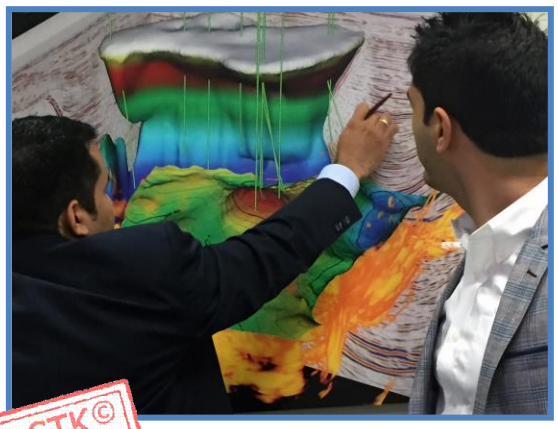
# COURSE OVERVIEW DE0488
# Fundamental Pressure-Volume-Temperature (PVT)

**Course Title**
Fundamental Pressure-Volume Temperature (PVT)

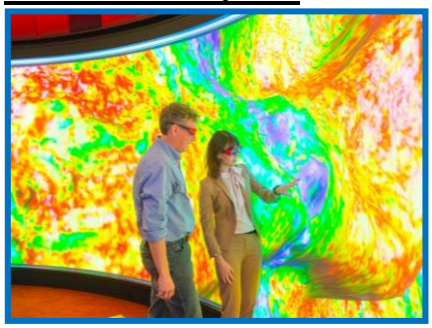



**Course Date/Venue**
Session 1: April 28-May 02, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 26-30, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

**Course Reference**
DE0488

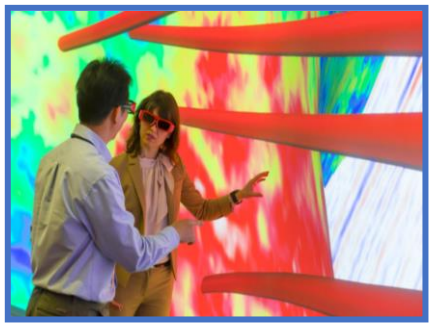

**Course Duration**
Five days/3.0 CEUs/30 PDHs

**Course Description**



***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***

Accurate information on fluid properties and phase behavior is an essential element in proper management of petroleum reservoirs. Reservoirs were often produced by depletion in which the reservoir pressure was the main variable that controlled the fluid properties. Thus, understanding phase behavior is an important step for modeling EOR and be prepared for the coming phase of development of the oil fields. Hence, experimental methods and predictive correlations with pressure as the variable were developed and successfully used for many years in industry.



The development of enhanced oil recovery techniques and growing interest in gas condensate and volatile oil reservoirs, involving wide compositional variations and complex fluid behavior during production, necessitated the use of more advanced compositional methods and new experimental procedures. The availability of high computational capabilities greatly assisted the rapid technology development in this area and its wide use in industry.

This course is designed to provide participants with a detailed and up-to-date overview of Fluid Properties and Phase Behavior (PVT). It covers the methods for obtaining values of reservoir fluid properties from laboratory data and correlations. Chemical properties of hydrocarbons, conventional laboratory PVT (Pressure-Volume-Temperature) tests and quality control will also be covered. Learn about phase diagrams, mixing rules, EOS, EOS tuning, and fluid properties. Examples and problems to solve will be included.

Further, the course will also discuss the fluid properties and their importance in reservoir engineering; the basic concepts of phase behavior and PVT (Pressure-Volume-Temperature) analysis; the chemical properties of hydrocarbons; the types of conventional laboratory PVT tests; the phase diagrams and their components and mixing rules and their application in phase behavior studies; the basic concepts of equations of state (EOS) and their role in phase behavior prediction; the laboratory equipment used in PVT analysis; the standard procedures for conducting PVT tests; the importance of quality control in PVT analysis; and the methods for validating PVT reports.

