

Code	Program Name	Days	Jan 2019	Feb 2019	March 2019	April 2019	May 2019	June 2019	July 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
EV01	Basics of metallurgy for engineers	2			1 <sup>st</sup> - 2 <sup>nd</sup> Mar							4 <sup>th</sup> - 5 <sup>th</sup> Oct		
EV02	Metallography for engineers	2							12 <sup>th</sup> - 13 <sup>th</sup> Jul					
EV03	Welding metallurgy for engineers	2							26 <sup>th</sup> - 27 <sup>th</sup> Jul	22 <sup>nd</sup> - 23 <sup>rd</sup> Aug				
EV04	Localised Corrosion in Stainless Steel	1		16 <sup>th</sup> Feb									2 <sup>nd</sup> Nov	
EV05	Corrosion Control Management – Engineering Approach	2		8 <sup>th</sup> - 9 <sup>th</sup> Feb			2 <sup>nd</sup> - 3 <sup>rd</sup> May							
EV06	Intergranular corrosion of austenitic stainless steel	2							5 <sup>th</sup> - 6 <sup>th</sup> Jul					



EV14	T-91/ P-91 High Pressure Welding Technology	2			8 <sup>th</sup> – 9 <sup>th</sup> Mar								
EV15	Low temperature service: Concepts on metal properties, manufacturing & testing	2			15 <sup>th</sup> - 16 <sup>th</sup> Mar						11 <sup>th</sup> - 12 <sup>th</sup> Oct		
EV16	Damage mechanisms for static equipment for refineries and process industries	2					3 <sup>rd</sup> - 4 <sup>th</sup> May				20 <sup>th</sup> - 21 <sup>st</sup> Sep		15 <sup>th</sup> - 16 <sup>th</sup> Nov
EV17	Eddy Current Testing Awareness	1									14 <sup>th</sup> Sep		
EV18	Hydrogen damage for industries (Asset integrity and Damage mechanism)	2						7 <sup>th</sup> – 8 <sup>th</sup> Jun					
EV19	High temperature degradation of industrial component	2									6 <sup>th</sup> – 7 <sup>th</sup> Sep		
EV20	Defect analysis in engineering components by Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscopy (EDS)”	1						16 <sup>th</sup> May					29 <sup>th</sup> Nov
EV21	Distillation operation, control & troubleshooting	2											19 <sup>th</sup> - 20 <sup>th</sup> July

EV22	Selection of NDT for effective end result	1			15 <sup>th</sup> Mar									
EV23	Ultrasonic Testing Level -II	2	6 <sup>th</sup> - 7 <sup>th</sup> Jan				21 <sup>st</sup> - 25 <sup>th</sup> May							
EV24	Magnetic Particle Testing Level -II	4		20 <sup>th</sup> - 23 <sup>rd</sup> Feb					19 <sup>th</sup> - 22 <sup>nd</sup> Aug					
EV25	Dye Penetration Testing Level -II	4	21 <sup>st</sup> - 24 <sup>th</sup> Jan						12 <sup>th</sup> - 15 <sup>th</sup> Aug					
EV26	PAUT -Introduction, calibration & interpretation	2						24 <sup>th</sup> - 25 <sup>th</sup> Jul				22 <sup>nd</sup> - 23 <sup>rd</sup> Nov		
EV27	Cost of Quality	1					29 <sup>th</sup> Jun							
EV28	Pressure Vessel Mechanical Design as per ASME PV Codes	4									2 <sup>nd</sup> - 5 <sup>th</sup> Oct			
EV29	Failure Prevention, Repairs and Life enhancement of piping, Vessels and Tanks	2		27 <sup>th</sup> - 28 <sup>th</sup> Feb										
EV30	Risk Based Inspection (RBI) in Process, Petrochemical, Oil and Gas Plants	3							8 <sup>th</sup> - 10 <sup>th</sup> Aug					

EV31	Storage Tank Design, In-Service Inspection, Maintenance and Repairs for Chemicals, Oil and Petroleum Terminals	3						20 <sup>th</sup> - 22 <sup>nd</sup> Jun					
EV32	Piping Systems and Pipeline Integrity in process industry	3				25 <sup>th</sup> - 27 <sup>th</sup> Apr							
EV33	Fitness for Service of Equipment and Piping per API 579 and ASME FFS1	3										21 <sup>st</sup> - 23 <sup>rd</sup> Nov	
EV34	Physical & Chemical testing of metals	1	19 <sup>th</sup> Jan						1 <sup>st</sup> Jul				9 <sup>th</sup> Nov
EV35	Evolving approach to site operation and maintenance on substation equipment & advanced monitoring system	2				19 <sup>th</sup> - 20 <sup>th</sup> Apr					6 <sup>th</sup> - 7 <sup>th</sup> Sep		
EV36	Corrosion under Insulation	2			1 <sup>st</sup> - 2 <sup>nd</sup> Mar			14 <sup>th</sup> - 15 <sup>th</sup> Jun				4 <sup>th</sup> - 5 <sup>th</sup> Oct	

