**CHEMICAL ENGINEERING (CHET)**

The **Training Elements** of a student in Chemical Engineering Technology major entering a coop program in a company should include some or all of the following:

1. **Safety and security procedures**

* To understand the general safety rules and regulations in the company.
* To understand the specific safety concerns inside the chemical/production plant.

1. **Unit Operations (I and II)**

* Know the nature of fluid flow (e.g. laminar and turbulent) in the process lines.
* Understand how the pressure drop in the process line is caused.
* Know the various types of pipe fitting (e.g. elbows, Tees, return bends valves reduction and enlargement of pipes), and the effect of these fittings on the pressure loss in the lines.
* Know the heat transfer mechanisms (e.g. conduction, convection, and radiation) of equipment.
* Understand the operation of various heat exchangers (e.g. shell and tube, plate heat exchangers, air-coolers forced and induced).
* Understand the operation of a distillation/fractionation unit, absorption (packed) column and mixing equipment.

1. **Chemical Reaction Engineering**

* Know the operation of the various types of reactors, namely: batch, semi-batch, continuous flow stirred tank, plug flow, fixed bed and fluidized bed.

1. **Production (Chemical Processes)**

* Know about different chemical processes.
* Study flow diagram, line diagram, utility diagram, P & I diagram.
* Process operation and operating parameters.
* Normal quantitative requirements of raw material and solvents.
* Shut down and start up procedure.

1. **Process Equipment**

* Study the construction, operation, identification of the parts of (I) heat exchangers, (ii) reaction vessels, (iii) columns, (iv) pumps, (v) compressors, (vi) valves, (vii) boilers, (viii) Storage tanks, etc.

1. **Process Control and Instrumentation**

* Study the process parameters and control actions, e.g., temperature control, pressure measurement & control, flow rate, density specific gravity, viscosity measurement.

1. **Optimization and Quality Control**

* Study about the purity and quality of the feed stocks and finished product.
* Study the mixing proportion of the blends and chemicals.
* Study about the optimization of the units and their corrective actions.

1. **Testing of the Products**

* Study about the products specifications.
* Know the characteristics of the product like acidity, alkalinity and flammability, etc.
* Know the different skill of testing product.

1. **Environment and Pollution**

* Study the chemical hazards and its impact on human beings.
* Study the chemical treatment to control and neutralize the pollution.
* Study pollutants in solid, liquid and gaseous forms and effluents.
* Study equipment like scrubber, blowers, scanner and decanter.

1. **Plant Utilities and Services**

* Study about utilities required to run the plant, e.g., cooling tower, water storage, compressor, instrument air, inert gas, etc.
* Identify the utilities for the respective plant.
* Know the color code of the different utilities and primary knowledge of insulation of the pipeline.
* Study the preventive maintenance of the parts and its compartments.

1. **Distributed Control System and Simulation**

* Study the plant, unit wise and in integrated form, its controls.

Study the different types of sensors, controllers, transmitters, recorders and transducers, their overall responses.