| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-01** |
| IV | COURSE TITLE | **DATA ANALYSIS WITH R** |
| V | DURATION | **01 Week** |
| IV | **OBJECTIVES** | |
| On completion of the course, the learner will be able to explain the applications of PLC in automation and be able to demonstrate the practical competencies as stated in the contents below | | |

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Basics and advantages of R Programming. Familiarization with the Interface of R Studio. Basic computations in R. Objects and vectors in R. Types of objects in R. Data types in R. Commands to work with variables in R. Operators in R. Control Structures and loops in R. Functions in R. Introduction to the Data Analysis process and its types.  Basic Using Packages for data analysis and graphical plots using R. | Install R / R Studio and R Packages. Performing basic calculations in R console.  Use various data types in R programming. Create, find and delete variables in R. Use various operators in R Programming. Use Control Structures and loops in R programs. Create user defined functions, using built in functions. Create Lists, Matrices, Arrays, Factors, and Data Frames in R. Use Packages to perform basic data analysis and plot the data graphically. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-02** |
| IV | COURSE TITLE | **PROGRAMMING WITH PYTHON** |
| V | DURATION | **01 Week** |
| IV | | **OBJECTIVES** |

On completion of the course, the learner will be able to explain the applications of PLC in automation and be able to demonstrate the practical competencies as stated in the contents below

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Basics and advantages of Python Programming. Introduction to packages in Python. Data types in Python. Variables in R. Operators in Python. I/O in Python. Control Structures and loops in Python. Introduction to OOPS. Create and manipulate Arrays and Strings in Python. Functions in Python. - Lists, Sets, Dictionaries and Tuples in Python | Install Python. Use the Python Terminal / Shell base and the IDLE and set the path. Install packages. Writ and execute a basic Python program. Work with variables in Python. Write programmes us control structures and loops. Create classes, objects and implement OOPS. Create user defined functions, use built in functions. Create and manipulate Arrays and Strings in Python. Create and use Lists, Sets, Dictionaries and Tuples in Python. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-03** |
| IV | COURSE TITLE | **DATA ANALYSIS WITH PYTHON** |
| V | DURATION | **01 Week** |
| IV | **OBJECTIVES** | |

On completion of the course, the learner will be able to explain the applications of PLC in automation and be able to demonstrate the practical competencies as stated in the contents below

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Introduction to the Data Analysis process and its types. Python Data Operations using Numpy and Pandas. Data processing of CSV, JSON, Excel and Relational Database files using Python. Merging, Grouping and concatenating data using Python. Date and time operations using Python. Perform Aggregations on Data Frames. Reading HTML pages. Tokenization and Applications of Python in NLP. Python Charts and Statistical data Analysis. | Install Numpy and Pandas. Perform basic data Operations using Numpy and Pandas. Process CSV, JSON, Excel and Relational Database files using Python. Merge, Group and concatenate data using Python. Perform date and time operations using Python. Perform Aggregations on Data Frames. Read HTML pages. Use Python for tokenization and NLP. Use Python for data analysis using charts. Use Python for Statistical data Analysis like mean, mode standard deviation, variance, normal and binomial distribution. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-04** |
| IV | COURSE TITLE | **IOT IMPLEMENTATION, PROTOCOLS AND SECURITY** |
| V | DURATION | **01 Week** |
| IV | | **OBJECTIVES** |

On completion of the course, the learner will be able to describe Internet of Things and be able to demonstrate the practical competencies as stated in the contents below