## COURSE DETAILS

Code	Course Name	No. of days	Course Contents	Useful For	Investment	Investment
					Indian Participant (Rs.)	Foreign Participant (USD)
EV01	Basics of metallurgy for engineers	2	<ul style="list-style-type: none"> <li>• Introduction and Importance of Metallurgy</li> <li>• Correlation of properties with composition and microstructure</li> <li>• Manufacturing methods (Casting, Rolling, Extrusion and Fogging)</li> <li>• Defects and Characterization</li> <li>• Metallography and Interpretation of microstructure</li> <li>• Heat treatment of steels and cast iron</li> <li>• Non-ferrous alloys and heat treatment</li> <li>• Mechanical behaviour of steels</li> <li>• Welding Metallurgy</li> <li>• Failure analysis</li> <li>• Corrosion and Preventions</li> <li>• Non-Destructive Techniques</li> <li>• Lab visit and Practical Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers (Management level)</li> <li>• Maintenance/Inspection Engineers</li> <li>• Process Engineers</li> <li>• NDT Engineers/ Inspectors</li> <li>• Plant Engineering/Managers</li> <li>• QA/QC Engineers</li> <li>• Reliability Engineers</li> <li>• Metallurgical/Material Engineers</li> <li>• HAZOP Engineers/Managers</li> <li>• Other Technical consultants, Laboratory, Sales Personnel, Engineers from allied discipline, disciplines, management and administrative staff.</li> </ul>	Rs. 9,500	230 USD
EV02	Metallography for engineers	1	<ul style="list-style-type: none"> <li>• Sample preparation by cutting, outting, grinding, and polishing</li> <li>• Etching the metals and alloy samples for development of microstructures</li> <li>• Fe-C phase diagram of steels and cast irons</li> <li>• Microscopy for observation of microstructures</li> <li>• Bright and dark field microscopy</li> <li>• Image analysis of the microstructures</li> <li>• Quantification of microstructure such as grain size, Inclusion rating and case depth measurement</li> <li>• Co-relation of microstructures with composition</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers from middle management</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers</li> <li>• Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Reliability Engineer</li> <li>• Metallurgical / Materials Engineers</li> <li>• HAZOP Engineers / Managers</li> </ul>	Rs. 6,500	180 USD

			and heat treatment of metals and alloys			
EV03	Welding metallurgy for engineers	1	<ul style="list-style-type: none"> <li>Welding metallurgy and weldability of different stainless steels.</li> <li>Classification, properties and applications of stainless steels such as ASS, FSS, MSS and DSS</li> <li>Importance of metallurgy of steels to control microstructure of the weld and defects associated with weld joint</li> </ul>	<ul style="list-style-type: none"> <li>Engineers (Management level)</li> <li>Maintenance/Inspection Engineers</li> <li>Process Engineers</li> <li>NDT Engineers/ Inspectors</li> <li>Plant Engineering/Managers</li> <li>QA/QC Engineers</li> <li>Reliability Engineers</li> <li>Metallurgical/Material Engineers</li> <li>HAZOP Engineers/Managers</li> <li>Other Technical consultants, Laboratory, Sales Personnel, Engineers from allied discipline, disciplines, management and administrative staff.</li> </ul>	Rs. 5,000	150 USD
EV04	Localised Corrosion in Stainless Steel	1	<ul style="list-style-type: none"> <li>Basics of Corrosion and its Control</li> <li>Introduction to Stainless Steel</li> <li>Localized Corrosion of Stainless steels</li> <li>Test Methods for assessing susceptibility to localized corrosion</li> <li>Metallurgical failure analysis</li> </ul>	<ul style="list-style-type: none"> <li>QA/QC Engineers/ Managers</li> <li>Third Party Inspection agency surveyors</li> <li>Personnel involved in Fabrication, Heat Treatment, Forge shops, Foundries</li> <li>Welding Engineers</li> <li>Laboratory Personnel</li> <li>Metallurgical / Materials Engineers</li> <li>And anyone who need a working understanding of Corrosion in SS and their testing.</li> </ul>	Rs. 8,000	200 USD
EV05	Corrosion Control Management – Engineering Approach	2	<ul style="list-style-type: none"> <li>Corrosion management, Corrosion control measures</li> <li>Design, Material Selection</li> <li>Fabrication processes, Corrosion Inhibition</li> <li>Coatings, Surface modification techniques</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical Engineers of middle management level</li> <li>Maintenance / Inspection Engineers</li> <li>Process engineers/ Design engineers</li> <li>Plant Engineers / Managers</li> </ul>	Rs. 9,500	230 USD

			<ul style="list-style-type: none"> <li>• Electrochemical protection, Corrosion Monitoring</li> <li>• Prediction and assessment of corrosion</li> <li>• Fitness-for-service methodologies</li> <li>• Laboratory simulation and corrosion testing</li> </ul>	<ul style="list-style-type: none"> <li>• Other Technical, Laboratory, Sales Personnel, Engineer from other disciplines Management and administrative staff, who needs a working knowledge and understanding of metals and their applications</li> </ul>		
EV06	Intergranular corrosion of austenitic stainless steel	2	<ul style="list-style-type: none"> <li>• Fundamentals of intergranular corrosion</li> <li>• Causes and forms of corrosion.</li> <li>• Classification of stainless steels and microstructures.</li> <li>• ASTM A262 Practice A—Oxalic Acid Etch Test</li> <li>• ASTM A262 Practice B—Ferric Sulfate-Sulfuric Acid Test</li> <li>• ASTM A262 Practice C—Nitric Acid Test</li> <li>• ASTM A262 Practice E—Copper-Copper Sulfate-Sulfuric Acid Test</li> <li>• Practical demonstration of IGC Testing of stainless-steel material.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical Engineers of middle management level</li> <li>• QA/ QC engineers</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers/ Design engineers</li> <li>• Plant Engineers / Managers</li> <li>• Other Technical, Laboratory, Sales Personnel, Engineer from other disciplines</li> <li>• Management and administrative staff, who needs a working knowledge and understanding of metals and their applications</li> </ul>	Rs. 9,500	230 USD
EV07	<b>WPS-</b> Welding Procedure Specification <b>PQR-</b> Welding Procedure Qualification and <b>WPQ-</b> Welder Performance Qualification	2	<ul style="list-style-type: none"> <li>• Introduction to Steels, Alloy Steels and Stainless steels</li> <li>• Basic Welding Methods (SMAW, GTAW, GMAW and SAW)</li> <li>• Metallurgical aspect of welding</li> <li>• Understanding of ASME SEC IX requirements</li> <li>• Destructive and Non-destructive testing of Welded structures</li> <li>• Importance of WPS/PQR</li> <li>• Essential and non-essential variables</li> <li>• Case studies on WPS/PQR/WPQ</li> <li>• To develop a test coupon by SMAW in 1G position</li> <li>• To demonstrate destructive methods of the weld as</li> </ul>	<ul style="list-style-type: none"> <li>• Fresh welding engineers</li> <li>• Welding Supervisors</li> <li>• Welding inspector and welders</li> <li>• Persons involved in Fabrication</li> <li>• Inspection Engineers</li> <li>• QA/QC Engineers, Managers</li> </ul>	Rs. 9,500	230 USD

