IA100: Course Contents

SNo	Core Modules	Duration (24 Weeks)
	IA100: Executive PG Program in Industrial Automation System Design (Online)	
1	**Measurements with Industrial Field Instruments** **Data Acquisition Systems (DAS)** **Process Plant Control & Automation System Design** **Programmable Automation Controllers (PAC)** **Automation System Integration & Engineering Concepts**	5 Weeks
2	**PLC & PID Controllers**	6 Weeks
3	**SCADA/ HMI System Development**	3 Weeks
4	**Industrial Networking & Industrial IoT**	2 Weeks
5	**Distributed Control Systems (DCS)**	2 Weeks
6	**Industrial Drives**	2 Weeks
7	**Project Work**	4 Weeks

1) *Measurements with Industrial Field Instruments, DAQ Systems and Programmable Automation Controllers (PAC)*

➢ Industrial Automation system structure & functional Levels
➢ Data Acquisition Systems (DAS) and Control Systems
➢ Standard instrumentation signal levels, selection of sensors / transducers for Industrial application
➢ Functions of industrial signal conditioners / Intelligent transmitters
➢ Graphical programming for data acquisition, signal processing, Control, analysis & presentation using Measurement and Automation Software
➢ DAQ applications using NI-LabVIEW software
➢ Control system design and simulation using NI-LabVIEW software
➢ Design of Instrumentation Loops, ISA Symbols & Diagrams
➢ Programmable Automation Controllers (PAC) architecture using NI hardware and software
➢ RTOS based Industrial Applications using NI Compact RIO

2) *PLC & PID Controllers:*

➢ Programmable Logic Controllers & PLC interfacing Techniques
➢ Programming of PLC using Ladder diagrams, Function Block diagram & Structured Text Language (with IEC 61131-3 Languages)

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- Allen Bradley Compact Logix Series PLC (1769 L23), RS Logix 5000 Software
- SIEMENS SIMATIC S7 controllers (CPU 400,1200 &1500) SIEMENS IM151-1 High Feature, Siemens Touch Panel TP 177B SIMATIC STEP 7 Professional programming Software, TIA v15.1& S7-PLCSIM
- ABB AC500 PLC System /ABB Software Control Builder IT
- System design with PLC / PID Controller and tuning methods
- Implementation of process control strategies /techniques using PLC
- Troubleshooting and maintenance of PLC systems

3) *SCADA/ HMI System Development:*

- Different Systems in SCADA-Field Instrumentation, RTUs, Industrial Data Communication / Networks and MTUs
- GE-iFix / Siemens WinCC SCADA Software
- HMI Development, Data Processing, Control Algorithm Programming
- Modem connectivity & SCADA protocols
- Network Communications, Communication with RTUs, PLC as RTUs
- PC with Data Acquisition Cards/ PAC as RTUs
- Database Connectivity with standard DBMS
- OPC (OLE for Process Control) Configuration with RTUs & MTU
- Historical data collection using SCADA software
- Basics of Industrial Data Analytics
- Connectivity using OPC UA: Information exchange with different layers of automation

4) *Industrial Networking & Industrial IoT (IIoT):*

- Introduction to Industrial Networking
- Analog and Digital Communications on Plant Floors
- PLC to PLC & PLC to PC communication
- RS232-422-485 standards, Ethernet, AB-DH485,
- HART, MODBUS, PROFIBUS,PROFINET and Foundation Fieldbus
- Introduction to Industrial Internet of Things (IIoT)and applications
    - Understanding IT and OT convergence: Evolution of IIoT
    - IIoT Architectures - Device, Network and Cloud Networks, communication technologies and protocols
- Industrial cloud platforms
    - Cloud components and services & How to use Node-RED node

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- ➢ Device Management, Databases, Visualization, Reporting, Notification/Alarm management, Security management, Cloud resource monitoring and management
- ➢ Siemens IoT2040 platform (industrial gateway) and associated hardware
- ➢ Interface with industrial cloud platforms (MindSphere / IBM Whatson)
- ➢ Industrial IoT security, Standards and Best practices

5) *Distributed Control System (DCS):*

- ➢ Distributed Control System (DCS) architecture with ABB Freelance 800F
- ➢ ABB Control Builder F Configuration / Development Tool
- ➢ Project Management and hardware configuration & Commissioning
- ➢ ABB - AC 800F (Industrial IT Controller) Process Station configuration
- ➢ Process visualization software, DigiVis for Operator Stations
- ➢ Developing DCS programs, task based programming and function blocks
- ➢ Foundation fieldbus and Profibus interfaces to DCS (ABB S800, Siemens ET200 distributed I/O modules)
- ➢ Field Device configuration via FDT/DTM
- ➢ Data access through Industrial Gateways

6) *Industrial Drives:*

- ➢ AC/DC Motors & Drives (AB Power flex)
- ➢ Servo Motor Drives (Siemens SINAMICS V90)
- ➢ Embedded Controllers for Drives
- ➢ Industrial Application of drives

7) *PC100 Project work:*

As part of this project work, students individual/ groups will be guided to do project work in latest/advanced technologies of Industrial Automation related to his/her field of interest. Working/ Sponsored candidates can opt to do their project work at the employed organization. The student has to submit project registration form, progress reports and project completion form duly signed from their project guide at the employed organization.

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