

**Establishment of**  
**Central Institute of Chemical Engineering and Technology (CICET)**

<b>TABLE OF CONTENTS</b>		
<b>Sl. No.</b>	<b>Topic</b>	<b>Page No.</b>
	Executive Summary	2
1.	Background	3-7
2.	Justification for establishment of CICET	8-9
3.	Mentor Institute - CIPET	10-13
4.	Objective	14
5.	Project Implementation	15-16
6.	Manpower Requirement	17
7.	Infrastructure / Financial Support	18

## EXECUTIVE SUMMARY

1.	<b>Project Title</b>	Establishment of CICET – 5 Centre
2.	<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To develop Skilled Trained Manpower for Chemical &amp; allied Industries</li> <li>• To develop Entrepreneurs who can take up Business in Chemical Sector</li> <li>• To assist the Micro, Small, Medium Chemical Industries in upgrading the Technologies &amp; Global Competitiveness</li> <li>• To promote cost effective Eco-friendly Product Development in Chemical Sector</li> <li>• To support the Chemical Industries in enhancing the Quality of Products at par with International Standards</li> <li>• To facilitate the Chemical Industries in enhancing their capabilities to develop Indigenous Chemical Products at competitive cost</li> <li>• To undertake Research &amp; Development in the areas of Organic Chemicals, Natural Products.</li> </ul>
3.	<b>Civil &amp; Technical Infrastructure</b>	<ul style="list-style-type: none"> <li>• Allotment of 15 acres of Land at free of cost and construction of 8000 sq.mtr. Academic and hostel building (boys &amp; girls) by Respective State Govt..</li> <li>• Plant &amp; Machinery shall be supported by Govt. of India.</li> </ul>
	<b>i. Plan</b>	
	<b>ii. Non-plan</b>	<ul style="list-style-type: none"> <li>• For 3 years which will be shared on 50: 50 basis between GOI &amp; Respective State Govt.</li> </ul>
4.	<b>Locations</b>	5 centres – locations to be decided
5.	<b>Project Duration</b>	3 Years
6.	<b>Financial Support</b>	Govt. of India & Respective State Government on 50:50 sharing basis
7.	<b>Mentor Institute</b>	Central Institute of Plastics Engineering & Technology (CIPET)

## **1. BACKGROUND:**

Chemicals are a part of every aspect of human life, right from the food we eat to the clothes we wear to the cars we drive. Chemical industry contributes significantly to improving the quality of life through breakthrough innovations enabling pure drinking water, faster medical treatment, stronger homes and greener fuels.

Globally, chemical industry was valued at \$4.3 Tn in 2015 and is expected to grow at 5.5% per annum till 2020 driven by demand from end use industries. The industry is increasingly shifting eastwards in line with the shift of its key consumer industries (e.g. automotive electronics, etc.), to leverage higher manufacturing competitiveness of emerging Asian economies and to serve the increasing local demand. China, as result of this shift, is the largest contributor with 34% share followed by European Union (17%) and North America (16%) to the global chemical industry.

### **Indian Chemical Industry**

Indian chemical industry is estimated to be valued at \$147Bn in 2015 and contributes 3% to the global chemical industry. It ranks 14<sup>th</sup> in exports and in imports of chemicals (excluding pharmaceutical products) globally. India's chemical's trade balance is negative with imports being significantly higher than the exports. Net imports have grown at 17% per annum during the 2011-15 period. Western India has been the dominant region contributing approx.50% to the Gross Value Added (GVA) for the chemical sector.

Government of India has taken several initiatives which will support the growth of chemical industry in India. "Make in India" is one of such initiative. The initiative is expected to foster growth in Indian chemical industry by enabling duty rationalization for feedstock, improving infrastructure and R&D & skill development along with ease of regulation for setting up "Reverse SEZs" and tax incentives for R&D investments.

