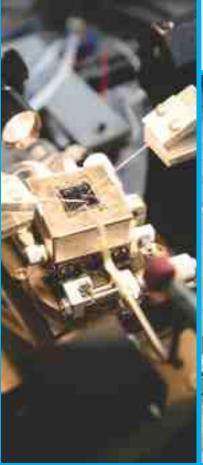# SmartBrains
Institute of Oil and Energy

Process
Automation

Why
SmartBrains?

SmartBrains is the ultimate choice for all the working & non working engineer's in energy Sector training requirements. Our extensive portfolio of energy training courses are:

- 100% focused on the Oil and energy industry.
- Guided by the industry's renowned professionals with unprecedented knowledge of the Oil and energy industry.
- Highly interactive program with practical and relevant case studies.
- Training by extensively researched self developed cutting edge techniques.
- Skill development techniques with comprehensive set of documentation, practical skills and tools used in the Industry.
- The perfect opportunity to develop network and experiences with knowledge sharing.
- Internationally acclaimed engineering qualification.
- Designed for both Fresh engineers and working professionals to attain growth in oil and energy industry.
- One of the finest international faculty.
- Interactive, interesting and motivational training sessions.
- Access to enormous reference books and research materials.

SmartBrains Oil and Energy Institute provides premium training courses for energy industry executives and fresh engineering graduates. Our success and distinguished reputation is thanks to our commitment to provide first-class programmes to our clients. Combining leading professionals from across the industry as lecturers and an interactive, practical format, the lessons learnt in a SmartBrains for Energy course are directly transferable back to the work place.

Our Strategic Objectives

To be recognized by industry and employers as a highly reputable training organization. Provide dynamic leadership, sound management and excellence in training. Continue to improve our services through quality management processes. Invest in and value our people through professional development activities. Grow our business through innovation and to continue to be financially secure. Be influential in the economic development of the industries we serve nation wise

Our Mission

"To provide quality training and assessment services and to prepare our students for a fulfilling professional career in their chosen industry. We are committed to upholding our values of providing excellence in training"

Course
STRUCTURE

"It is really difficult to change your domain from O&M to designing, but designig trainig from smartbrians made it as smooth as butter. I got job in Designing with ease. I am very thankful to this institute of Designing"

Dilip Kumar Panda
United Systems India Pvt Ltd, Hyderabad

Basic Digital Control System For Industrial Automation

- Overview of Industries and their working Methodologies
- Current Technologies and their Scope
- Role of Automation Engineer in various type of Industries
- History of Automation and Types of Automation
- Basic Automation requirement based on plant type and client requirement of various industries such as Chemical, Petrochemical, Power plant, Oil & Gas refineries, Pharmaceutical Industries
- Limitation of Automation
- Advantages and Disadvantages of Automation
- Vendor detail and complete Technical specification of all automotive products
- Interfacing and Communication Techniques using in Industry
- Process Control Modes [PI, PD, PID]
- Overview of Field Devices [I/O], Sensors and transducer Interface, I/O Modules, Wiring Concept.

- Controller Architecture, Communication Module, Communication Bus, Communication Media, Communication Ports
- Network Protocols, Network Topologies, Communication Protocols, And Baud Rate, Redundancy etc
- Installation, Commissioning, Erection and Maintenance Tips of all Devices

Programmable Logic Controller

- Role of PLC in Automation
- PLC Vs Micro controllers
- PLC Fundamental and Types of PLC
- I/O Module(Digital/Analog)
- Source/ Sink Concept
- Introduction of field devices attached to PLC
- Types of input/ output interfaces
- Relay/Opto coupler/Transistors switching concept
- Block diagram of PLC system
- Component of PLC system [Power supply/CPU/I /OModules/Communication]
- Architecture of PLC

- Programming modes
- Data files Modification and I/O mapping
- Scan cycle/ Scan time
- PLC Driver/ Protocols
- PLC Cable, Port, Baud Rate
- Addressing Concept
- Introduction to PLC Programming Software's
- Uploading/Downloading & Monitoring the current status
- Standard procedure of wiring Diagram/Layouts
- Basic Ladder logic development
- Bit/ Byte& Word Concept
- Start Stop Logics
- Latching/ Holding Concept
- Interlocking concept
- Digital and Analog Interfaces
- Programming logical &Arithmetic Instructions Such as:
  - Read -Write /Load-Unload/Set Reset/ Leading - Falling Edges
  - Logical gates
  - Timer Blocks
  - Counter Blocks
  - Move Blocks
  - Compare Blocks
  - Arithmetic Blocks
  - SCP Blocks
- Forcing of I/Os
- Communication with SCADA Software
- Fault Finding & Troubleshooting
- Hands on experiences on making the ladder logics

