SCHEDULE :

Eligibility : Degree/ Diploma in Chemical / Petrochemical Engg.

SYLLABUS –

Basic subject preparation required before joining this Training Program.

- Heat Transfer
- Mass Transfer
- Fluid Flow Operation
- Engineering Drawing
- Mathematics
- Metallurgy
- Line Sizing
- Pressure Drop Calculation

1. Module I – INTRODUCTION

1.1. Introduction to Upstream, Midstream and Downstream Industry like oil & Gas, Petrochemical, Chemical, Fertilizer, Steel, Power, Pharmaceutical, Food, Water etc…including their function and role of Chemical Process Engineer.

1.2. Introduction to various phases in the project life cycle and role of chemical process engineer in the various phase of project to enhance skills for working.

1.3. Introduction to process engineering department deliverables including use by various engineering department and interface requirement and impact during various stages in project execution.

1.4. Introduction to difference between process equipment and utility equipment

1.5. Introduction to various Static equipment used in process industry including their application like storage, heat exchange, mixing, accumulator, distillation, Separators etc…

1.6. Introduction to Rotating equipment like Pumps, Compressor, Turbine, Blowers etc.

1.7. Introduction to package equipment used in process industry including their applications like Boiler, Chiller, Cooling Towers, Nitrogen Separation Plant etc.

1.8. Introduction of various Valve, Special Parts and Instruments including instrument interlocks for various processes.

2. Module 2 : Introduction to Basic Engineering Package and FEED (Front End Engineering Design) Package

2.1. Establishing a process design basis, developing process options and optimization of selected design.

3. Module 3 : PRE FEED Deliverables of Project including Conceptual and Preliminary Process Design

Pre FEED or Conceptual and Preliminary process design is an important part of Process Engineers of identifying multiple technical options for given process goal based on environmental safety and operating/maintenance economic evaluation including future expansion philosophy which mainly includes preliminary process flow diagrams, mass & energy balances, a list of major equipment, and a rough order of magnitude cost estimate along with identifying potential risks associated with the design. Some of the phases in the Conceptual and Preliminary Process Design are as follows

3.1. **Project Phase 1 – Identification Phase for Preliminary Process Design** : In this phase various options for given process is identified and screening is done based on process requirement, Safe operating requirement like fully Automatic, Semi-Automatic, Manual and Batch Type, safe maintenance requirement, climatic conditions and finally economy. During Identification phase it is mandatory to focus on revenue, expenses reduction, strategic growth, improving reliability and efficiency, identifying key risk and uncertainties, and finally to maintain consistency working on searching multiple options to reach to process goal, identifying major equipment required for set process, preparation of Block Flow Diagram (BFD) and finalising approximate cost of project which includes mainly cost of equipment.

3.2. **Project Phase 2 – Selection and Alternatives evaluation for Preliminary Process Design** :

Evaluation of identified process alternatives : In this phase main responsibility is to select one process from various identified for achieving given process goal. In this phase case studies are done and assessed based on very specific process requirement, safe operating and maintenance conditions, Risk and uncertainties, economically and

environmentally viable or not etc. also comparison is done between batch process versus continuous process, fully automatic versus semi-automatic versus manual and finally most promising process is adopted for selection of equipment including preliminary process design.

Preliminary Process Design : After final evaluation work start on only one process application and further development is started for generating data as a input to further detailed engineering. Some of the deliverables generated at this stage are as follows

- **Design Basis** for Process at preliminary stage including scope, purpose, requirement of various inputs, user requirement and stage wise methodology of plant design and selection.
- **Summary of evaluation** of various process alternatives as a record for further verification of finalised process
- **Heat and Material Balance** Data including simulation of process at preliminary stage for deciding and sizing of equipment
- **Preliminary Process Flow Diagrams** (PFDs) including understanding what exactly PFD is, why it is required, who are the users, what is purpose, what type of inputs are required, how to use the inputs for preparation of PFD, how to check prepared PFD and method of maintaining IDC (Inter Department Checking) records.
- **Equipment List** including their service conditions based on experience and as per available vendor data which is used by Equipment department for finalising vendors and further detailed engineering. List of equipment is also used by piping department for development of preliminary plot plan and basic equipment layouts. Equipment list also is used by other engineering disciplines like Electrical, Instrumentation and Civil/Structural including some vendors.
- **Approximate Capex and Opex** based on preliminary process based on equipment list.
- **Raw Material Requirement** based on preliminary process data
- **Utilities requirement** based on preliminary process data for finalising vendors
- **Risk summery** at various stages like plant running condition, maintenance etc…

This completes PRE-FEED activities

4. Module 4 : FEED or Basic Engineering Package including Deliverables

FEDD or Basic Engineering Package is very important and critical for making project successful and is vital part of any project which is used for process detailed engineering purpose like final sizing of equipment, line sizing, election of instruments etc… in FEED stage accuracy of document is much better than preliminary stage. This FEED package can be designed various stages like Process Design Package with Engineering Deliverables and Detailed Process Design Package with Final Deliverables.

4.1. Project Phase 3 – Process Design Package with Deliverables

In this project phase FEED package is developed based on operating conditions, design conditions and Pneumatic/Hydro testing conditions including process reliability, process efficiency and process safety at all the level from design stage, pre-commissioning stage, commission stage, operating stage and maintenance stage. Due to accuracy cost estimation is more accurate at this stage.