Driven by consumption growth and Government's initiatives, the Indian chemical industry provides multiple opportunities for both the MNCs and the domestic companies. Few of which are:

- Chemical producers could enhance profitability of their product portfolio by exploring adjacencies and vertical integration options.
- MNCs could further strengthen their position in the country by building strategic alliances, investing in market creation activities and by scaling up through M&S's.
- Domestic companies with competitive cost structure could leverage export potential opportunities.

The R&D intensity of Indian companies has traditionally been limited, but this situation is slowly changing with more and more companies looking at R&D as a key source of building and sustaining competitive advantage. The investment in R&D for Indian companies is expected to grow above 2% (as % of revenues) thereby bridging the competitive gap to a certain extent. The industry is also observing increasing tie-ups with academia which will facilitate the technology / applied research further.

Innovation is a good way to ensure sustainability over long term and address challenges occurring due to recession, cyclicalities etc. It is not constrained to R&D but applicable to the entire value chain. Innovations in market delivery, supply chain, go to market propositions etc. could help increase competitiveness. Indian manufacturers have been developing market access quite strongly with deeper understanding of regional needs and focus on brand development. Development of these intangible assets will certainly enhance competitive advantage of such companies.

Despite the new government initiatives and continuous improvement efforts by industry participants, the chemical industry continues to face several challenges. Availability of feedstock at competitive costs remains a key concern. Lack of domestic manufacturing of several intermediates increases lead times and lowers competitiveness of downstream producers. Lack of adequate physical infrastructure and sub-par chemical logistics infrastructure makes material production and movement cost chemical industry. Uninterrupted power supply remains a challenge for the energy intensive chemical industry. To add to above, significant glut in global chemical capacities has led to growth of imports in India. Large capacity additions in Middle East and USA are another cause of concern for the domestic players. The duty structure needs rationalization for several products value chain in order to boost domestic value addition. PCPIRs implementation is yet to take off as expected. Only four states – Gujarat, Andhra Pradesh, Orissa and Tamil Nadu have so far shown interest in developing PCPIR regions.

## The major segments of Chemical Sector which

1. Bulk Chemicals
2. Petrochemicals
3. Intermediates
4. Fertilizers
5. Pharmaceuticals
6. Agrochemicals
7. Specialty Chemicals
8. Biotechnology
9. Process, plant and machinery

The Indian chemical sector ranks 6<sup>th</sup> in the world and 3<sup>rd</sup> in Asia and has an estimated size of INR 6,00,000 crore (USD 108 billion), which is approximately 2% of India's GDP. The share of this industry in national exports is around 9.2%, but despite its large size and significant GDP contribution, India's chemical industry represents only around 3% of the global chemical industry size.

The total employment generated by this sector is about 8 lakhs, out of which Gujarat, Maharashtra & Tamil Nadu account for 60% of it. The State-wise share in the employment in the chemical segment is as under:-

- Gujarat (22%)
- Maharashtra (18%)
- Tamil Nadu (18%)
- Andhra Pradesh (8%)
- Uttar Pradesh (5%)
- Karnataka (4%)
- Others (25%)

A chemical plant needs a number of raw materials for producing the finished/end products. This has given rise to the cluster approach where a number of such industries are concentrated in a contiguous area, i.e. located in the vicinity of one another in an earmarked industrial area for chemicals. This facilitates a symbiotic relationship among them where finished products of one industry act as raw materials for another. Considering the fact that a number of chemicals are hazardous (i.e. toxic, explosive, inflammable, corrosive, etc.), their transportation may be difficult and dangerous and pose serious risks, and therefore, the operation of these industries in close proximity ensures safety, saves fuel and sustains a thriving downstream segment that provided employment to lakhs of people.

