



# Gujarat Council of Vocational Training Gandhinagar



1. Name of Course:

**Certificate Course In Chemical Plant Operations**

N.C.O. No. for Skills Covered:  
(Please refer National Classification of  
Occupations -2004 available  
on www.dget.nic.in)


2. Engineering OR Non-engineering: **Engineering**

3. No. of students per batch: **20 Trainee**

4. Duration in Hours. : **152 hours**

5. Duration in Month: **6 Months**

5. Examination Scheme:

No.	Name of Subject	Teaching Hours during full course.	Maximum Marks. (Excluding Sessional)	Minimum Marks required for Passing (Excluding Sessional).	Sessional Marks if any.
Subject-1	<b>Theory</b>	<b>76 hrs.</b>	<b>100</b>	<b>40</b>	<b>00</b>
Subject-2	<b>Practical</b>	<b>76 hrs.</b>	<b>300</b>	<b>180</b>	<b>00</b>

7. Entry qualification for Trainee:

Minimum entry qualification (Essential):	<b>BSc/ MSc Chemistry, Diploma Chemical</b>
Desirable:	<b>Minimum of 1 year experience in chemical plant operations</b>

8. Minimum qualification for Trainer:

Minimum qualification (Essential):	<b>Diploma/ BE Chemical</b>
Desirable:	<b>Minimum 3 years Professional Teaching Experience in Chemical Stream.</b>



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9. Syllabus Committee Member:

Sr. No.	Name	Organization	Designation	Technical Qualification	Experience in Years	Signature
1.	Shri. J A Mehta	Industrial Training Institute – Ankleshwar	Principal	Diploma Automobile	32 yrs	
2.	Shri. Sanjay Bamrotiya	Hindalco Industries Ltd.	Asst. Mgr.	BE Chemical	4 yrs	
		Industrial Training Institute – Ankleshwar	Supervisor Instructor		2 yrs	
3	Shri. Manilal Kolacha	Sulphur Mills Panoli	Production Engg.	BE Chemical + MBA	1 yr	
		Industrial Training Institute – Ankleshwar	Supervisor Instructor		2 yrs	
4	Shri. Chandar Shekhar Satyanarayan	Rallis India Ltd.	General Manager	B. Tech & M.S	27 yrs	
5	Shri. Balkrishna Patidar	Rallis India Ltd	Asst. Mgr.	MSc. + B Tech Chem.	18 yrs	
6	Shri. V. P Vyas	Rallis India Ltd	Asst. Mgr.	PGDHRM	8 yrs	
7	Shri Kishor Patil	Rallis India Ltd	Manager	MSc. PGDIS	17 yrs	

10. Terminal Skills of trainee: (Should be well defined and having reference to NCO):

The trainee, after successful completion of training, will have following skills...

1. Basic Understanding of unit Operations / Processes
2. Handling, Storage & Transportation of Hazardous Chemicals
3. Awareness of Industrial Safe Work Practices.
4. Asset Care Management
5. Quality Management System
6. Improve Problem solving technique using Analytical tools



(please attach separate sheet, if more space is required)



Gujarat Council of Vocational Training  
Gandhinagar



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11. Approximate cost of Tools  
/ Equipments / Machinery for  
Starting one batch of the course:

Rupees  
10 Lakhs

Reference Year  
2014-15

12. Area required for practical / Workshop for one batch.

100 Sq. Meter

13. Minimum Power connection required

5 K.W/ Day

14.1 No of items in Standard list of Machinery:

Attached

14.1.1. Page NO from \_\_\_ to \_\_\_.

14.2 No of items in Standard list of Shop outfit:

Attached

14.2.1. Page NO from \_\_\_ to \_\_\_.

14.3 No of items in Standard list of Trainee Toll-Kit:

Attached

14.3.1. Page NO from \_\_\_ to \_\_\_.

\*\*\*\*\* FOR OFFICIAL USE \*\*\*\*\*

Approved by GCVT in Governing Body meeting on

31-3-2015

Syllabus implemented w.e.f. admission session

Next Session

Revision History

1. Revision No..... Revision Date.
2. Revision No..... Revision Date.
3. Revision No..... Revision Date.





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(As many sheets as required should be used to accommodate all items)


