

Industrial Piping Engineering

Program Description

Course Name	Industrial Piping Engineering
Course Name as on Certificate	Certification in Industrial Piping Engineering
Certificate Type	Certificate of Completion by IITM Pravartak and L&T EduTech
Certificate Issued by	IIT MADRAS and L&T EduTech
Course Description	<p>Industrial Piping Engineering is a science and a specialized discipline of Mechanical Engineering that is seldom covered in any University curriculum. The science behind piping engineering is extremely important for the reliability of the plant and the safety of the process, personnel, and public. In a typical Chemical or Process Plant, the material cost of piping is around 35% of the initial fixed cost next to the material cost of major equipment (~50%). The field labour cost against the piping goes around 50%. Piping consumes around 50% of engineering man-hours for its design. The importance of piping is far beyond these values. The piping system consists of several piping components. The failure of any one of these components has the potential to shut down the whole plant and, in some cases, it becomes a serious threat to public safety which demands 100% accuracy both in design and erection. With this aim, the course content is meticulously designed to cater to the needs of the Process, Oil & Gas, and Chemical Industries. In a nutshell, the course covers the hydraulics of piping systems subjected to both single and two-phase gas & liquid flows, pipe design, flange types & class, valve types & class, pipe stress analysis, pipe supports, cross-country onshore pipeline construction, and ASME B31.1-Power Piping, ASME B31.3-Process Piping. This course is embedded with working examples of several practical problems coupled with hands-on experience in pipe stress analysis software, and meticulously designed industrial projects for learners' execution.</p> <p>Enables learner to:</p> <ul style="list-style-type: none"> • Tabulate Single & Two-Phase flow through Pipes & Pressure Drop Calculations • Associate with Pipe design, Pipes, Fittings, Valves, Supports, Stress & Flexibility Analysis • Categorize ASME B 31 Standards for Power, Process, and Hydrocarbons Piping Systems as well as Pipeline construction
Educational Qualification	<ul style="list-style-type: none"> • Students pursuing Diploma / UG / PG Programs in Mechanical and other allied domains • Faculties in the field of Mechanical and other allied domains • Working professionals in the above domains
Pre Requisites	Fluid Mechanics and Strength of Materials
Course Content	See Enclosed Programme details – as Annexure 1
Pedagogy	Online Self-paced E-Learning Content
Assessment	One Final Assessment
Programme Faculty	Dr. Nakka Muralidhara Rao , Subject Matter Expert – L&T EduTech

	<p>As an alumni from IIT Kharagpur, Dr. Nakka Muralidhara Rao has nearly 3 decades of experience in the fields of thermal power plants, heat and mass transfer, fluid modeling and pipe design analysis. While serving as the Head of Rolta Academy, he was instrumental in its establishment as a world-class institution. Spearheaded the Project Control, Proposal & Estimation department.</p> <p>He also led the design and analysis of the Flame Deflector Plate for the Dissipation of Flume Gases in a Semi-Cryo Engine Test Facility, collaborating with ISRO for the Test Facility Centre in Mahendragiri, Tamil Nadu, while utilizing CFD (Computational Fluid Dynamics) analysis techniques.</p>		
Duration	Weeks: 14 ; Hours : 35		
Class Schedule	Self Paced		
Programme Highlights/USPs	<p>Introduction to Flow Regimes Two-Phase Flow-Homogeneous Model, Separated & Drift Flux Models, Piping System Components, Pressure Drop in Single phase and Two-phase flows Pipes, Pipe Fittings & Flanges, Valves Piping Drawings & Graphics Flexibility Analysis of Pipes Supports, Expansion Joints, Jacketing, Vibration, Insulation & Cathodic Protection Transient Analysis of Pipes ASME Section B31.1, 31.3, 31.4 Pipeline Construction</p>		
Total Fees		Total Fees (Rs.)	
	Total Programme Fee	Rs. 5,100/- inclusive of Tax	

ANNEXURE 1

Proposed Course outline / programme / plan - Unit wise syllabus details.

Unit-1**Single-Phase: Pipe Hydraulics, Sizing & Pressure Drop**

Regimes: Flow: Regime Identification

Pressure Drop: Derivation of Pressure Drop in Pipe, Darcy & Fanning Friction Factor, Friction Factor Correlations, Pipe Sizing, Pressure Drop Calculation in Piping Components, Pressure Drop Calculations in Pipe Network, Pressure Drop Calculation in Header & Branching Pipes

Unit -2**Two-Phase Flow: Regimes, Notations & Pressure Drop Models**

Regimes: Formation of Two-Phase Flow Regimes in Horizontal & Vertical Pipes, Influence of Bend on Upstream & Downstream Two-Phase Flow Regime Formation

Notations: Two-Phase Terminologies, Relationships for Two-Phase Parameters, Flow Pattern Maps for Identification of Two-Phase flow Regimes

Models: Homogeneous Model, Two-Phase Multiplier, Evaluation of Pressure Drop, Separated Model, Drift Flux Model, Slip Ratio Correlations, K \square H Correlations, Drift Flux Correlations

Unit -3**Two-Phase Flow Pressure Drop, Pipes, Pipe Fittings, Flanges & Valves**

Two-Phase Pressure Drop: Sudden Enlargement & Contraction, Orifice, Nozzle, Venturi, Bend, Fittings, Parallel Pipes, Series Pipes & Pipe Network

Pipes & Fittings: Pipe End Connections, Pipe Size & Schedule Numbers, Pipe Types based on Manufacturing, Materials, Ends & Joints, Fitting Types & End Connections

Flanges: Flanges (Types, End Connections, Facing, Materials, Temperature & Pressure Rating), Gaskets & Bolting

Valves: Description & Functioning of Valves (Isolation, Regulating, Non-Return, Special Purpose Valves), Manufacturing & Assembly of Valves

Unit -4**Piping Drawings, Symbols, Stresses, Flexibility Analysis, Transient Analysis, Water & Steam Hammer**

Drawings: PFDs, P&IDs, Orthographic & Isometric Views,

Symbols: Symbols, Abbreviations, 3D Modelling Software

Stresses: Induced Stresses, Pipe Stress Analysis, Stress Analysis Demonstration using Software

Transient: Transient Fluid Flow Analysis, Water Hammer, Steam Hammer, Gravity Flow of Liquids

Unit -5**Pipe Supports, ASME B31 Standards, Pipeline Construction**

Supports & Hangers: Pipe Supports, Expansion Joints, Design of Jacketed Piping, Vibration, Insulation, Buried Pipe, Cathodic Protection

ASME B31 Code: Interpretation of the various ASME codes such ASME 31.1 - Power Piping, ASME B31.3 - Process Piping, and ASME B31.4 - Pipeline Transportation...

Pipeline Construction: Right of Way, Stringing, Trenching, Bending, Coating, Lowering, Back Filling, Markers, Clan-up, HDD Method, Thrust Boring, Micro Tunneling, Hot Tapping Work