Further, it is imperative that persons with the right qualifications & skill-sets should be at the right place for optimal utilization of their talent and capability i.e. a technical/ operator should have the qualification of ITI/ Diploma, whereas high-end R&D may need Ph.D. holders. Further, the educational distribution of personnel will also change depending on the level of automation – more automated processes will have a lower need for ITIs, B.Sc

(Chemistry), etc. As the level of employment in the chemical sector depends on the education and experience of a person, the present scenario is as follows:-

- Engineers MBAs' having 10-12 years of industry experience, work as Managers.
- Diploma /Graduate engineers /MSc Chemistry with 4-8 years industry experience work as Supervisors.
- ITIs, BSc Chemistry, minimally educated 8<sup>th</sup>/10<sup>th</sup> /12<sup>th</sup> pass /fail work in different grades of Operators/Helpers

Value of India's exports of inorganic chemicals have increased from USD1.4 billion in FY14 to USD0.70 billion in FY15\*, while the organic chemical market has reached USD5.9 billion in FY15\* from USD12.04 billion in FY14. The major growth drivers are;

### **Sector Dynamics**

The Indian Chemical Industry comprises both small and large-scale units, and presently, there are about 70,000 chemical manufacturing units located in the country (Deptt. Of Chemicals and Petrochemicals-Draft National Chemical Policy-December 2013) a major component (in numbers) are covered in the small scale sector. Top ten chemical companies listed in the Indian markets, based on their 2012 revenues are as follows:

1. Tata Chemicals
2. United Phosphorous Limited
3. BASF
4. India Glycols
5. Pidilite Industries
6. Vikas WSP
7. Phillips Carbon Black Limited
8. Gujarat Heavy Chemicals
9. Aarti Industries
10. Gujarat Alkalies & Chemicals Limited

In the petrochemicals space, polymers constitute 70% of end products petrochemicals market in India. Indian polymers industry is oligopolistic in nature with only 4 large producers:

- ✓ Reliance Industries Ltd. (RIL)
- ✓ Indian Oil Corporation Limited (IOCL)
- ✓ Haldia Petrochem Ltd (HPL)
- ✓ Gas Authority of India Ltd (GAIL)
- ✓ Many more players are entering viz: OPAL. HMEL, BPCL, Brahmputra Crackers etc.

## Key Trends & Developments

Indian Chemical players have been focusing on sustainable development. Water, environmental impact, raw materials, safety over lifecycle and energy use is some of the issues grappling the industry. Indian chemical companies are largely investing in innovative solutions to find appropriate answers to these challenges. Some of the successful examples from the industry are as follows:

- Kanoria Chemicals & Industries Limited (KCI) launched a “waste to wealth” program at its Ankleshwar plant with the objective of recovery of recyclable water from distillery effluents. KCI went for reverse osmosis technology to achieve maximum recycle and minimum possible disposal.
- The Arulpuram common effluent treatment plant in Tirupur adopted a technology to recycle more than 98% of water and reuse of more than 90% of the salt by implementing an effluent treatment plant consisting of a pre-treatment system followed by water recovery system using reverse osmosis.
- Bristol-Myers Squibb went for integrating the pervaporation technology with constant volume distillation operation. With the integrated approach Bristol Myers achieved 56% reduction in THF (100% reduction in entrainer) and 93% reduction in wastes generated.

Strong end use industries growth driven primarily by consumption is expected to fuel demand of the chemical products and thereby offers an opportunity for both MNCs and domestic chemical companies to grow. Strong outlook for chemical demand should ideally result in investment in capacity additions and hence import substitution.

However, increasing domestic production requires being competitive at a global level to withstand imports and increase exports. To successfully achieve this, availability of feedstock, competitive capital cost and more towards global standards in a planned manner are required. Besides the above, adoption of an integrated cluster in cluster approach could also contribute in enhancing the competitiveness of domestic manufacturing. India is today seen as a growth market for MNCs looking to expand in emerging markets. Several domestic companies have built significant assets and have the opportunity to go global. The Government initiatives like “Make in India” and GST are certainly major steps which will help improve industry’s competitiveness but a lot more remains to be done. The same could be achieved if industry and Government work in tandem with a vision to make Indian chemical Industry as one of the most competitive in the world.