## GUJARAT COUNCIL OF VOCATIONAL TRAINING GANDHINAGAR

Name of Syllabus: Certificate Course In Chemical plant operations

Sector: Chemical

Terminal Competency: BSc/ MSc/ Diploma chemical with minimum One year Experience

Theory	Practical
<p><b>Safety</b></p> <ol style="list-style-type: none"><li>1. General Safety Training</li><li>2. Classification of fire &amp; Mitigation</li><li>3. Fire extinguisher( Type of fire extinguisher and their application)</li><li>4. Fire Hydrant system</li><li>5. Safety Gadgets</li><li>6. On site &amp; Off Site emergency plan</li><li>7. Role and responsibility of safety officer/ Incident Controller / ERT</li><li>8. HAZOP, HIRA, JSA, PSM &amp; FMEA</li><li>9. Near Miss, incident and accident investigation</li></ol> <p><b>Chemical Plant Equipments (Total - 22 hrs)</b></p> <ol style="list-style-type: none"><li>1. Reactors (MOC, Shape, Size pressure rating)</li><li>2. Mass Transfer Device (Pump and type of pump)</li><li>3. Heat Transfer Devices (Condensers and type of condensers)</li><li>4. Various types of drives (Gear Box &amp; motors)</li><li>5. Process Controlling Instruments (Temperature, Pressure, Flow device)</li></ol>	<p>Do's &amp; Don'ts when on duty, Demonstration how to use Fire Extinguishers &amp; Other Safety Devices , Shop Floor training on doing HAZOP, HIRA etc.</p> <p>Description of equipments, how they function, what are different uses of equipments, components linked to the equipments, Importance of different components. Start-up &amp; Shutdown of Equipments. Data Monitoring &amp; Analysis related to equipments.</p>

Signature: 





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Sector: **Chemical**

Terminal Competency: **BSc, MSc/ Diploma chemical with minimum One year Experience**

<b>Theory</b>	<b>Practical</b>
<ol style="list-style-type: none"><li>6. Flow Controlling Devices (Valve and type of valves)</li><li>7. Safety device ( Rupture disc, SRV, PRV, Flam arrester, breather valves)</li><li>8. Energy Management (Boiler, Cooling towers, Compressors, Air compressors, PSA Nitrogen plant, Power plant, Diesel generator).</li><li>9. Waste Management (RO plant, MEE, MBR, Incinerator)</li><li>10. Asset Care Management</li></ol> <p><b>Unit Operations</b></p> <ol style="list-style-type: none"><li>1. Distillation (Simple distillation, Vacuum distillation, Fractional &amp; Azeotropic distillation)</li><li>2. Extraction</li><li>3. Washing of liquid and solid by water and by solvents</li><li>4. Dehydration</li><li>5. Crystallization</li><li>6. Filtration(NF, ANF Press filter dry and centrifuge)</li><li>7. Drying, Sieving, Pulverizing, Mixing, and Blending</li><li>8. Cooling tower operation and humidification</li><li>9. Scrubber and Gas absorption system</li></ol>	<p>Physical Flow of Liquids and correlation along with the working principles, Equipments involved in unit operations. Impact on Environment. Importance of Utility &amp; Safety Gadgets in unit operations. Start-up &amp; Shut-down of Operations. Autonomous Maintenance &amp; its importance in upkeep of machinery. Physical change along with separation of the chemicals. Demonstration of safe operations. Data observation and root cause analysis.</p>

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Sector: Chemical

Terminal Competency: BSc, MSc/ Diploma chemical with minimum One year Experience

<b>Theory</b>	<b>Practical</b>
<p><b>Unit Processes</b></p> <p>Chlorination, Bromination, Hydrogenation, Methylation, Condensation, Hydrolysis, Friedelcraft reactions.</p> <p><b>Material Handling and storage</b></p> <ol style="list-style-type: none"><li>1. Storage and transportation of Acids and Base</li><li>2. How to store compatible materials</li><li>3. Storage and Transportation of Metallic compound (Like Sodium Metal Sodium Hydride and Sodium Tertiary But oxide ETC)</li><li>4. Storage and Transportation of Flammable material</li><li>5. Do's &amp; Don'ts' of Material handling, Loading &amp; Unloading</li><li>6. MSDS ( LD50, TLV, LEL, UEL etc)</li><li>7. Static charge and prevention from accumulation of the static Charge</li><li>8. Handling of ISO tankers.(Bromine &amp; Ammonia)</li><li>9. Legal requirement (ISO Standards)</li><li>10. Standardization (IMS)</li></ol>	<p>Physical Observation of Chemical reactions &amp; monitoring of heat evolve &amp; absorbed while exothermic &amp; andothermic chemical reactions.</p> <p>Different type of equipments used in material handling. Safety precaution to be taken care while using the equipments. Material of construction for handling of different chemicals. Mitigation arrangement if chemical gets leak. PPE's to be sued while handling the chemicals. Demonstration of ISO Tanker.unloading and plant transferring.</p>