For generating better engineering deliverables, some of the additional points considered during this project phase are as follows

- Raw material specifications
- Plant capacity requirements
- Product specifications
- Critical plant operating parameters
- Available utilities specifications
- Individual unit operations performance requirements
- Process regulatory requirements

- All other operating goals and constraints desired by the plant owners/operators/engineers.

After considering all above points it is very easy to give shape to process engineering deliverables which are required by other engineering disciplines for further engineering design. During this stage deliverables are generated based on

process requirement based on various studies, deliverables are analysed/Reviewed/IDC, optimised based on review/IDC and issued for Design (IFD) to other engineering disciplines, some of the FEED deliverables are as follows.

- Process design basis
- Material & Energy Balance (M&EB)
- Process Flow Diagrams (PFDs) of Tanks, Vessels, Reactors, Distillation Columns, Absorption Columns, Phase Separators, Condenser, Sub-coolers, Heat Exchangers, Pumps, Compressor, Turbines, Blower etc…
- Process descriptions
- Utility balances and Utility Flow Diagrams (UFDs) like Steam, Chilled Water, Cooling Water, Nitrogen, Instrument Air, Compressed Air, Plant Air.
- Piping & Instrumentation Diagrams (P&IDs) of Tanks, Vessels, Reactors, Distillation Columns, Absorption Columns, Phase Separators, Condenser, Sub-coolers, Heat Exchangers, Pumps, Compressor, Turbines, Blower etc…
- Process control description
- Preliminary line/pipe list of all prepared P&ID
- Process Equipment List and Preliminary instrument list, and Preliminary Tie in list
- Equipment process datasheets of Tanks, Vessels, Reactors, Distillation Columns, Absorption Columns, Phase Separators, Condenser, Sub-coolers, Heat Exchangers, Pumps, Compressor, Turbines, Blower etc…
- Instrument process datasheets of Pressure Instruments, Temperature Instruments, Level Instruments and Flow Instruments.
- Hydraulic design reports.

4.2. **Project Phase 4 – Detailed Process Design Package with Deliverables**

In this project phase final FEED package or Basic Engineering Package is developed which is used by all EPC companies and vendors. This FEED/BEP is also used for writing process specification for collecting vendor drawings, and also used for preparing Plant Operating Manual. Many of such FEED/BEP will have vendor scope marked like ISBL and OSBL. Such FEED/BEP also helps to understand/Identify type of buildings required, Piping Routing, Electrical and Instrumentation Cable Routing, type of insulations and many more information which helps to take decision at Engineering Design, Procurement and Construction, Installation, Pre-Commissioning and Commissioning stages. Some of the deliverables at this project phase are as follows

- Preliminary general arrangement drawings including building requirement and general description of project site
- Budget pricing from vendors on major pieces of equipment
- Process design philosophies
- Relief system design basis and Relief scenario datasheets and relief valve process datasheets
- Material Selection Diagrams (MSDs) and piping specifications
- Tie-in list and Process specialty items list
- Identification of power source and location and Preliminary single line diagrams
- Raw material and product storage and handling requirements
- Process effluent and emissions summary
- Process risk analysis (PHA, HAZOP, etc.) and Preliminary operating procedures
- Preliminary product and in-process QC sampling/testing plan and Preliminary project schedule.

This stage completes FEED Package or Basic Engineering Package.

5. Module 5 : Process Modelling and Simulation

5.1. Detailed mass and energy balances

5.2. Unit operation design/evaluation

5.3. Piping system hydraulics calculations

5.4. Relief and flare system design/evaluation

5.5. Heat exchanger design/evaluation

Note: SIT reserves right to change the Training Content at any time as per the current job requirement.

Key Benefits of Training Program:

- Exposure to working culture of Engineering, Procurement and Construction Companies.
- Thorough Knowledge provided to understand the project activities.
- Introduction of interactive methods within the departments.
- Understanding of Deliverables to function smoothly and quality output.
- Training of relevant soft-skills helps to improve attitude and efficiency.
- Acquire the knowledge of Advance technologies used currently in the Industry.
- Enrich the knowledge of International codes and standards for perfection in design.
- Enhance the knowledge of Current engineering practices used.
- Introduction to relevant advance software (wherever applicable).
- Training in Personal Development to enhance the communication skills (wherever applicable).

After successful completion of Training Program you will have opportunity to work in EPC sector as:

- Design Engineer
- Construction Engineer
- Project Engineer
- Inspection and Testing Engineer
- Site Engineer
- Erection Engineer
- Installation & Commissioning Engineer
- Maintenance & Operation Engineer
- QA/ QC Engineer

SIT conducts various Training programs in Following Disciplines. (Full time / Week End Batches / Part Time Corporate Batch

- Piping Engineering
- Mechanical Design of Process Equipments
- Process Engineering
- Advance Pipe Stress Analysis
- Process Instrumentation & Control
- Water & Waste Water Engineering
- Air Conditioning System Design (HVAC)
- Structural Engineering
- Electrical System Design
- Engineering Design and Drafting
- Health, Safety & Environment in Construction
- Piping Design and Drafting
- HVAC Design & Drafting
- The Art of Developing a Balanced Personality
- Civil/Structural Design & Drafting
- MEP (Mechanical, Electrical & Plumbing)

Together We Will Bring New Dimensions To Engineering Industry

Suvidya Institute of Technology Pvt. Ltd.
18/140, Anand Nagar, Nehru Road, Vakola, Santacruz (East), Mumbai, Maharashtra - 400 055 NDIA
Phone: 9167219405, 9167219404, 09821569885, E-mail : enquiry@suvidya.ac.in,
Web Site: www.suvidya.ac.in