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Introduction to the concepts of "Internet of Things ", its advantages and present trends. Introduction to the role and importance of the internet and cloud in IOT. Introduction to Arduino - the board, IDE, Shields and Libraries. Using C for Arduino programming. Writing and testing programmes for Digital I/O, PWM and serial communication. Introduction to various sensors. Introduction to GSM and Wi Fi shields for wireless communication and appliance control with Arduino. Introduction to IOT Protocols and Security. | Identify of the various components of the Arduino board. Identify the various elements of the programming IDE. Create simple Arduino sketches using data types, operators, control structures, loops and functions. Perform serial communication. Write and test sketches for controlling digital I/O, PWM, Interface LEDs and switches. Use sensors for temperature, light, proximity, motion indication etc.  Control lamps, relays, motors etc. Load sensor data on to the internet. Use the Wi-Fi and Bluetooth modules for communication with devices. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-05** |
| IV | COURSE TITLE | **APPLICATIONS OF DIGITAL ELECTRONICS** |
| V | DURATION | **01 Week** |
| IV | **OBJECTIVES** ||

On completion of the course, the learner will be able to explain the concepts, applications of digital logic and be able to demonstrate the practical competencies as stated in the contents below

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Introduction to Digital systems and logic gates. Introduction to Binary, Octal and BCD Number systems. Concepts of Combinational circuits. Operations. Introduction to Sequential Logic circuits. Concepts of Flip Flops, Shift Registers and Counter. Introduction to Seven Segment Displays. | Test digital logic gates ICs. Construct and test Adders, Subtractors and Comparators. Construct and test Multiplexer and Demultiplexer. Test Flip Flop circuits. Design and Test Counters and Shift Registers. Interface Seven Segment Displays. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-06** |
| IV | COURSE TITLE | **CYBERSECURITY FUNDAMENTALS** |
| V | DURATION | **01 Week** |
| IV | **OBJECTIVES** ||

On completion of the course, the learner will be able to describe the roles, objectives, principles and methods of Cybersecurity and be able to demonstrate the practical competencies as stated in the contents below

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Introduction to Information security and Cybersecurity. Introduction to the best practices in Information Security. Introduction to the roles, objectives and principles of Cybersecurity. Introduction to Ethics in Cybersecurity, the I.T Act and penalties for cybercrimes. Description of risk management processes and practices. Identification of security tools and techniques. Introduction to system and application security threats, vulnerabilities and attacks. Introduction to Browser security. | Perform Exercises to : Identify various cyber security measures implemented in a few prominent organizations in India. Identify various types of security tools to avoid virus attacks. Identify an incident of cyber-attack on an industrial establishment, report its impact, causes and remedial measures to avoid such attack. Identify cyber-attacks involving financial losses and analyze the causes and remedial measures for such attacks to be avoided. Identify various tools for safe browsing and browser security. Configure Browser settings to reduce the risks. Configure e - mail settings for mitigation of threats. Information Security Audit Sample exercise. |

| I | SECTION CODE | **IA** |
|---|---|---|
| II | SECTION NAME | **INDUSTRIAL AUTOMATION** |
| III | COURSE CODE | **IA-07** |
| IV | COURSE TITLE | **DATA ANALYSIS WITH EXCEL** |
| V | DURATION | **01 Week** |
| IV | **OBJECTIVES** | |
| On completion of the course, the learner will be able to explain the concepts, applications of digital logic and be able to demonstrate the practical competencies as stated in the contents below | | |

VI **Course Content:**

| Theory topics | Practical Topics |
|---|---|
| Introduction to the Data Analysis process and its types.  Performing Sorting and filtering on Excel data. Apply conditional Formatting. Charts for data visualization.  Data Validation Subtotals and consolidation. Use formulae for analyzing data. Use basic statistical functions. What if analysis, Data Tables, Pivot tables and charts for data analysis. | Create Excel Data Sheets, Apply Data validation and Conditional Format.  Apply Basic Math and Statistical Formulae. Create charts. Sort, Filtering and Advanced filtering. Generate Subtotals, Find Duplicates and remove them. Use the Goal Seek, Scenario Manager. Create two variable Data tables. Consolidate Data and Create Subtotals. Use different versions of Count () Function, Date Functions, Text functions, Look Up Functions and Statistical Functions for Data Analysis. Create Pivot Tables and Charts for analyzing Data. |