051 & 8255	CO1	13	10	8	6	24
2	Introduction of Arduino	CO2	6	4	4	4	12
3	Basic of PLC and SCADA System	CO3	6	6	2	6	14
4	Basics of Internet of Things (IoT)	CO4	5	2	2	6	10
Grand Total			30	22	16	22	60

XII. COs AND POs AND PSOs MAPPING

Course outcome (Cos)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	1	2	3	2	1	3	2	1

CO2	3	2	3	3	1	3	1	2	3	1
CO3	3	3	1	2	1	1	3	3	2	3
CO4	2	2	3	0	1	3	2	1	3	2
Legends: -3- <i>High</i> 2- <i>Moderate/Medium</i> 1- <i>Slight/Low</i> 0- <i>None</i>										