During this interactive course, participants will learn the application of black oil properties and phase behavior calculations; the PVT analysis techniques, interpreting laboratory PVT results; the application of AOP/SARA analysis; the miscibility and reservoir fluids and PVT fluid properties reporting; the development of EOS models and EOS tuning techniques; the data requirements for EOS development and advanced phase behavior calculations; the integration of PVT data with reservoir simulation; the application of PVT analysis in reservoir management; evaluating development of EOS Models; and the software tools used in PVT data analysis.

## Course Objectives

Upon the successful completion of this course, participants will be able to:-

- Apply and gain an in-depth knowledge on fluid properties and phase behavior (PVT)
- Have ability to describe the fluid phase behavior
- Have ability to perform quality control on PVT analysis (basic validation of PVT reports and application of black oil properties to calculate/estimate reservoir fluid characteristics)
- Interpret laboratory PVT analysis results and report black - oil properties
- Gain ability to understand AOP/SARA analysis
- Understand PVT analysis, phase behavior calculations, miscibility and reservoir fluids
- Understand PVT fluid properties, reporting and evaluating
- Develop equation of state (EOS) models
- Discuss EOS - tuning and data requirements

- Discuss the fluid properties and their importance in reservoir engineering as well as the basic concepts of phase behavior and PVT (Pressure-Volume-Temperature) analysis
- Understand the chemical properties of hydrocarbons and identify the types of conventional laboratory PVT tests
- Understand phase diagrams and their components and explain mixing rules and their application in phase behavior studies
- Explain the basic concepts of equations of state (EOS) and their role in phase behavior prediction
- Recognize laboratory equipment used in PVT analysis and review standard procedures for conducting PVT tests
- Explain the importance of quality control in PVT analysis and apply proper methods for validating PVT reports
- Calculate and estimate reservoir fluid characteristics using black oil properties
- Apply effective methods for calculating phase behavior and understand compositional analysis in PVT studies using advanced techniques
- Interpret laboratory PVT results and carryout AOP/SARA analysis in reservoir fluid characterization
- Understand the concepts of miscibility and reservoir fluids
- List the components of a comprehensive PVT report and develop EOS models
- Carryout EOS tuning techniques and identify the data required for developing accurate EOS models
- Apply advanced methods for phase behavior calculations using EOS
- Integrate PVT data with reservoir simulation and understand the role of PVT analysis in reservoir management and optimization
- Evaluate the effectiveness of developed EOS models and discuss software tools used in PVT data analysis
- Carryout systematic techniques for advanced reporting of PVT data

## Exclusive Smart Training Kit - H-STK®


*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

## Who Should Attend

This course provides an overview of all significant aspects and considerations of fluid properties and phase behavior (PVT) for petroleum and reservoir engineers dealing with phase behavior miscible displacement and reservoir simulation.

## Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

## Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

**Course Instructor(s)**

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

**Dr. Hesham Abdou**, PhD, MSc, BSc, is a **Senior Drilling & Petroleum Engineer** with over **35 years** of integrated industrial and academic experience as a **University Professor**. His specialization widely covers in the areas of **Drilling & Completion** Technology, **Directional Drilling**, **Horizontal & Sidetracking**, **Drilling Operation** Management, **Drilling & Production** Equipment, **ERD Drilling & Stuck Pipe** Prevention, **Natural & Artificial Flow Well Completion**, **Well Testing** Procedures & Evaluation, **Well** Performance, **Coiled Tubing** Technology, **Oil Recovery Methods** Enhancement**, Well Integrity** Management, **Well Casing & Cementing**, **Acid Gas** Removal, **Heavy Oil Production** & Treatment Techniques, **Crude Oil Testing & Water Analysis**, **Crude Oil & Water** Sampling Procedures, **Equipment Handling** Procedures, **Crude & Vacuum Process** Technology, **Gas Conditioning & Processing**, **Cooling Towers** Operation & Troubleshooting, **Sucker Rod Pumping**, **ESP & Gas Lift**, **PCP & Jet Pump**, **Pigging** Operations, Electric Submersible Pumps (**ESP**), Progressive Cavity Pumps (**PCP**), **Water Flooding**, **Water Lift Pumps** Troubleshooting, **Water System Design** & Installation, **Water Networks Design** Procedures, **Water Pumping** Process, **Pipelines**, **Pumps**, **Turbines**, **Heat Exchangers**, **Separators**, **Heaters**, **Compressors**, **Storage Tanks**, **Valves** Selection, **Compressors**, **Tank & Tank Farms** Operations & Performance, **Oil & Gas Transportation**, **Oil & Gas Production** Strategies, **Artificial Lift** Methods, **Piping & Pumping** Operations, Oil & Water Source Wells Restoration, **Pump** Performance Monitoring, **Rotor Bearing** Modelling, **Hydraulic** Repairs & Cylinders, **Root Cause Analysis**, **Vibration & Condition** Monitoring, **Piping Stress** Analysis, **Amine Gas Sweetening & Sulfur Recovery**, Heat & Mass Transfer and Fluid Mechanics.