Supervisory Control And Data Acquisition

- Introduction of Virtual Instrumentation System
- Basics of Signals
- Fundamental of SCADA s/w
- Creating &Editing Tags
- Dynamic Graphic Display such as:
  - Percentage filling
  - Object Location
  - Visibility
  - Object size
  - Orientation
  - Analogues and Digital Operations
- Creating Alarms (Digital &Analog) & Events
- Creating Trends(Real &Historical)
- Data Base Communication [Excel / Visual Basic]
- Communication Protocols
- Device Communication [PLC]
- Security Management
- Recipe Management
- Motor control logics
- Practical Exposure of SCADA

Human Machine Interface

- Fundamental of HMI
- Need of HMI
- HMI Vs Scada
- HMI Uploading and Downloading
- PLC-HMI Communication
- Start Stop logic/Timer/Counter

Instrumentation Interface

- Fundamental of Instrumentation
- Role of Instrumentation in Automation
- Communication Vs Interfacing
- Characteristics of Instrumentation System
- Sensor Vs Transducers
- Actuators Vs Sensors
- Principal/Construction/Output of different Field Instrumentation
- Temperature/ Pressure/ Proximity/ Level / Flow /CT-PT/ Encoders Interfaces
- Fundamental of Valves
- Concept of Transmitters and Switches
- Fundamental of Process Controllers (ON-OFF/PID)

Plc Networking

- What is PLC Network and Need of Networking
- Network Topoligies
- Network Types (LAN/MAN/WAN)
- Network Protocols (Mod Bus/Profi Bus/Field Bus /Ethernet/Devicenet /Controlnet/DH485/DH+)
- Communication Protocols (RS232/RS422/ RS485/RS423)
- All type of communication Port and there properties
- OSI Vs TCP-IP layer model
- Nodes/Bridges/Gateway/ Switches/Routers
- Baud rates Vs Bit rates
- Network Address (IP/MAC/Physical/Port)
- Protocols Vs Device Drivers
- AIC+ Card and there Detail

Electromechanical Interfaces

- Introduction of Electrical Motors
- Types of Electrical motors and there Applications
- Principals and Construction of Motors
- Behavior and characteristic of motors
- Speed and Torque control Technique of different motors
- Limitation of Electrical motors
- Drawback of Induction motors and there Solutions
- Introduction of Starter and there Types
- CCD Vs PCD of DOL/RDOL/Star Delta
- Star Delta Vs DOL
- Roll of motors in Automation
- Introduction of Power Factors?
- Improvement of PF
- Roll of Capacitor Bank
- Leading and Lagging factor
- Concept of Earthing /Neutral
- Concept of Phase and Line Voltage/Current
- Protection of Electrical motors

Variable Frequency Drive

- Concept of AC / DC Drives
- About Soft Starters
- Drivers Vs Controllers
- Functional Block diagram of Drives
- Selection Criteria of drives
- Ohm Law Vs Drive Law
- Power Conversion Circuits
- Analysis of different operational method such as:
- PWM control method
    - Flux vector control method
    - Vector voltage control method
    - Direct torque control method
- Introduction of VFD
- Detail of V/F control Drive
- Block Diagram of V/F Control Drive
- CCD and PCD of Power flex4M Drive
- Basic/Advanced/Display Parameters of Power Flex4
- External vol/current Interfacing
- Digital/Analog Signal Interfacing
- Local/ Remote operations of Drives
- Advantages and Disadvantages of Drives
- Limitation of Drives

Pannel Design

- Concept of Panel and Types of Panels
- LT/HT/DG/MCC/PCC/ AMF /Capacitors panel /Transition Panel/Control Panel
- What is Switch Gears Vs Accessories
- Need of Switch Gears and there properties with Limitations
- All Types of Circuit Breakers (MCB/MCCB/RCB /RCCB/ELCB/ACB/VCB)
- What is Bus Bar and there Size Calculation
- Load Calculation of Motors
- About CT/PT/Volt meter/Ammeters/Galvano meters
- CCD Layouts Vs PCD Layouts
- Layouts Diagram
- Power Flow Vs Control Flow
- Cable Tray and Duct
- Cooling Systems
- Panel Protection technique

Admission
Requirements

- Duly Filled Application Form
- 2 Photographs
- Photo State of Qualifying Examination
- Address Proof
- I.D. Proof
- Latest Resume

Declaration

- This training program is on AUTONOMOUS basis conducted by SmartBrains.
- SmartBrains has right to expel any student at any time for misbehavior, poor attendance without refunding the fees.
- Certification will be issued only after completion of course, submission of all assignments and passing all the examinations.
- SmartBrains has its own rules and regulations about conducting examinations and assessment of examinations

Oil & Energy