Moreover in line with Country’s vision – Make in India – CICET will also focus on developing cost effective Chemical Products, Eco-friendly Chemical Technologies through Technology support and Research.

Further, **Hon’ble Minister for Chemicals & Fertilizers** during the launch function of **India Chem 2016** at Mumbai in June 2016 has announced the establishment of CICET.

## 2. JUSTIFICATION FOR ESTABLISHMENT OF CICET

The chemical sector, one of the oldest in India, is evolving dynamically and gradually migrating from pure process based to knowledge based regime. The sector is predominately based on derivatives from cracking of naphtha and other hydrocarbon feedstock providing building blocks, such as Benzene, Toluene, Xylene, Naphthalene, Ethylene, Propylene, etc.

This diversified sector, covering thousands of commercial products, is very critical to the industrial and economic development of our country and occupies a pivotal position in meeting basic needs & improving quality of life. Chemical are the mainstay of the industrial & agricultural development of the country & provide building blocks for several downstream industries, such as textile, paper, paint, soap, detergent, pharmaceutical, varnish, etc. Also, chemicals like pesticides and fertilizers increase the yield of the crops and thus contribute towards providing food security to the mankind.

### 2.1 Human Resources & Skill Requirement:

The Chemicals Industry has grown in volume terms by a Compounded Annual Growth Rate (CAGR) of 2.4% between 2003 and 2009. During the same period, the Petrochemicals sector has grown at a CAGR of 5%.

The existing & Projected Industry Size Industry in Chemical Sector

Year	2008	2012	2018	2022
Chemicals (in '000 MT)	7,725	8,523	10,881	12,685

The existing & projected human resource requirement (Production / QC / Procurement / Research / Sales & Marketing and Support functions – HR, Finance) keeping in mind the above-mentioned growth is illustrated in the following table at the level of Supervisory & Non-supervisory cadre:

Year	2008	2012	2018	2022
Chemicals (in '000)	798	841	922	933

### 2.2 Technology Support Services:

To support the Chemical Industry growth and to utilize the Potential, the existing Small, Medium and Large scale Industries require Technology Support Services viz., Formulation Development, Newer Process Development, Cost Effective Technological Solutions, Testing & Quality Control of various Chemicals like Organic Chemical, Specialty Chemicals which are predominantly like Paints, Pesticide, Textiles etc.

### **2.3 Research & Development (R&D):**

There is a good scope for enriching the infrastructure to augment the Research & Development in the area of Organic Chemicals, Natural Products - Isolation, Methodology Development, Medicinal Chemistry, Fluoro-Organics, Agro Chemicals, Pheromones, Catalysis, Analytical Chemistry - Biochemicals & Environmental Engineering, Chemical Engineering & Technology.

In view of above on similar lines of CIPET, CICET will focus on Skill, Technology Support Services, Academic and Research & Development in all domains of Chemical Engineering & Technology.

### 3. MENTOR INSTITUTE – CIPET

Central Institute of Plastics Engineering & Technology (CIPET) is an ISO 9001:2008 QMS, NABL, ISO/IEC 17025:2005 accredited premier National Institute devoted to **Skill Development, Technology support, Academic & Research (STAR)** activities for the growth of Plastics & allied industries in the country. CIPET was established by Government of India in 1968 at Chennai. Today, CIPET has 28 centres spread across the country - **5** High Learning Centres (HLC) at Ahmedabad, Bhubaneswar, Chennai, Kochi & Lucknow; **15** Other Learning /Diploma Centres (OLC) at Aurangabad, Amritsar, Bhopal, Guwahati, Hajipur, Haldia, Hyderabad, Imphal, Jaipur, Murthal, Mysore, Bhubaneswar-II, Vijayawada, Baddi & Raipur; **2** Vocational Training Centres (VTC) at Valsad & Gwalior; **3** Specialized Centres at Madurai, Balasore & PPMC-Guwahati; **2** R&D Wings – LARPM, Bhubaneswar & ARSTPS, Chennai and **1** Polymer Data Service Centre (PDS) at Gurgaon. **11** more centres – at Varanasi, Chandrapur, Medak, Ranchi, Srinagar, Dehradun, Jaipur, Agartala, Bihar & Mumbai including 1 R&D Centre at Bengaluru are in the process of establishment during XII Year Plan.

