EE28017 Cyber Physics Application in Industrial IoT Cr 1

Course Code	:	EE28017
Course Title	:	Cyber Physics Application in Industrial IoT
Number of Credits	:	1
Pre-requisites (Course Code)	:	Nil
Course Type	:	Vocational

Course Objective:

The students will utilize the principles of Cyber-Physical Systems (CPS) and Internet of Things (IoT) to develop applications , implement IoT applications by selecting appropriate hardware and software platform and also Develop IoT applications using open-source platforms.

Course Outcomes: After successful completion of this module, students should be able to:

CO1 : Basics of cyber physics components

CO2: Understanding of sensors and actuators

CO3: Layout diagram of open source microcontroller board

CO4: Understanding of analog and digital I/O for cyber-physics

CO5: Understanding of different protocols for IoT connectivity

CO6: Basic architecture for IoT enabled Cyber Physics

Course Contents:

1.CYBER PHYSICAL SYSTEM.(THEORY)

1. CPS Realworld.
2. Design and Validation of CPS.
3. Smart city application CPS.
4. CPS Hardware Platforms(Process, Sensors and Actuators).

2.Industry 4.0.

1. IOT Fundamentals and protocols including layers.
2. Sensor and Interfacing.

Hands on Practice:

1. Architecture and pin diagram of Arduino UNO/MEGA and ESP8266
2. IDE installation for open source C++ or Phython
3. Analog and Digital voltage sensing and processing through Firmware
4. Analog and Digital voltage based actuator through Firmware
5. Display OLED/Seven segment integration through IDE
6. PCB Design Concept and implementation with uC.
7. Implementation of UI/UX through RestAPI based Thingspeak
8. DATA logging and Generating CSV through RestAPI
9. Writing a Firmware for ESP-8266 or NODEMCU(programming based knowledge)
10. IoT based transformer / condition monitoring system

References:

1. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
2. Asoke K Talukder and Roopa R Yavagal,"Mobile Computing," Tata McGraw Hill, 2010.
3. Computer Networks; By:Tanenbaum, Andrew S; Pearson Education Pte. Ltd., Delhi, 4th Edition
4. Data and Computer Communications; By:Stallings, William; Pearson Education Pte. Ltd., Delhi, 6th Edition
5. F. Adelstein and S.K.S. Gupta, "Fundamentals of Mobile and Pervasive Computing," McGraw Hill, 2009.

EE28019 Industrial Control and Remote Monitoring Cr 1

Course Code	:	EE28019
Course Title	:	Industrial Control and Remote Monitoring
Number of Credits	:	1
Pre-requisites (Course Code)	:	Nil
Course Type	:	Vocational

Course Objective:

To provide hands on experience in developing Industrial Control and remote monitoring by using PLC (Programmable logic Controller), thus by utilizing it in Process control applications

Course Outcomes: After successful completion of this module, students should be able to:

CO1: Know about typical components of a Programmable Logic Controller
CO2: Know the concept of Electrical ladder logic and its relationship to PLC instructions
CO3: Understand the concept of digital electronics and data acquisition
CO4: Program PLC logical switching circuits for industrial applications
CO5: Choose and utilize Timer, Counter, and other intermediate programming functions
CO6: Design and program automated industrial production line

Course Contents:

1. Programmable logic Controller SYSTEM. (THEORY)

1. Introduction to Industrial Automation.
2. Introduction to PLC programmable logic controller
3. PLCs & related software and its major Components
4. Relay logic Hardware Platforms (Switches, Sensors and Actuators).
5. Study of Contactors, Timers, Counter and Comparator

2. Human Machine interface:

1. Introduction to HMI Communication with PLC
2. HMI tags and Assignments
3. Project on Industrial load sequential feedback control Using PLC HMI

Hands on Practice:

1. Introduction of PLC SOFTWARE as TIA Portal
2. Ladder Programming for Basic gates logics by using SPST Contacts
3. Ladder Programming on SPDT
4. Latching Concept and related Latching program
5. Study of program memory and Programming on Memory Bits
6. Study of TIMER BLOCKs and its Programming
7. Introduction to COMPARATOR BLOCK and its Programming
8. Introduction to COUNTER BLOCK and its Types with Programming
9. Project on Industrial Load OFF/ON control Using PLC and HMI
10. Introduction to analog Logic in PLC and its Programming

References:

1. Programmable logic Controller by Vijay R. Jadhav KHANNA PUBLISHERS Second Edition 2012
2. Industrial Automation Using PLC,SCADA and DCS by R.G Jamkar Laxmi Publications Private Limited;
3. PLC and SCADA by Prof Rajesh Mehra and Er. Vikrant Vij Published by University Science Press, 1st
4. Programmable logic Controller: Programming methods and Applications By John R Hackworth and Frederick D. Hackworth Jr. PEARSON Edition: 1st Edition, 2006

MATLAB for Engineers

Course Code	EE28021
Course Title	MATLAB for Engineers
Number of Credits	0-0-2-1
Course Type	Vocational Elective

Course Objectives:

The prime focus of this course is to provide the students a basic understanding of the MATLAB coding and to solve mathematical and engineering problems numerically relevant to the academic and industrial applications.

Course Outcomes:

- ✓ **CO1:** Understanding of the MATLAB environment as a programming tool.
- ✓ **CO2:** Ability to know and execute the MATLAB commands and features to the particular problem definition.
- ✓ **CO3:** Apply the concepts of the MATLAB to write programming for the mathematical problems such as finding the roots of the equation.
- ✓ **CO4:** Being able to analyse the errors in the post-processing and display the results graphically.
- ✓ **CO5:** Write the algorithm for the solution of fundamental partial and ordinary differential equations.
- ✓ **CO6:** Develop the skill to analyze and write the algorithms to solve the complex engineering and industry standard problems.

Course Contents:

Lab-1:
Introduction to the course, software description, installation and basics of MATLAB as the programming tool.

Lab-2:

Demonstration and practice of the basic commands and features of the MATLAB (Do loop, If-else loop, While loop etc, basic plotting).

Lab-3:

Formulate a Matlab algorithm for the solution of algebraic and transcendental equations using bi-section method.

Lab-4:

Formulate a Matlab algorithm for the solution of algebraic and transcendental Equations using Regula-Falsi method.

Lab-5:

Formulate a Matlab algorithm for the solution of algebraic and transcendental Equations using Newton Raphson method.

Lab-6:

Performing matrix inversion and solving eigen-value problems using Gauss-Jordan Method.

Lab-7:

Formulate a Matlab algorithm for the interpolation using Newton's forward / backward interpolation formula.

Lab-8:

Numerical solution of ordinary differential equations using Taylor series method and Euler's Method.

Lab-9:

Numerical solution of partial differential equations: Solution to Laplace equation

Lab-10:

Scheduling algorithm implementation using MATLAB.

Assessment Scheme:

Activity	Marks
Daily performance	50
Lab Record	30
Examination	20
Total	100

Text Books:

1. S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Indian Edition , McGraw Hill, 2012.
2. V. Rajaraman, Computer Oriented Numerical Methods , PHI, 2002.
3. David Houcque, Introduction to Matlab for engineering students, Northwestern University.