During his career life, Dr. Hesham held significant positions and dedication as the **General Manager**, **Petroleum Engineering Assistant General Manager**, **Workover Assistant General Manager**, **Workover Department Manager**, **Artificial Section Head**, **Oil & Gas Production Engineer** and **Senior Instructor/Lecturer** from various companies and universities such as the Cairo University, Helwan University, British University in Egypt, Banha University and Agiba Petroleum Company.

Dr. Hesham has a **PhD** and **Master** degree in **Mechanical Power Engineering** and a **Bachelor** degree in **Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Peer Reviewer**. Dr. Hesham is a member of Egyptian Engineering Syndicate and the Society of Petroleum Engineering. Moreover, he has published technical papers and journals and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

## Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

## Course Fee

**US$ 8,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

## Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

## Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

***Day 1***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Overview of Fluid Properties & Phase Behavior***<br>*Introduction to Fluid Properties and their Importance in Reservoir Engineering • Basic Concepts of Phase Behavior and PVT (Pressure-Volume-Temperature) Analysis* |
| *0930 – 0945* | *Break* |
| *0945 – 1040* | ***Chemical Properties of Hydrocarbons***<br>*Understanding the Chemical Properties of Hydrocarbons • Classification of Hydrocarbons and their Characteristics* |
| *1040 -1135* | ***Conventional Laboratory PVT Tests***<br>*Introduction to PVT Tests and their Significance • Types of Conventional Laboratory PVT Tests* |
| *1135 - 1230* | ***Phase Diagrams***<br>*Understanding Phase Diagrams and their Components • Construction and Interpretation of Phase Diagrams* |

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| 1230 – 1245 | Break |
| 1245 -1335 | ***Mixing Rules & Applications***<br>Explanation of Mixing Rules and their Application in Phase Behavior Studies • Practical Examples of Mixing Rules in Fluid Analysis |
| 1335 – 1420 | ***Introduction to Equations of State (EOS)***<br>Basic Concepts of EOS and their Role in Phase Behavior Prediction • Commonly Used EOS in Reservoir Engineering |
| 1420 – 1430 | ***Recap***<br>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow |
| 1430 | Lunch & End of Day One |

***Day 2***

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| 0730 – 0830 | ***PVT Laboratory Equipment & Procedures***<br>Overview of Laboratory Equipment Used in PVT Analysis • Standard Procedures for Conducting PVT Tests |
| 0830 - 0930 | ***Quality Control in PVT Analysis***<br>Importance of Quality Control in PVT Analysis • Techniques for Ensuring Accuracy and Reliability of PVT Data |
| 0930 - 0945 | Break |
| 0945 – 1030 | ***Basic Validation of PVT Reports***<br>Methods for Validating PVT Reports • Key Parameters to Check in PVT Reports |
| 1030 - 1230 | ***Application of Black Oil Properties***<br>Understanding Black Oil Properties and their Applications • Calculating and Estimating Reservoir Fluid Characteristics Using Black Oil Properties |
| 1230 – 1245 | Break |
| 1245 – 1335 | ***PVT Analysis Examples***<br>Practical Examples of PVT Analysis • Exercises for Interpreting PVT Data |
| 1335 – 1420 | ***Phase Behavior Calculations***<br>Methods for Calculating Phase Behavior • Use of Software Tools for Phase Behavior Calculations |
| 1420 – 1430 | ***Recap***<br>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow |
| 1430 | Lunch & End of Day Two |