All CIPET centres are equipped with state-of-art infrastructure & facilities in the areas of Plastics processing, Testing and Quality control, Design, CAD/CAM/CAE, Tooling & Mould Manufacturing. With its activities focusing on STAR, CIPET caters to the industries in terms of Development of New Technologies, Consultancy & Technology Support, Creation of Technical Talents and Skilled Manpower, thereby complying to the Govt.'s policies.

#### ACADEMIC

- Objectives of CIPET are to offer blend of various specialized **Academic programmes** in the field of Plastics Engineering & Technology (**Doctoral, Post Graduate, Undergraduate, Post Diploma or Diploma**) in order to provide qualified Human Resources to plastics & its allied Industry.

#### TECHNOLOGY SUPPORT

- CIPET renders Technology Support Services in **Design, Tooling, Plastics Processing, and Testing & Quality Assurance** in India & Abroad. *Major Public Sector & Govt. organizations in India recognized CIPET as their prospective vendor for precision tooling, mould & product development.*
- CIPET's **Plastics Testing Centre (PTC)** is equipped with state-of-the-art equipments and is recognized as one of the best plastics testing facilities in Asia. CIPET's testing facilities are recognised by Bureau of Indian Standards (BIS) for Plastics products and also all laboratories are National Accreditation Board for Testing & Calibration Laboratories (NABL) accredited.

- CIPET's expertise for consultancy services and as a third party inspection agency for plastics products are recognized and utilized by various Central & State Govt organizations for pre-despatch / delivery inspection of plastics & allied products.
- The biodegradable testing centre of CIPET is first of its kind in the country works jointly with European Bioplastics & International Biodegradable products Institute.

## RESEARCH

- Envisioned to be a Global R&D Hub, CIPET has established two exclusive R & D wings - the **Advanced Research School for Technology & Product Simulation - ARSTPS** at Chennai focuses on Innovative Product Design for Automobile, Aerospace, Medical and Packaging Industries, Product and Tool Design Conceptualization, e-Manufacturing of Prototypes, Rapid Prototyping for Lead Time Reduction, Reverse Engineering for Metal Substitution with Aesthetic and Ergonomical Approach. The **Laboratory for Advanced Research in Polymeric Materials (LARPM)** at Bhubaneswar concentrates on Biopolymers, Functional Plastics, Carbon Nanotubes, Polymer Membranes, Conducting Polymers, Fuel Cells, e-Waste Recycling, Polymer Composites & Nanocomposites, Characterization of Blends, Alloys, and Fuel Cells.
- CIPET has been recognised by Department of Scientific and Industrial Research (DSIR) as a scientific and research organisation in the field of Plastics Engineering & Technology.

## ALUMNI

- With strong **Alumni** base of about 60,000 Professionals, CIPET has emerged as an Apex plastics technology institution, not only in India but a unique institution of its kind in Asia. CIPET's Alumni network spreads across South-East, Middle-East countries, Africa, Europe, Australia, North America, etc. (Singapore, Malaysia, Thailand, Korea, UAE, Oman, Saudi Arabia, Nigeria, Kenya, USA, CANADA, Germany, etc.)
- **"CIPET" brand** itself is recognised as major qualification criteria for supervisory and managerial manpower for the plastics industries across the globe.

