

INSTRUMENTATION DESIGN ENGINEERING

www.smartbrains.com

Design | Engineering | Construction | Maintenance

A robust course for Instrumentation Engineers with sufficient depth in a specific area of **Instrumentation Design Engineering** to solve complex real world engineering problem and to understand engineering trade-off and contribute effectively in multi disciplinary project with informed decision making.



SMARTBRAINS ENGINEERS & TECHNOLOGIST PVT. LTD.

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About the Program?

The objective of this course is to provide the candidates the Detail knowledge and skills in Instrumentation Design discipline to facilitate faster learning curves while on the job.

The objective of this course is to provide basic knowledge and skills in this discipline of Instrumentation Design Engineering for Oil & Gas sector. This course will cover the fundamental principles and concepts used in Instrumentation Design & Detailing. Upon completion of this course, students will have a clear understanding of the design principles used in Instrumentation System Design for Oil & Gas Energy Sector.

The objective of this course is to provide delegates the Detail knowledge and skills into Design, Engineering, Construction, Commissioning operation & Maintenance in the field of Instrumentation Design Engineering for Oil & Energy Sector.

2

Learning Objective

- Overview of EPC Industry and Scope.
- Role of Instrumentation Engineer in various types of Industry.
- Knowing Client requirements and collection of specific data for projects.
- Relevant Codes & Standards.
- Basic Design requirement based on the type of plant e.g. Chemical, Petrochemical, Pharmaceutical Industrial, power plant etc.
- Selection of Instruments for Controlling Flow, Temperature, level and Pressure.
- Vendor's details and specification for all Instruments used to control Flow, Level, Temperature and Pressure.
- Installation and maintenance Tips of all Instruments.
- Instrument Index, Instrument Location Plan Details
- Process Data sheets and Specifications, Instrument Data Sheets
- Instrument Wiring Layout, Logic Diagrams
- Loop Drawing, Loop Wiring Diagram, JB Layout
- Cable Schedule, Cable Tray Layout
- Hook-Up Drawing

3

Methodology

SmartBrains Engineers Technologist Pvt. Ltd. uses mixes of techniques aligned to a unique pedagogy which is Goal-Centric & Action Oriented. Demonstrates Case Studies using the statistical tools, exercises & brainstorming using Adaptive Probing Methodology along with classroom theories and live Project exposure. Delivered by Senior Industry Professionals having extensive experience in their core domain.

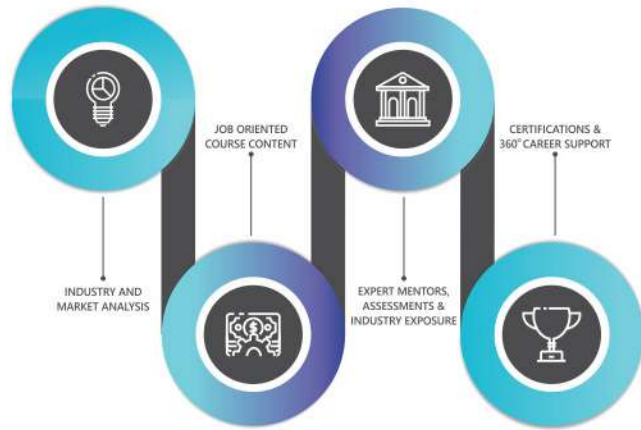
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Career Benefits

- **Become Eligible** for Design & Engineering jobs in to electrical Engineering demanding background.
- Open doors to **Job Opportunities Abroad** demanding specialization.
- Fill the void of thousands of untapped **High-Paying Jobs** in Design Engineering with **Talent Shortage**.
- **Get Promoted** in your current profile with most in-demand skill.
- Distinguish your profile from peers during **Job Interviews**.
- Earn a **Rewarding Global Certification** Certified by (National Skill Development Corporation of India (NSDC), Under the Ministry of Skill Development and Entrepreneurship (Govt. of India) Training & Certification Program.
- **Improve your CV & LinkedIn Profile** with professional development.



- The program is a global standard offering that uses mixes of techniques aligned to a unique pedagogy which is Goal-Centric & Action Oriented.
- Includes classroom theory, learning videos, demonstration of statistical tools like Advanced Excel Programs and Other Software tools.
- Real-project case studies using the statistical tools demonstrated, exercises and brainstorming using adaptive probing methodology.