***Day 3***

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| 0730 – 0830 | ***Detailed PVT Analysis Techniques***<br>Advanced Techniques in PVT Analysis • Understanding Compositional Analysis in PVT Studies |
| 0830 - 0930 | ***Interpreting Laboratory PVT Results***<br>Techniques for Interpreting Laboratory PVT Results • Practical Examples and Case Studies |
| 0930 - 0945 | Break |
| 0945 – 1030 | ***Application of AOP/SARA Analysis***<br>Understanding AOP (Asphaltene Onset Pressure) and SARA (Saturates, Aromatics, Resins, and Asphaltenes) Analysis • Applications of AOP/SARA in Reservoir Fluid Characterization |

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| 1030 - 1230 | ***Miscibility & Reservoir Fluids***<br>*Concepts of Miscibility in Reservoir Fluids • Factors Affecting Miscibility and Its Importance in Reservoir Engineering* |
| 1230 – 1245 | *Break* |
| 1245 – 1335 | ***PVT Fluid Properties Reporting***<br>*Best practices for Reporting PVT Fluid Properties • Components of a Comprehensive PVT Report* |
| 1335 – 1420 | ***Examples & Problem Solving***<br>*Solving Practical Problems Related to PVT Analysis • Group Exercises and Discussions* |
| 1420 – 1430 | ***Recap***<br>*Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow* |
| 1430 | *Lunch & End of Day Three* |

***Day 4***

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| 0730 – 0830 | ***Development of EOS Models***<br>*Steps Involved in Developing EOS Models • Importance of EOS in Predicting Phase Behavior* |
| 0830 - 0930 | ***EOS Tuning Techniques***<br>*Techniques for Tuning EOS Models • Practical Examples of EOS Tuning* |
| 0930 - 0945 | *Break* |
| 0945 – 1030 | ***Data Requirements for EOS Development***<br>*Data Required for Developing Accurate EOS Models • Sources and Quality Control of Data* |
| 1030 - 1230 | ***Advanced Phase Behavior Calculations***<br>*Advanced Methods for Phase Behavior Calculations Using EOS • Case Studies and Practical Applications* |
| 1230 – 1245 | *Break* |
| 1245 – 1335 | ***Integration of PVT Data with Reservoir Simulation***<br>*Importance of Integrating PVT Data with Reservoir Simulation • Techniques for Effective Integration* |
| 1335 – 1420 | ***Exercises***<br>*Practical Exercises on EOS Development and Tuning • Interpretation and Validation of Results* |
| 1420 – 1430 | ***Recap***<br>*Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow* |
| 1430 | *Lunch & End of Day Four* |

***Day 5***

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| 0730 – 0830 | ***Application of PVT Analysis in Reservoir Management***<br>*Role of PVT Analysis in Reservoir Management and Optimization • Case Studies and Examples* |
| 0830 - 0930 | ***Evaluating Development of EOS Models***<br>*Evaluating the Effectiveness of Developed EOS Models • Continuous Improvement of EOS Models* |