## INTERNATIONAL INTERACTION

CIPET had signed Memorandum of Understandings (MoUs) for joint collaboration in faculty & staff exchange, student exchange, collaborative research projects, exchange of academic materials, develop certification programs, technological support services, formulation of standards and specifications etc., with world renowned Universities / Organizations at USA, Canada, Australia, Germany, Russia, South Korea, China, Brazil, France, Poland, Mexico, South Africa etc.

- Michigan State University in the area of ***Biopolymers & Biodegradable Polymeric Materials for plasticulture & other innovative applications***,

- Massachusetts Institute of Technology, in the area of development of ***Nano Engineered Materials for Conservation of Natural Resources***
- University of New South Wales, in the area of “***Fly ash reinforced Composites & Synthesis & Characterization of Carbon Nanotubes***”
- University of Toronto in the area of “***Biocomposites and Composites from Recycled materials***”
- The Pennsylvania State University in the area of “***Polymer Electronics, Biosensors, Rheology of Polymers & Fuel Cells***”,
- ASTM International, in “***Standardization Techniques in Polymers & Development of new standards based on high end applications***”
- University of Guelph, in the area of “***Natural Fiber based Composites***”
- University of Massachusetts Lowell in the area of “***Polymer Processing & Characterization and Polymers for Stenting applications***”,
- Biodegradable Products Institute & European Bioplastics in “***Establishment of Biodegradable Research Center.***”
- European Higher Institute for the Enterprise and its Techniques, Metz-France (Europe) for “***Technology Transfer in Resin Transfer Moulding and Aero Space Applications***”
- CIATEQ Advanced Technology Centre, Mexico in the area of “***Application Development of Plastics, Mould / Product Development***”.
- The Institute of Biopolymers & Chemical Fibres, Lodz, Poland in the area of “***Fibre Science & Technology***”.
- Kyung Hee University, Korea in the area of “***Smart and Shape Memory Polymers***”
- Hannam University, Korea in the area of “***Rheology of polymers & composites***”
- Shanghai University, PR China in the area of “***Material Science and Engineering***”
- Sao Paulo State University (UNESP), Brazil in the area of “***Eco-friendly material development***”
- Lomonosov Moscow State University, Russia in the area of “***Nano Technology***”
- NCNSM-CSIR, South Africa in the area of “***Polymer based Materials and Product Development***”
- CIPET’s International recognition is apparent from the fact that the prestigious assignments of Academic and Consultancy Services are being received from Sultanate of Oman, Kingdom of Saudi Arabia, Srilanka, Qatar, UAE, Singapore, Malaysia, Nigeria, Kenya, Bangladesh, etc.

- CIPET publishes serial publications like CIPET Times with coverage on latest technological developments, news and views about CIPET and industry trends. CIPET's International Journal of Plastics Technology (IJPT) has international recognition as the Scientific Journal in the field of plastics technology with elite and eminent international Editorial board.
- CIPET has established very good interaction with Regional & National Plastics Associations in India. CIPET is a founder member of Plastindia Foundation, Apex plastics association in India.

With these vast experience, expertise and credentials CIPET can assist in establishing CIPET at different location across the country with the funding support from Govt. of India & respective State Governments.

#### **4. OBJECTIVE**

- To develop Skilled Trained Manpower for Chemical & allied Industries
- To develop Entrepreneurs who can take up Business in Chemical Sector
- To assist the Micro, Small, Medium Chemical Industries in upgrading the Technologies & Global Competitiveness
- To promote cost effective Eco-friendly Product Development in Chemical Sector
- To support the Chemical Industries in enhancing the Quality of Products at par with International Standards
- To facilitate the Chemical Industries in enhancing their capabilities to develop Indigenous Chemical Products at competitive cost
- To undertake Research & Development in the areas of Organic Chemicals, Natural Products.
- To offer Consultancy Services in fields of Paints, Pesticides, Effluent treatment, Hazards Waste Management etc
- To promote Green Technology in Chemical Industries

## 5. PROJECT IMPLEMENTATION

Establishment of CICET can be taken up in a phased manner.