			per ASME codes			
EV08	Reformer tube: damage mechanisms, failure investigation, inspection and Remaining life assessment	2	<ul style="list-style-type: none"> <li>• Understating of damage mechanisms prevailing in the reformer tube</li> <li>• Gain a valuable practical understanding of principles of degradation that occurs in short term and long-term operation of reformers.</li> <li>• Design aspects leading to failures.</li> <li>• Welding issues related to reformer.</li> <li>• Metallurgical understanding of the reformer tubes.</li> <li>• Knowledge to increase the problem-solving attitude and take the first-hand judgment on the reformer tube failures.</li> <li>• Attitude to analyze the difference in metal behavior helps to decide better mitigation to the persistent tube failures;</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers of middle management level</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers</li> <li>• Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Reliability Engineers</li> <li>• Metallurgical / Materials Engineers</li> <li>• HAZOP Engineers / Managers</li> <li>• Other Technical, Laboratory, Sales Personnel, Engineers from allied disciplines, management and administrative staff.</li> </ul>	Rs. 15,000	300 USD
EV09	Boiler tube failures interface between Operation & Maintenance	2	<ul style="list-style-type: none"> <li>• Develop an Understanding for different damage mechanisms prevailing in boiler tube failures.</li> <li>• Gain a valuable working understanding of fundamental principles of degradation that occurs in short term and long-term operation of boilers.</li> <li>• Knowledge to increase the problem-solving attitude and take the first-hand judgment on the boiler tube failures.</li> <li>• Attitude to analyze the difference in metal behavior helps to decide better mitigation to the persistent boiler tube failure.</li> <li>• Recognize general procedures, techniques and precautions in failure analysis and how stress systems relate to fracture of ductile and brittle materials.</li> <li>• Achieve the knowledge required to conduct or supervise basic failure investigation and effectively communicate with metallurgists &amp; other experts on more complicated cases.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical Engineers from middle management</li> <li>• Maintenance / Inspection Engineers</li> <li>• Boiler inspectors / Process engineers</li> <li>• Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Reliability Engineer</li> <li>• Metallurgical / Materials Engineers</li> <li>• HAZOP Engineers / Managers</li> <li>• Other Technical, Laboratory, Sales Personnel, Engineer from other disciplines, management and administrative staff who need a working understanding of metals and their applications.</li> </ul>	Rs. 15,000	300 USD

EV10	Heat exchanger: inspection, condition assessment, fitness for service and failure investigation	2	<ul style="list-style-type: none"> <li>• Understate metallurgical aspects of heat exchanger, design and manufacturing considerations.</li> <li>• Gain valuable inputs on principles of degradation that occurs in short term and long-term operation of heat exchangers.</li> <li>• Design aspects related to failure.</li> <li>• Welding issues related to heat exchangers.</li> <li>• Metallurgical understanding of the heat exchanger tubes.</li> <li>• Exposure to increase the problem-solving attitude and take the first-hand judgment on the heat exchanger failures.</li> <li>• Understanding the difference in metal behavior to mitigate the persistent tube failures.</li> <li>• Understanding general procedures, techniques and precautions in failure analysis and how stress systems relate to fracture of ductile and brittle materials.</li> <li>• Latest NDT inspection techniques for tube assessment.</li> <li>• Achieve the knowledge required to conduct or supervise basic failure investigation and effectively communicate with metallurgists &amp; other experts on more complicated cases.</li> <li>• Preparing oneself to improve reliability of company operations, cost saving, increase profitability, and enhances safety.</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers of middle management level</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers</li> <li>• Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Reliability Engineers</li> <li>• Metallurgical / Materials Engineers</li> <li>• HAZOP Engineers / Managers</li> <li>• Other Technical, Laboratory, Sales Personnel, Engineers from allied disciplines, management and administrative staff who need a working understanding of metals and their applications.</li> </ul>	Rs. 15,000	300 USD
EV11	Damage mechanisms and life management of Gas Turbine components	2	<ul style="list-style-type: none"> <li>• Introduction to Gas Turbine</li> <li>• Basics of metallurgy for gas turbine materials</li> <li>• Damage mechanism in gas turbine components</li> <li>• Understanding and Managing GT Blades / Vanes Refurbishment</li> <li>• Coatings for gas turbine components and degradations</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers of middle management level</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers/ Design engineers</li> <li>• Plant Engineers / Managers</li> <li>• Surveyors / Loss assessors</li> <li>• Other Technical, Laboratory, Sales</li> </ul>	Rs. 15,000	300 USD