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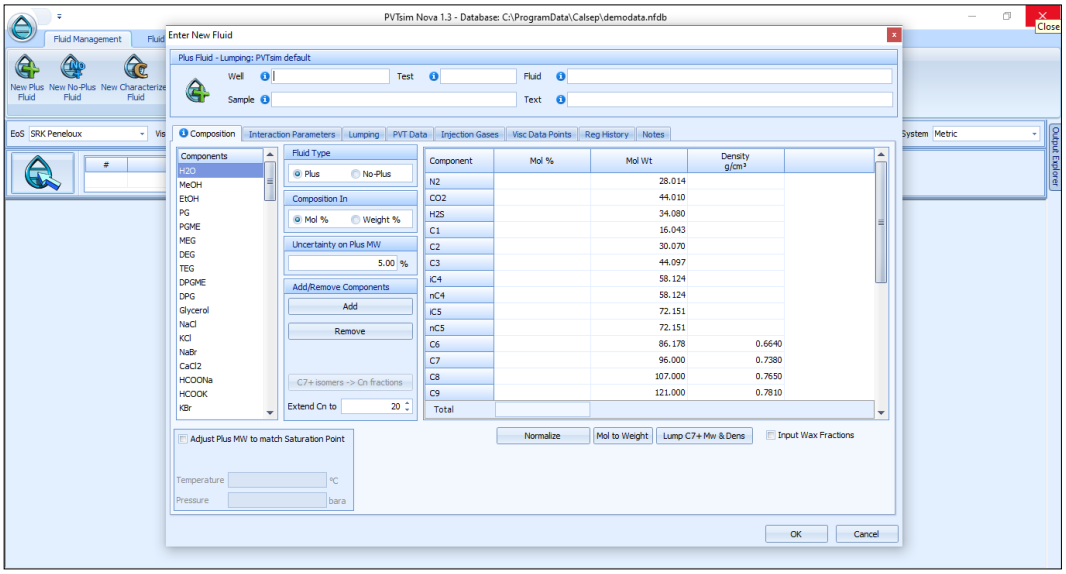
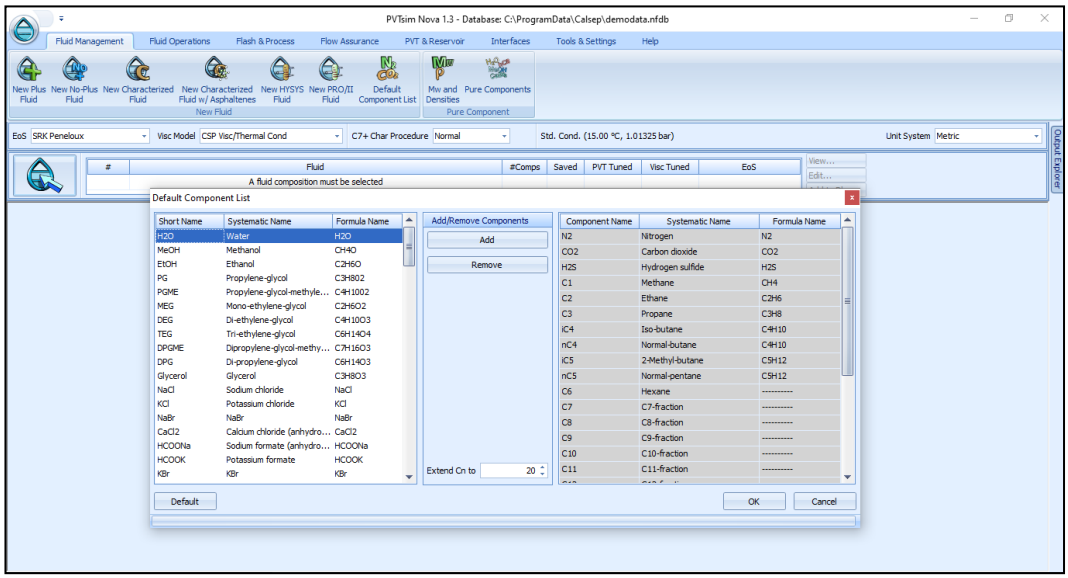
| *0930 - 0945* | *Break* |
| *0945 – 1030* | ***PVT Data Analysis Software***<br>*Overview of Software Tools Used in PVT Data Analysis • Demonstration of popular PVT analysis software* |
| *1030 - 1230* | ***Advanced PVT Reporting Techniques***<br>*Techniques for Advanced Reporting of PVT Data*<br>*Ensuring Clarity and Comprehensiveness in Reports* |
| *1230 – 1245* | *Break* |
| *1245 - 1345* | ***Final Project & Presentation***<br>*Group Project on a Comprehensive PVT Analysis Case Study*<br>*Presentation and Discussion of Project Findings* |
| *1345 – 1400* | ***Course Conclusion***<br>*Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course* |
| *1400 – 1415* | ***POST-TEST*** |
| *1415 – 1430* | ***Presentation of Certificates*** |
| *1430* | *Lunch & End of Course* |

## Simulator (Hands-on Practical Sessions)

Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator "PVTsim Software".




**PVTsim Software**

## Course Coordinator

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