### Phase – I:

The following are the segments which offer economy potential, to conduct the Skill Development Training Programmes:

1. Bulk Chemicals
2. Petrochemicals
3. Intermediates
4. Fertilizers
5. Pharmaceuticals
6. Agrochemicals
7. Specialty Chemicals
8. Biotechnology
9. Process, plant and machinery

In line with National Skill Qualification (NSQF), the various levels from I to IV can be devised for the above segments for the Chemical & Petrochemical Sector.

During Phase – I, the following Vocational / Skill Development / Diploma / Graduate level Training Programmes in Chemical and allied Sectors are proposed to be conducted at 5 CICET Centres to cater the Skilled Manpower requirement of the Chemical Industry in the Country. In line with national policy on skill development, the Skill Development Training Programmes are conducted in the Country have to be aligned with National Skill Qualification Framework (NSQF) for quality education and enhanced employability.

Accordingly it is proposed to organize, Short duration Skill Development Training Programmes viz. -- **Level I to Level IV (Helper to Operator) & Level V (Technician) as per National Skill Qualification Framework (NSQF) alignment**

The Proposed Skill Development Training Programme in Chemical Sector at CICET is furnished below:

**Proposed Skill Development Training Programme in Chemical Sector at CICET :**

**Certificate/Diploma/Under Graduate/Post Diploma (in Science /Technology)  
(80 Hrs/960 Hrs/ 1 Year / 3 Years)**

**Phase – I:**

Sl.No.	Name of the Skill Development Training Programme	NSQF Level	Duration	Job Role	Educational Qualification
1.	Chemical Manufacturing Plant	I to IV	80 to 960 Hours	Attendant to Operator	Able to read & write to 8 <sup>th</sup> STD.
2.	Maintenance of Chemical Manufacturing Plant	I to IV	80 to 960 Hours	Attendant to Operator	
3.	Handling of Hazards / Toxic Chemicals	I to IV	80 to 960 Hours	Attendant to Operator	
4.	Diploma in Chemical Technology (Delars & Retailers)	V	3 Years	Commercial Assistant	10 <sup>th</sup> STD. / SSC/SSLC
5.	Diploma in Chemical Technology (Plant Engineering)	V	3 Years	Technician	
6.	Diploma in Chemical Technology (Plant Safety)	V	3 Years	Technician	
7.	Diploma in Chemical Technology Waste Management	V	3 Years	Technician	
8.	Diploma in Chemical Technology (Effluent Treatment - Process Design)	V	3 Years	Technician	
9.	Diploma in Chemical Technology (Plant Operator)	V	3 Years	Technician	
10.	Diploma in Chemical Technology (Plant Maintenance)	V	3 Years	Technician	
11.	Diploma in Chemical Technology (Plant Design)	V	3 Years	Technician	
12.	Diploma in Safety in Chemical Industries	V	3 Years	Technician	
13.	Diploma in Argo-Chemicals	V	3 Years	Technician	
14.	Diploma in Analytical Techniques	V	3 Years	Technician	
15.	Diploma in Green Technology	V	3 Years	Technician	

## Phase – II

During Phase – II, Higher End UG, PG & Doctoral programmes in the niche areas of Chemical Engineering & Technology shall be taken up, after ensuring self-sustainable mode of operation for 3 Years.(for level 8,9,10)

CICET will also focus on rendering Technology Support Services, undertaking Consultancy assignments and Research & Development activities in all the frontiers of Chemical Engineering and Technology. Focused approach towards Technology upgradation, Cost Effective & Eco-Friendly Technology Chemical Solutions, Industry Automation, Import substitution / Development of Indigenous Chemicals in line with Make in India Vision.