			<ul style="list-style-type: none"> <li>• Rejuvenation and Remaining life assessment of hot gas path components</li> <li>• NDT for Gas turbine components</li> <li>• Case studies on gas turbine components</li> </ul>	<p>Personnel, Engineer from allied disciplines</p> <ul style="list-style-type: none"> <li>• Management and administrative staff, who need a working knowledge and understanding of metals and their applications</li> </ul>		
EV12	Damage mechanisms, inspection and RLA of steam turbine components	2	<ul style="list-style-type: none"> <li>• Turbine alloys: Metallurgy of alloy steels with practice fundamentals, Metallurgical degradation with respect to creep fatigue and thermal.</li> <li>• Steam turbine design: Performance improvements and their effects on long term reliability, Risks of uprating turbine output and industry experience.</li> <li>• High Temperature Degradation/Failure Mechanisms: Delving into turbine components, high temperature material degradation &amp; component failure mechanisms contributed by: Creep, Fatigue, Thermal-Mechanical Fatigue, Creep-Fatigue Interaction, Embrittlement, Oxidation Damage, Hot Corrosion Damage, Over-temperature Exposure and condensation corrosion.</li> <li>• RCA Analysis: Performing effective RCA analysis - Identifying mechanism, causes and circumstances of primary failure of a component that have resulted in incident causing multiple component failure. Methodology to arrive at recommendations to avoid recurrence.</li> <li>• Turbine Casing Cracks: Classifying the failure mechanisms that contribute to cracks and explaining the areas of concern that should be evaluated during each outage.</li> <li>• NDT Health Assessment of Turbine rotor blade, guide vane &amp; Disc: NDT selection criteria and execution for condition assessment of turbine units.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical Engineers of middle management level</li> <li>• Maintenance / Inspection Engineers</li> <li>• Process engineers/ Design engineers</li> <li>• Plant Engineers / Managers</li> <li>• Other Technical, Laboratory, Sales Personnel, Engineer from other disciplines</li> <li>• Management and administrative staff, who needs a working knowledge and understanding of metals and their applications.</li> </ul>	Rs. 15,000	300 USD

			<ul style="list-style-type: none"> <li>Health assessment technologies: Uncovering new advanced cost-effective approaches to life extension of turbine units.</li> </ul>			
EV13	REAC- Reactor Effluent Air Cooler: Damage mechanisms, corrosion, FFS & Inspection	2	<ul style="list-style-type: none"> <li>Role of REAC in hydrocracking</li> <li>Materials for REAC tubes and header</li> <li>Design consideration for REAC</li> <li>Operational aspect and water injection for REAC</li> <li>Damage mechanism and mitigation</li> <li>Inspection during fabrication and in service</li> <li>Role of NACE material certification and testing</li> <li>Fitness for service assessment</li> <li>Current standards and its role</li> <li>Failure investigation of REAC components</li> <li>NDT methods, limitation for REAC application</li> <li>Improving the reliability based on fabrication details.</li> </ul>	<ul style="list-style-type: none"> <li>Refinery Engineers</li> <li>Process Engineers</li> <li>Inspection Engineers</li> <li>Design Engineers</li> <li>Technical Service Engineers</li> <li>Reliability Engineers</li> </ul>	Rs. 35,000	650 USD
EV14	T-91/ P-91 High Pressure Welding Technology	2	<ul style="list-style-type: none"> <li>To provide broad outline of concepts and basis of developments of T-91/P-91 steel and their properties.</li> <li>To provide basic Understanding and fundamental knowledge on metallurgy and welding technology of T-91.</li> <li>Exposure to various aspects of welding of T-91/P-91 steel including pre-heating and post weld heat treatment.</li> <li>Role of repair welding, NDT &amp; inspection with special reference to T-91/P-91 steel.</li> </ul>	<ul style="list-style-type: none"> <li>Welding Supervisors/ Fabricators</li> <li>Designers / Process Engineers</li> <li>Maintenance Engineers</li> <li>Managers/ Manufacturers</li> <li>Power Plant Engineers</li> <li>Petrochemicals &amp; Fertilizer Engineers</li> <li>QA/ QC/ Reliability Engineers</li> <li>Metallurgical / Materials Engineers</li> <li>HAZOP Engineers / Managers</li> </ul>	Rs. 15,000	300 USD
EV15	Low temperature service: Concepts on metal properties, manufacturing &	2	<ul style="list-style-type: none"> <li>Basic principles of Metallurgy</li> <li>Tensile Properties and Testing</li> <li>Hardness Test</li> <li>Bend Test</li> <li>Impact Toughness Test</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical Engineers of middle management level</li> <li>Maintenance / Inspection Engineers</li> <li>Process engineers/ Design engineers</li> <li>Plant Engineers / Managers</li> </ul>	Rs. 20,000	370 USD