Program Highlights



Assessment



Byte Size Learning



Assignments



Projects



Industry Interaction



360° Career Support



Case Study



Discussion Forum

SmartBrains engineers and technologist Pvt. Ltd. has received recognition, endorsement and affiliation from National Skill Development Corporation of India (NSDC), a Public Private Partnership (PPP), Under the Ministry of Skill Development and Entrepreneurship (Govt. of India) and various Skill Sector Councils as an authorized training partner under various trades. SmartBrains is authorized to provide skill based training for engineering/non-engineering candidates as per their interest. SmartBrains as a training institute will provide complete practical knowledge based skill training to the candidates and NSDC/Skill Councils will be responsible for providing recognition & certification to the candidates. The National Skill Development Corporation (NSDC) is one of its kind, Public Private Partnership Under the Ministry of Skill Development and Entrepreneurship (Govt. of India) aims to promote skill development by catalyzing creation of large, quality and for-profit vocational institutions. Further, the organisation provides funding to build scalable and profitable vocational training initiatives. Its mandate is also to enable support system which focuses on quality assurance, information systems and train the trainer academies either directly or through partnerships. NSDC acts as a catalyst in skill development by providing funding to enterprises, companies and organizations that provide skill training. It also develops appropriate models to enhance, support and coordinate private sector initiatives. The differentiated focus on 21 sectors under NSDC's purview and its understanding of their viability will make every sector attractive to private investment.



MODE/DURATION

- Fast Track - 60 Hours
- Weekend - 80 Hours
- Online - 80 Hours

LEARNING BASED OUTCOMES

Get hands-on experience in applying design tools & techniques to real engineering problems and understand Design, Engineering, Construction, O & M etc. Thus, become a Technology Driven Engineering Professional.

TRAINER

Delivered by Senior Industry Professionals having extensive experience of Design & Engineering in diverse domains & industries. These practitioners are also Empanelled as subject matter experts with SmartBrains Engineers & Technologist Pvt. Ltd.

CONTENT

Get 24 x 7 access to SmartBrains LMS platform (Online/Offline) with Abundant Content on Instrumentation Design Engineering including Courseware (PPT / PDF), data, case studies, articles, books, videos, examples, presentations, resource library & related more.

JOB ORIENTED OUTCOMES

Fill the Void of Talent Shortage in Design Engineering by becoming eligible for thousands of High Paying Jobs in India & Abroad with an upgraded profile through this skill & certification. Additionally, Get Promoted from your current position with added skill set.

Become eligible for Instrumentation Design Engineering job demanding background

Explore + Analyse + Solve Engineering Problems using Analytics Tools & Design Software

Fill the void of thousands of untapped High-Paying Jobs in Instrumentation Design Engineering

Helps understand Engineering Procurement and construction (EPC) contracts.

Distinguish your professional profile from peer during Job Interviews and stand out of the box

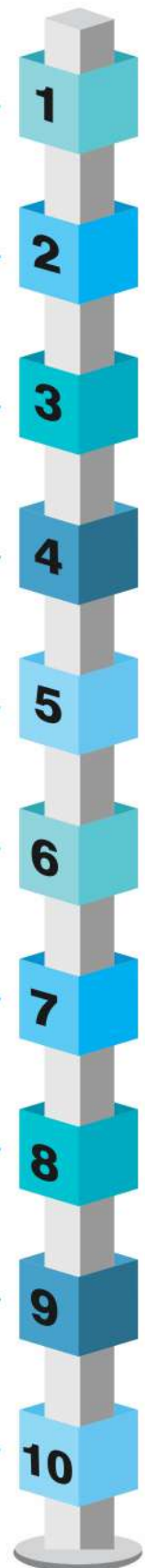
Understand 'What' & 'How' aspects of Instrumentation Design Engineering

Perform exercises by accessing our labs and simulation software

Improve your Curriculum Vitae and your social job profile with professional development

Support your startup or your professional life with high hike

Build a startup in one of the most rewarding fields of Instrumentation Design Engineering



1. Introduction to oil and gas industry & epc contracts

- General Industry overview and basic concepts
- Oil and gas prospecting(exploration)
- Oil and gas production facilities
- What is an EPC contract
- The tender & procurement process
- The scope of works

2. Hazardous Areas

- Definitions
- Introduction: explosion consequences
- Classification system: sources of release and zoning
- Classification of apparatus: grouping and temperature
- Instruments and instrument symbols
- Hazardous Definition for instruments system
- Hazardous are of classification
- Hazardous analysis, hazardous operation
- Hazardous identification
- Concept of group, div, zones and classes, temperature, explosion triangle and mode of safety

3. Introduction to process measurement

- Basic measurement concepts
- Definition of terminology
- Measuring instruments and control valves as part of the overall control system