## Phase – II:

Sl.No.	Name of the Skill Development Training Programme	NSQF Level	Duration	Job Role	Educational Qualification
1.	B.Sc. (Analytical Chemistry)	-	3 Years	Supervisor / Lab Technician	12 <sup>th</sup> STD. (Science)
2.	B.Sc. (Applied Chemistry)	-	3 Years	Supervisor / Lab Technician	
3.	B.Sc. (Environmental Science)	-	3 Years	Supervisor / Lab Technician	
4.	B.Sc. (Green Chemistry)	-	3 Years	Supervisor / Lab Technician	
5.	PGD in Formulation Technology	VII	1 Year	Supervisor / Analyst	Science Graduate with Chemistry Science
6.	PGD in Analytical Techniques	VII	1 Year	Supervisor / Analyst	
7.	PGD in Regulatory Affairs	VII	1 Year	Supervisor / Analyst	
8.	PGD in Chemical Technology (Plant Engineering)	VII	1 Year	Supervisor / Analyst	
9.	PGD in Chemical Technology (Plant Safety)	VII	1 Year	Supervisor / Analyst	
10.	PGD in Chemical Technology Waste Management	VII	1 Year	Supervisor / Analyst	
11.	PGD in Chemical Technology (Effluent Treatment - Process Design)	VII	1 Year	Supervisor / Analyst	
12.	PGD in Chemical Technology (Plant Operator)	VII	1 Year	Supervisor / Analyst	
13.	PGD in Chemical Technology	VII	1 Year	Supervisor /	

	(Plant Maintenance)			Analyst	
14.	PGD in Chemical Technology (Plant Design)	VII	1 Year	Supervisor / Analyst	
15.	PGD in Safety in Chemical Industries	VII	1 Year	Supervisor / Analyst	
16.	PGD in Green Technology	VII	1 Year	Supervisor / Analyst	
17.	PGD in Testing & QC of Chemicals (Construction Chemicals)	VII	1 Year	Supervisor / Analyst	
18.	PGD in Testing & QC of Chemicals (Fine Chemicals)	VII	1 Year	Supervisor / Analyst	
19.	PGD in Testing & QC of Chemicals (Agro Chemicals)	VII	1 Year	Supervisor / Analyst	
20.	PGD in Testing & QC of Chemicals (Specialty Chemicals)	VII	1 Year	Supervisor / Analyst	
21.	PGD in Quality Management System	VII	1 Year	Supervisor / Analyst	
22.	PGD in Instrumental methods & Chemical Analysis	VII	1 Year	Supervisor / Analyst	
23.	PGD in Bioorganic Chemist	VII	1 Year	Supervisor / Analyst	
24.	PGD in Chemical Pedagogy	VII	1 Year	Supervisor / Analyst	
25.	PGD in Industrial Chemist	VII	1 Year	Supervisor / Analyst	
26.	PGD in Inorganic Chemist	VII	1 Year	Supervisor / Analyst	
27.	PGD in Surface & Interface analysis	VII	1 Year	Supervisor / Analyst	
28.	PGD in Organic Chemist	VII	1 Year	Supervisor / Analyst	
29.	PGD in Chemical Safety	VII	1 Year	Supervisor / Analyst	
30.	PGD in Qualitative & Quantitative analysis	VII	1 Year	Supervisor / Analyst	

## 6. MANPOWER REQUIREMENT

It is proposed to establish the CICET Centres at 5 different locations and having separate Head Office location which can control & monitor the Centres of CICET.

It is estimated the total manpower requirement are as follows:

CICET Head Office	-	30 Employees
CICET Centre	-	35 Employees per Centre (175 Employees for 5 locations)
Total Manpower Requirement	-	205

The proposed Organogram for Head Office & CICET centre given below:

## 7. INFRASTRUCTURE / FINANCIAL SUPPORT

Civil Infrastructure	The necessary land & building support shall be provided by the Respective State Govt.
Technical Infrastructure	Procurement of Plant & Machinery shall be provided by Govt. of India.
Financial Support	The required funding support for establishment can be met on 50:50 Govt. of India & Respective State Govt.  The cost estimation per centre can be worked separately