	testing		<ul style="list-style-type: none"> <li>• Inspection Techniques for low temperature services</li> <li>• Significance of Flaws with respect to Brittle Fracture</li> <li>• Assessment of existing equipment for brittle fracture</li> <li>• Ductility to brittle transition</li> </ul>	<ul style="list-style-type: none"> <li>• Other Technical, Laboratory, Sales Personnel, Engineer from other disciplines</li> </ul>		
EV16	Damage mechanisms for static equipment for refineries /petrochemical/ fertilizer and process industries	3	<ul style="list-style-type: none"> <li>• Overview of Damage Mechanisms in static equipments</li> <li>• Commonly Observed Damage Mechanisms and Distinctive Damage Mechanisms</li> <li>• Fundamentals of Corrosion Knowledge</li> <li>• Basics of metallurgy and material science to facilitate understanding of damage mechanisms</li> <li>• Damage Mechanisms: Mechanisms affected material, Characteristics, Identification, Diagnoses and Remedial measures for approximately 70 damage mechanisms</li> <li>• Lab exposure to individual samples for specific damages</li> </ul>	<ul style="list-style-type: none"> <li>• Design engineers/ fabrication contractors</li> <li>• Material manufacturers</li> <li>• Project engineers</li> <li>• QA/QC engineers / managers</li> <li>• Project management consultants</li> <li>• Process engineers</li> <li>• Metallurgist/ mechanical engineers</li> <li>• Procurement &amp; material engineers</li> </ul>	Rs. 30,000	580 USD
EV17	Eddy Current Testing Awareness	1	<ul style="list-style-type: none"> <li>• Introduction to heat exchanger, types and damage mechanism in HE</li> <li>• Introduction to eddy current testing principles, theory including variables in eddy current testing and etc standard</li> <li>• Calibration with case study</li> <li>• Difference between eddy current, saturated probe eddy current and remote field testing</li> <li>• Practical demonstration on Olympus MS 5800 equipment</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Training Engineers</li> <li>• Fresh/Junior Inspection Engineers</li> <li>• Trainee Process Engineers</li> <li>• Trainee Plant Engineers/ Managers</li> <li>• QA/QC Engineers</li> <li>• Metallurgical/ Material Engineers</li> <li>• Other Technical, Laboratory, Engineers from other allied disciplines, management and administrative staff who need a working understanding of NDT and their application.</li> </ul>	Rs. 6,000	170 USD
EV18	Hydrogen damage for industries	2	<ul style="list-style-type: none"> <li>• Introduction to Hydrogen and Metal Interaction</li> <li>• Theory of Hydrogen Penetration</li> </ul>	<ul style="list-style-type: none"> <li>• Process Engineers</li> <li>• Inspection Engineers</li> </ul>	Rs. 20,000	400 USD

	(Asset integrity and Damage mechanism)		<ul style="list-style-type: none"> <li>• Sources of Hydrogen</li> <li>• Hydrogen Embrittlement</li> <li>• Hydrogen Blistering</li> <li>• Hydrogen Debonding</li> <li>• Hydrogen Induced Cracking</li> <li>• Hydrogen Flacking</li> <li>• Stress Oriented Hydrogen Cracking</li> <li>• High Temperature Hydrogen Attack</li> <li>• Inspection and Mitigation methods</li> </ul>	<ul style="list-style-type: none"> <li>• Design Engineers</li> <li>• Technical Service Engineers</li> <li>• Reliability Engineers</li> </ul>		
EV19	High temperature degradation of industrial component	2	<ul style="list-style-type: none"> <li>• Introduction to high temperature materials</li> <li>• Metallurgical factors and process control for high temperature materials</li> <li>• Damage Mechanisms for High Temperature Components</li> <li>• Case Studies and Failure Investigation</li> <li>• Inspection methods for early damage mechanisms to identify on-set of damage mechanisms</li> <li>• Laboratory visits and practical exposure</li> </ul>	<ul style="list-style-type: none"> <li>• Process Engineers</li> <li>• Inspection Engineers</li> <li>• Design Engineers</li> <li>• Technical Service Engineers</li> <li>• Reliability Engineers</li> </ul>	Rs. 20,000	400 USD
EV20	Defect analysis in engineering components by Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscopy (EDS)”	1	<ul style="list-style-type: none"> <li>• Principles of Scanning Electron Microscope</li> <li>• Sample Preparation technique for SEM</li> <li>• Principles of Energy Dispersive Spectroscopy</li> <li>• Demonstration of SEM with EDS</li> <li>• Working of SEM with Instrumentation</li> <li>• Working of SEM with Instrumentation</li> <li>• Hands-on training with attendee’s samples</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Control Engineers from Foundries and Forging</li> <li>• R&amp;D Engineers</li> <li>• Academic Trainers</li> </ul>	Rs. 6,000	170 USD
EV21	Distillation operation, control & troubleshooting	2	<ul style="list-style-type: none"> <li>• General Introduction</li> <li>• Distillation Equipment</li> <li>• Process Control</li> <li>• Commissioning</li> <li>• Troubleshooting</li> </ul>	<ul style="list-style-type: none"> <li>• 1st Line Operations personnel,</li> <li>• Operation Supervisors,</li> <li>• 1st Line Maintenance personnel,</li> <li>• Maintenance Supervisors,</li> <li>• Senior Plant Supervisors,</li> <li>• Operations Engineers</li> <li>• Process Support Engineers,</li> </ul>	Rs. 20,000	400 USD