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<b>Theory</b>	<b>Practical</b>
<p><b>Work Culture</b></p> <p>TBEM, EPM, KKHD, IMS, DISHA, LASER &amp; TCOC.</p> <p><b>Permit System</b></p> <p>General Work permit, Height work permit, Electrical permit, Excavation work permit, Vessel entry permit, Hot work permit, Tanker loading and Unloading permit.</p> <p><b>Quality Control or Quality assurance</b></p> <ol style="list-style-type: none"><li>1. Chemical Analysis (wet Instrumentation, GC, HPLC, AAS, UV)</li><li>2. RM inspection process</li><li>3. Intermediate inspection process</li><li>4. Finish Goods inspection process</li><li>5. Pre Dispatch Inspection process</li></ol> <p><b>Behavioural Science</b></p> <ol style="list-style-type: none"><li>1. Attitude, discipline, time mgmt, communication, Sincerity, transparency, ethics, Manpower Handling.</li><li>2. 5 S, Kaizen &amp; 7 QC Tools</li></ol>	<p>System based approach &amp; Innovations</p> <p>How to prepare the permit, and assess hazards involve in the activity. Safe Work procedure to be followed. Involvement of Cross Functional department.</p> <p>Usage of different instrument for chemical analysis, what are the acceptable parameter.</p>

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**Gandhinagar**



**Standard List of Machinery - Equipment / Shop-outfit / or Trainee Toolkit**  
**For Certificate Course In Chemical Plant Operations**

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1.	Instructor Table	Shop Outfit	1 no	-	1 no
2.	Instructor Chairs	Shop Outfit	1 no	-	1 no
3.	Trainee Chairs	Shop Outfit	20 nos	-	20 nos
4.	Table for Trainees	Shop Outfit	20 nos	-	20 nos
5.	White Board	Shop Outfit	1 no	-	1 no
6.	Computer	Shop Outfit	1 no	-	1 no
7.	Projector with Screen	Shop Outfit	1 no	-	1 no
8.	Reactors	Machinery	1 no	-	1 no
9.	Tanks	Machinery	1 no	-	1 no
10.	Heat Exchangers	Machinery	1 no	-	1 no
11.	Condensers	Machinery	1 no	-	1 no
12.	Gear Box	Machinery	1 no	-	1 no
13.	Motor	Machinery	1 no	-	1 no
14.	Valve (Ball, Gate, Globe, Butterfly, Needle, Actuated, Control, Flush Valves)	Machinery	1 no each	-	1 no each
15.	Pumps (Centrifugal, Reciprocal, Gear Pump)	Machinery	1 no each	-	1 no each
16.	Filters (ANF, NF, Centrifuge, Sparkler, Candle & Strainer)	Machinery	1 no each	-	1 no each
17.	Drier (FBD, RVD, DCD, Tray Drier, Spin Flash Drier)	Machinery	1 no each	-	1 no each
18.	Vacuum system (Steam ejector, Watering pump, Water ejector, Oil ring vacuum pump, Dry vacuum pump)	Machinery	1 no each	-	1 no each







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19.	Column (Pack column, Plate Column, Absorption)	Machinery	1 no each	-	1 no each
20.	Column (Pack column, Plate Column, Absorption)	Machinery			
21.	Safety device (SRV, Rupture disc, PRV, Breather valve, Flam arrester, Fire Hydrant System)	Machinery	1 no each	-	1 no each
22.	Fire Extinguishers (Foam, DCP, ABC, Type D, CO2)	Machinery	1 no each	-	1 no each
23.	Safety Gadgets (SCBA, Air Line Respirator, Full Face Mask with canister, Half Face Mask, Dusk Mask, Ear Muff & Ear Plug, Chemical Resistance Suit, Safety Goggles)	Machinery	1 no each	-	1 no each
24.	Drives (Gear, Pulley, Coupling)	Machinery	1 no each	-	1 no each
25.	Piping (SS316, MS, MSPTFE, PVDF, HDPE, GI, PVC)	Machinery	1 no each	-	1 no each
26.	Cooling tower	Machinery	1 no	-	1 no
27.	Air compressor	Machinery	1 no	-	1 no
28.	Chilling compressor	Machinery	1 no	-	1 no
29.	Boiler	Machinery	1 no	-	1 no
30.	Thermo pack	Machinery	1 no	-	1 no
31.	DG set	Machinery	1 no	-	1 no
32.	Captive power plant	Machinery	1 no	-	1 no
33.	Waste Water Treatment (RO plant, MEE, MBR, Incinerator)	Machinery	1 no	-	1 no
34.	QA (Gas chromatography, High performance liquid chromatography, Particle Size Analyzer, Ultra Violet Spectrophotometer, Karlfisher Analyzer, Glass Vessels for chemical testing)	Machinery	1 no	-	1 no
35.	Measuring Devices (Temperature Indicator, Temperature Sensors, Pressure Gauge, Weighing balance, Flow Meter)	Machinery	1 no	-	1 no