Pressure Measurement

- Principle of pressure measurement
- Pressure transducers and elements

Level Measurement

- Principles of level measurement
- Simple sight glasses
- Hydrostatic pressure
- Ultrasonic measurement
- Electrical measurement
- Density measurement

Temperature Measurement

- Principles of temperature measurement
- Thermocouples
- Resistance Temperature Detectors (RTD's)

Flow Measurement

- Principles of flow measurement
- Open channel flow measurement
- Oscillatory flow measurement
- Magnetic flow measurement
- Positive displacement
- Ultrasonic flow measurement
- Mass flow measurement

4. Control Valve Essentials

- Introduction to control valve theory
- Different types of control valves
- Characteristics
- High pressure drop applications
- Sizing of control valves, actuation and essential accessories
 - Examples of high pressure drop applications
 - Actuators
 - Positioners
 - Pneumatic circuits
- Control Valve Material, Standards, Applications, Maintenance and Installation
 - Materials
 - Quality Standards
 - Severe Service Applications
 - Pressure Relief Valves
 - Installation and Maintenance

5. ESD and F&G Emergency Shutdown Logics (ESD)

- Input & output measurement standards
- ESD (Emergency Shutdown Logics)
- I/O type, operation and applications

Fire & Gas (F&G)

- Basics of fire & gas (F&G) system
- Type of detector & alarm system
- Working principle of F & G system

6. Instrumentation standards in oil and gas, E & I drawings and documentation

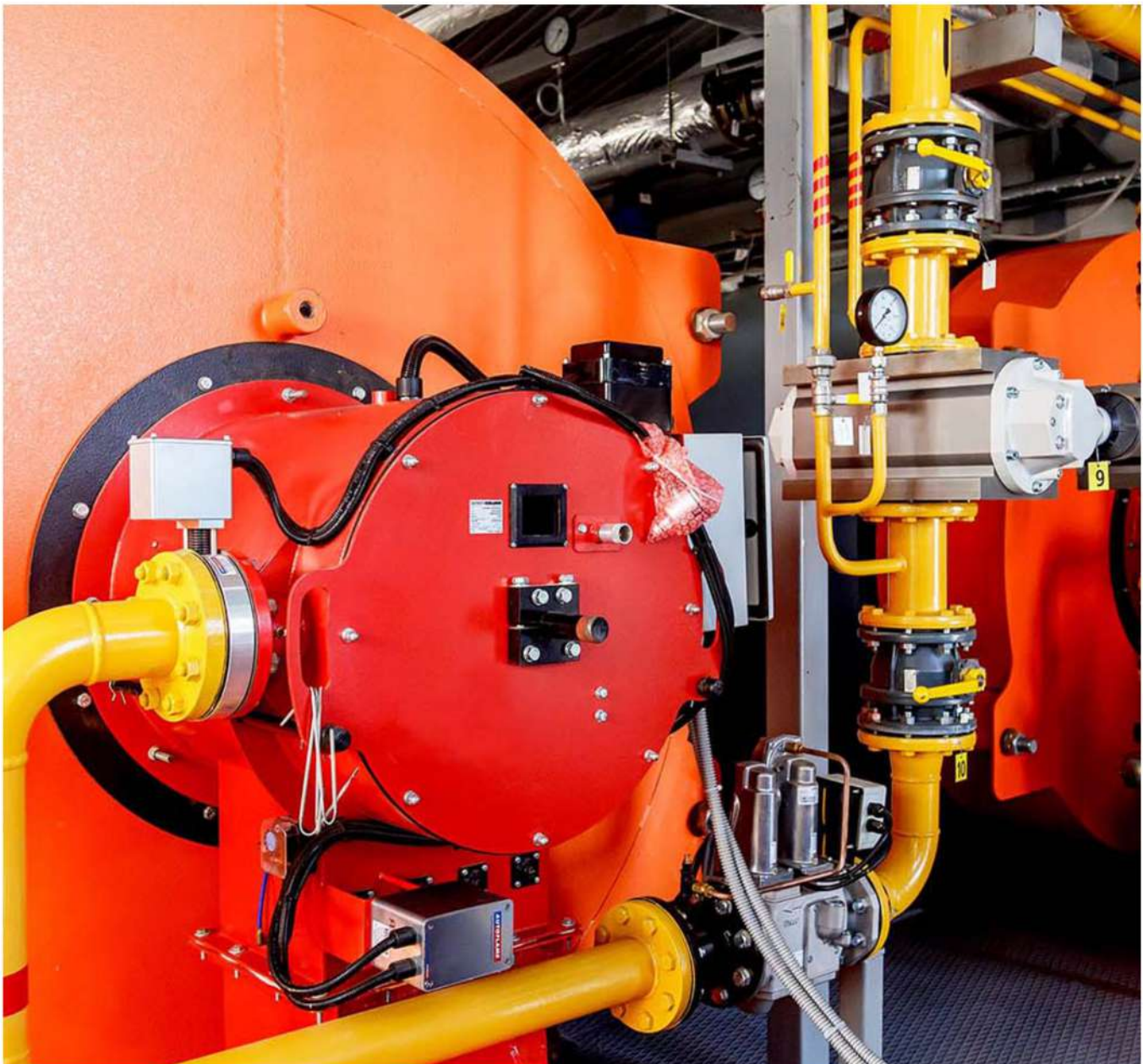
- Plant documentation
- The role of plant documentation, standards and specifications
- Drawing Types and Standards
- Standards organizations (ISA, IEC, ISO)
- Understanding diagram layouts and formats
- ISO 9002 and document control
- API RP14F – Section 122 – electronic instrumentation