				<ul style="list-style-type: none"> <li>• Design Engineers,</li> <li>• Cost Engineers</li> </ul>		
EV22	Selection of NDT for effective end result	1	<ul style="list-style-type: none"> <li>• Understanding will be developed for various non-destructive testing techniques like UT, MT, PT, RT etc. with practical demonstration</li> <li>• Gain a valuable working understanding of use of non-destructive technique with respect to the flaw anticipated.</li> <li>• Recognize the requirement of training and certification of NDT personnel and requirements of Nondestructive testing laboratory.</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Engineers of junior management level</li> <li>• Fresh /junior Inspection Engineers</li> <li>• Trainee process engineers</li> <li>• Trainee Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Metallurgical / Materials Engineers</li> </ul>	Rs. 4,000	150 USD
EV23	Ultrasonic Testing Level –II	6	<ul style="list-style-type: none"> <li>• History/ Theories</li> <li>• Equipment for ultrasonic applications</li> <li>• Calibration Techniques/ System Checks and Calibrations</li> <li>• Inspection Techniques</li> <li>• Advantages and Limitations</li> <li>• Practical Training on latest equipment</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Engineers of junior management level</li> <li>• Fresh /Junior Inspection Engineers</li> <li>• Trainee process engineers</li> <li>• Trainee Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Metallurgical / Materials Engineers</li> <li>• Other Technical, Laboratory, engineers from other allied disciplines, management and administrative staff who need a working understanding of NDT and their applications.</li> </ul>	Rs. 10,000	220 USD
EV24	Magnetic Particle Testing Level –II	4	<ul style="list-style-type: none"> <li>• History</li> <li>• Theories</li> <li>• Equipment for ultrasonic applications</li> <li>• Techniques</li> <li>• Introduction to American and British Codes</li> <li>• Discussion of Level I and II Questions in ASNT</li> <li>• General Mock test and Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Engineers of junior management level</li> <li>• Fresh /Junior Inspection Engineers</li> <li>• Trainee process engineers</li> <li>• Trainee Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> </ul>	Rs. 7,000	180 USD

			<ul style="list-style-type: none"> <li>• Advantages and Limitations.</li> <li>• Practical Training on latest equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Metallurgical / Materials Engineers</li> <li>• Other Technical, Laboratory, engineers from other allied disciplines, management and administrative staff who need a working understanding of NDT and their applications.</li> </ul>		
EV25	Dye Penetration Testing Level -II	4	<ul style="list-style-type: none"> <li>• History</li> <li>• Theories</li> <li>• Penetrant Equipment &amp; Materials</li> <li>• Penetrant procedures</li> <li>• Techniques &amp; Variables</li> <li>• Evaluation &amp; Disposition</li> <li>• Penetrant testing applications</li> <li>• Quality control considerations</li> <li>• Advantages and Limitations.</li> <li>• Practical Training.</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Engineers of junior management level</li> <li>• Fresh /Junior Inspection Engineers</li> <li>• Trainee process engineers</li> <li>• Trainee Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Metallurgical / Materials Engineers</li> <li>• Other Technical, Laboratory, engineers from other allied disciplines, management and administrative staff who need a working understanding of NDT and their applications.</li> </ul>	Rs. 7,000	180 USD
EV26	PAUT -Introduction, calibration & interpretation.		<ul style="list-style-type: none"> <li>• Introduction of conventional ultrasonic testing and Process discontinuities.</li> <li>• Introduction to PAUT and TOFD, difference between conventional UT and Advance UT, Advantages and drawbacks.</li> <li>• Introduction of Omni scan MX2, PAUT Probes and wedges, TOFD probes and wedges.</li> <li>• Introduction to Omni PC.</li> <li>• Significance of scan plan preparation for PAUT and TOFD.</li> </ul>	<ul style="list-style-type: none"> <li>• NDT Technicians</li> <li>• Engineers of junior management level</li> <li>• Fresh /Junior Inspection Engineers</li> <li>• Trainee process engineers</li> <li>• Trainee Plant Engineers / Managers</li> <li>• QA / QC Engineers</li> <li>• Metallurgical / Materials Engineers</li> <li>• Other Technical, Laboratory, engineers from other allied</li> </ul>	Rs. 10,000	220 USD

			<ul style="list-style-type: none"> <li>• Introduction of Omni scan MX2.</li> <li>• Demonstration of Calibration steps. Wedge delay/ Sensitivity/ TCG/ Encoder</li> <li>• Demonstration on known defective sample/ Interpretation.</li> </ul>	disciplines, management and administrative staff who need a working understanding of NDT and their applications.		
EV27	Cost of Quality	1	<ul style="list-style-type: none"> <li>• Quality Management</li> <li>• Cost of Quality</li> <li>• Quality Gurus and Their Strategies</li> <li>• The Seven Wastes</li> </ul>	<ul style="list-style-type: none"> <li>• Middle Level Executives</li> <li>• All professionals with a passion of being associated with the evolution of best-in- class brand of their respective organizations</li> </ul>	Rs. 6,000	170 USD
EV28	Pressure Vessel Mechanical design as per ASME PV Codes	4	<ul style="list-style-type: none"> <li>• Types of Process Equipment and Vessels</li> <li>• Selection of Engineering Materials of Vessels and Components</li> <li>• Design of Cylindrical Shell under Internal Pressure</li> <li>• Design of Spherical Shell, Hemispherical Heads, Ellipsoidal Heads, Tori-spherical Heads</li> <li>• External Pressure Design for Cylinders, Heads, Stiffening Rings</li> <li>• Bolted Flanges</li> <li>• Flange Bolt Sizing, and Bolt Loadings</li> <li>• Orientation to software design applications</li> <li>• Design of Openings (Nozzles) in pressure vessels, Reinforced Opening,</li> <li>• Large opening design as per Appendix I-7</li> <li>• Local Load Stress Analysis (WRC107)</li> <li>• Design of Supports (Skirts, Saddles, Leg, Brackets)</li> <li>• Wind Load Analysis</li> <li>• Seismic Load considerations and analysis</li> <li>• Orientation to software design applications</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced Professionals who wish to brush up their knowledge and stay abreast with the latest in the industry. This would provide you an edge amongst all.</li> <li>• Engineers and Technologists and fresher from varied technical background interested in learning more about Pressure Vessel design and analysis disciplines</li> </ul>	Rs. 30,000	550 USD
EV29	Failure Prevention, Repairs and Life enhancement of piping, Vessels and	2	<p><b>Day 1:</b></p> <ul style="list-style-type: none"> <li>• Overview of Oil &amp; Gas and Process Industry- Process Equipment, Piping and Pipeline Systems</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced Professionals who wish to brush up their knowledge and stay abreast with the latest in the industry.</li> </ul>	20,000	400 USD

	Tanks		<ul style="list-style-type: none"> <li>• Process Equipment and Piping Systems in Oil and Gas Sector, Petrochemical and Chemical Plants</li> <li>• Selection of Engineering Materials of Process Equipment &amp; Piping System</li> <li>• Failure Modes &amp; Damages of Process Equipment and Systems</li> <li>• Risk based Inspection Programs</li> <li>• Inspection Practices</li> <li>• Tips to Minimize Corrosion and Failures</li> <li>• Welding Inspections and Quality Assurance</li> <li>• Welding Quality Assurance ASME Sec IX</li> </ul> <p><b>Day 2:</b></p> <ul style="list-style-type: none"> <li>• Proper Inspections, Repairs and Maintenance:</li> <li>• Quality Control, Inspection of Process Equipment, Maintenance Guidelines</li> <li>• Welding Defects Inspection and NDE</li> <li>• Piping Inspection &amp; Testing Practices, Maintenance Guidelines</li> <li>• Piping Inspection Frequency and Extent of Inspection</li> <li>• Inspection while Equipment and Piping is under Shutdown</li> <li>• Repairs of damaged Vessels in Service, Maintenance Guidelines of Equipment</li> <li>• In-service Inspection for Safe Remaining Life</li> <li>• Tank Inspection for Suitability for Service</li> <li>• Tank Inspection Repair &amp; Alteration API 653 Sec 9</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers and Technologists and fresher from varied technical background interested in learning more about Welding technology, Quality Assurance, Inspections and Evaluation of Weld Defects.</li> </ul>		
EV30	Risk Based Inspection (RBI) in	3	<p><b>Day 1:</b></p> <ul style="list-style-type: none"> <li>• Introduction and Application of Risk based</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced Professionals who wish to brush up their knowledge and</li> </ul>	Rs. 20,000	400 USD

	<p>Process, Petrochemical, Oil and Gas Plants</p>		<p>Inspection (RBI) to Process plant Safety</p> <ul style="list-style-type: none"> <li>• Risk Analysis including Hazards Analysis</li> <li>• Qualitative and Quantitative Approach to RBI</li> <li>• Consequence Analysis (Fluid Properties, amount available for release, estimate of release rate, post leak response and estimate of potentially hazard area)</li> </ul> <p><b>Day 2:</b></p> <ul style="list-style-type: none"> <li>• Likelihood Analysis (Failure Frequencies, Equipment modification factor, Plant Management System, Auditing)</li> <li>• Development of Inspection Programs to Reduce Risk</li> <li>• Plant Database Structure</li> </ul> <p><b>Day 3:</b></p> <ul style="list-style-type: none"> <li>• Explanation of Base Resource Documents and Technical Modules (includes thinning, stress corrosion cracking, high temperature hydrogen attack, furnace tubes, mechanical fatigue, brittle fracture, equipment lining, external damage)</li> <li>• Role of Proper Selection of Materials of Construction of Equipment &amp; Machines</li> <li>• Discussions on Plant Case Histories</li> </ul>	<p>stay abreast with the latest in the industry. This would provide you an edge amongst all.</p> <ul style="list-style-type: none"> <li>• Engineers and Technologists and fresher from varied technical background interested in learning more about Risk Based Inspection (RBI).</li> </ul>		
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EV31	Storage Tank Design, In-Service Inspection, Maintenance and Repairs for Chemicals, Oil and Petroleum Terminals	3	<p><b>Day 1:</b></p> <ul style="list-style-type: none"> <li>• Design of Welded Steel Tanks for Oil Storage (API 650)</li> <li>• Design of Welded Steel Tanks for Oil Storage (API 620)</li> <li>• Orientation to the tank design software/ ETank</li> <li>• Storage tank design as per IS:803 and API:650, Practical Exercise</li> </ul> <p><b>Day 2:</b></p> <ul style="list-style-type: none"> <li>• Lining of Aboveground Petroleum Storage Tank Bottoms (API RP 652)</li> <li>• Cathodic Protection of Aboveground Petroleum Storage Tanks (API RP 651)</li> <li>• Welding Quality Assurance, ASME PV Code Welding, Sec IX</li> <li>• Damages and Deterioration of Tanks in operation at tank farms</li> </ul> <p><b>Day 3:</b></p> <ul style="list-style-type: none"> <li>• Tank Inspection, Sec 6 (API 653)</li> <li>• Examination and Testing, Sec 12 (API 653)</li> <li>• Understanding Tank Roof Assembly (Fixed/ Floating), Supported and Domed Roof</li> </ul> <p>Maintenance practices, planning and Repairs for extended service</p>	<ul style="list-style-type: none"> <li>• Experienced Professionals who wish to brush up their knowledge and stay abreast with the latest in the industry.</li> <li>• Engineers and Technologists and fresher from varied technical background interested in learning more about storage tank technology discipline.</li> </ul>	Rs. 30,000	550 USD
EV32	Piping Systems and Pipeline Integrity in	3	<ul style="list-style-type: none"> <li>• Piping &amp; Pipeline Terminology, Components</li> <li>• Piping &amp; pipeline design standards, ASME B31.1,</li> </ul>	<ul style="list-style-type: none"> <li>• Experienced Professionals who wish to brush up their knowledge and stay</li> </ul>	Rs. 30,000	550 USD