- ISA standards library for automation and control
- Specification forms – ISA S20 – specification forms for process measurement

7. Instrumentation Drawings, Documentation & Schematics

- Instrument index sheet
- Instrument data/spec sheet
- Process data sheet
- Calculation and Sizing
- Input/output list
- Cable schedule
- JB schedule
- Conventional instrument field wiring
- Instrumentation drawings/layout
- Type of layout & drawing management

- Piping & instrumentation diagram (P&ID)
- Process flow diagram
- Logic diagram
- Loop diagram
- Hook-ups/isometric diagram
- Standard symbols & instrument legends
- Nomenclature
- Field wiring diagram
- Logic diagram
- Level sketch
- JB layout diagram
- Cable tray layout & routing diagram
- Instrument nozzle elevation drawing
- Control valve assembly
- Mounting layout (supports, anchors, sleepers & guides)



Prospect Recruiters



Course Certificates

SmartBrains is associated with The National Skill Development Corporation (NSDC) as the Training and Certification partner for various job oriented training programs across various sectors including Oil & Gas, Power, Renewable Energy, Hydrocarbon, IT & ITs, Electronics, Telecom, Agriculture, Life science etc. offering assessment based Training & certifications for a gamut of job profile.

Who should join?

- Working professionals in **Domains:** Site Engineering, Construction & Commissioning operation & Maintenance, Instrumentation Engineering Field.
- Students (**Instrumentation Engineers, Electronics and Instrumentation Engineers**) who want to develop their career in Design Engineering.



Global Certification

For facilitating corporation among government, Industry & academia to validate skill-sets & respective domain knowledge, SmartBrains offers various Global Certification. It helps in employability, Improving C.V's, Professional development & setting-up Start-ups or business.

SmartBrains is knowledge based multi-disciplinary organization with the work scope of whole life cycle for Engineering Consulting, Technology Services, Human resource outsourcing, Skill Development and Vocational Training Company, committed towards bringing an entire range of services for various sectors into most of business functions. Organization founded in 1998, combine deep industry experience, technical expertise and a global delivery model to create value-based solutions to fulfill industries requirements, success has been built upon the unstinted support and relationships with its partners and the patronage of its clients from across the Globe. SmartBrains has received recognition, endorsement and affiliation from National Skill Development Corporation of India (NSDC), a Public Private Partnership (PPP) , Under the Ministry of Skill Development and Entrepreneurship (Govt. of India Enterprises) & various Skill Sector Councils as an authorized training partner under various trades.

SmartBrains is the global market leader in providing high-level training services to the Oil and Gas sector, Petrochemical, Refinery, LNG, Power Plants, Fiscal, Contracts, Strategy, Process Engineering, Piping Engineering, Electrical Engineering, Instrumentation Design, Plant Equipments, Civil and Structural Engineering, HVAC, Project Management, HSE, Financial and Risk Management. Operating nation wise over the last 8 years, our courses are widely acknowledged within the energy community for quality and up-to-date information. Our success and distinguished reputation is down to our commitment to the industry, a high-level of expertise, sector knowledge, cultural diversity and experience that comes from organizing many courses.

Our other Instrumentation Engineering Courses

- Control valve sizing, selection and maintenance
- Calibration, installation and maintenance of instruments
- Hazops for engineers & technicians
- Industrial automation
- Instrumentation drawings & documentation
- Industrial flow measurements

Our Popular Courses

- Electrical Design Engineering
- Piping Design Engineering
- Instrumentation Design Engineering
- Civil & Structural Design Engineering
- HVAC Design Engineering
- Renewable Energy : Engineering & Design
- Power Plant Engineering
- Industrial Automation

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