	process industry		<p>B31.3, B31.4, B31.8</p> <ul style="list-style-type: none"> <li>• Pipeline Design, Construction &amp; Maintenance</li> <li>• Materials, Welding Processes</li> <li>• Weld Discontinuities</li> <li>• Corrosion principles, types, Inspection</li> <li>• Discussion on API 570 (Piping &amp; pipeline Inspection, repairs, alteration and re-rating)</li> <li>• Inspection Interval</li> <li>• Corrosion Rate evaluation</li> <li>• Minimum Safe Thickness evaluation</li> <li>• API 579 (Fitness-for-Service) Analysis</li> <li>• Pipe Line Integrity Management and Strategies</li> <li>• Main factors affecting pipeline integrity</li> <li>• Pressure and Leak Testing, Hydro test</li> <li>• External and internal Protection, Cathodic Protection</li> </ul>	<p>abreast with the latest in the industry. This would provide you an edge amongst all.</p> <ul style="list-style-type: none"> <li>• Engineers and Technologists and fresher from varied technical background interested in learning more about Piping Systems and Pipeline Integrity.</li> </ul>		
EV33	Fitness for Service of Equipment and Piping per API 579 and ASME FFS1	3	<p><b>Day 1</b></p> <ul style="list-style-type: none"> <li>• Session 1: Understanding of Process Plant System under Analysis</li> <li>• Session 2: General Flaw and Damage Mechanism</li> <li>• Session 3: Assessment of Equipment and Piping for Brittle Fracture</li> <li>• Session 4: Assessment of General Metal Loss</li> </ul> <p><b>Day 2</b></p> <ul style="list-style-type: none"> <li>• Session 1: Assessment of Local Metal Loss</li> <li>• Session 2: Assessment of Pitting Corrosion</li> <li>• Session 3: Assessment of Blisters and Laminations</li> <li>• Session 4: Assessment of Weld Misalignment and Shell Distortions</li> </ul>	<ul style="list-style-type: none"> <li>• Equipment Design Engineers / Managers, Safety Engineers</li> <li>• Inspection and Quality Control Specialists, Technical Supervisory Personnel responsible for operating plants, Operation Engineers, Maintenance engineers</li> </ul>	Rs. 45,000	800 USD

			<p><b>Day 3:</b></p> <ul style="list-style-type: none"> <li>• Session 1: Assessment of Crack-Like Flaws (Part 1)</li> <li>• Session 2: Assessment of Crack-Like Flaws (Part 2)</li> <li>• Session 3: Assessment of Fire Damage</li> <li>• Session 4: Thickness, MAWP, Stress Evaluation for FFS Assessment</li> </ul>			
EV34	Physical & Chemical testing of metals	1	<ul style="list-style-type: none"> <li>• Introduction to destructive &amp; non-destructive test for chemical.</li> <li>• Introduction to material properties</li> <li>• National International standards for mechanical &amp; chemical tests.</li> <li>• Types of Chemical Tests &amp; Mechanical Tests</li> <li>• Introduction of Tensile test.</li> <li>• Types of Hardness test</li> <li>• Flaring &amp; flattening test for tubes &amp; pipes</li> <li>• Introduction of Impact test</li> <li>• Calibration requirements for material testing.</li> <li>• Specific requirements of ISO/IEC-17025 for</li> <li>• Chemical and mechanical</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers of middle management level</li> <li>• Maintenance / Inspection Engineers</li> <li>• QA / QC Engineers</li> <li>• Metallurgical / Materials Engineers</li> </ul>	Rs. 6,000	150 USD
EV35	Evolving approach to site operation and maintenance on substation equipment & advanced monitoring system	2	<ul style="list-style-type: none"> <li>• To know the function and working of switch yard equipment</li> <li>• Operation and maintenance of switch yard equipment</li> <li>• Evolving Maintenance procedure</li> <li>• Need for advanced monitoring system and its effective use</li> <li>• Prevent major failure</li> </ul>	<ul style="list-style-type: none"> <li>• Electrical engineers.</li> <li>• Inspection engineers, storage and third-party inspectors.</li> <li>• Technicians, operation, commissioning, maintenance care people who are involved or make a fresh start up -in day to day installation, operation and maintenance work of 66KV electrical switch yard equipment.</li> </ul>	Rs. 9,500	280 USD

EV36	Corrosion under Insulation	2	<ul style="list-style-type: none"> <li>• History and introduction to Corrosion Under Insulation (CUI)</li> <li>• How does CUI occur</li> <li>• How to detect CUI – Methods</li> <li>• How to detect CUI – Strategies</li> <li>• How to combat CUI (Operating Plant)</li> <li>• How to combat CUI (New Plant Painting)</li> <li>• How to combat CUI (New Plant Insulation)</li> <li>• Case study</li> </ul>	<ul style="list-style-type: none"> <li>• Inspection/Corrosion Engineers</li> <li>• Maintenance Engineers</li> <li>• Operations Engineers</li> <li>• Design Engineers</li> <li>• Project Engineers</li> <li>• Construction Engineers</li> <li>• Reliability Engineers</li> </ul>	Rs. 12,000	250 USD