

SERIOUS ACCIDENTS IN NOV-DEC 2021

2 DEAD, SEVERAL INJURED IN BLAST AT CHEMICAL FACTORY



At least two workers died and 14 were injured in a blast inside Gujarat Fluorochemicals Limited (GFL), located in Goghamba in Panchmahal district of Gujarat.

11 COVID PATIENTS KILLED IN FIRE AT ICU WARD



A major fire broke out in the civil hospital of Ahmednagar, killing at least 10 patients admitted in ICU.



THIS ISSUE

Editorial **P.1**CoE Activities **P.2**Scenario Selection for Quantative Risk Study **P.3**Elements of Process Safety **P.4**Process Safety Management Pary-III **P.5**Significance of Behavioral & Operational Factors **P.7**Courses & Services Availabe **P.8**

EDITORIAL



Prof. Shrikant J. Wagh
Provot UPL University of sustainable Technology

Dear Readers,
Greetings!

SAFEXCELLENCE, the brain child of Centre of Excellence (CoE) for Process Safety, was born on Aug. 1, 2020. Since then eight bimonthly reports have been published with information on ghastry industry accidents, informative details of PSM issues, new initiatives of CoE and several activities carried out under the aegis of CoE. I am happy to share with you that CoE has been successfully handling the industrial assignments with its experts and knowledge partner. Also, CoE has its own Advisory Board under the able leadership of Mr Vikram Shroff, Global Director, UPL & Group Companies, and experienced leaders from the fields of industry and research and academics. The advisory board members are keen to disseminate their experiential expertise for the development of CoE. Very soon we will be reaching to you through a webinar series on certain critical aspects of PSM to be delivered by international experts.

We are pleased to present to you the nineth issue of SAFEXCELLENCE. Your views and responses are welcome. Please mail it to safexcellence@sriect.in

ACCIDENT AT AMBUJA CEMENT PLANT IN NAGOUR, ONE WORKER KILLED



An accident took place at an Ambuja cement plant in Nagaur district of Rajasthan. In this cement plant located in Mundwa, a heavy iron machine fell from a height. In this accident, a laborer who came in the grip of the machine died on the spot.

ONE DEAD, FOUR INJURED IN REACTOR BLAST AT ANKLESHWAR CHEMICAL FACTORY



A 25-year-old labourer died on the spot and five others were injured after a blast at a reactor of RP Industries' chemical manufacturing unit at Ankleshwar in Panoli GIDC, Bharuch. The five with minor and major injuries were rushed to Parth Hospital and are now stable.

CoE ACTIVITIES

WEBINAR ON EVOLUTION OF RISK BASED PROCESS SAFETY



Mr Swapan Kumar Hazra
B.Tech. Mechanical Engineer, IIT Kharagpur

UPL SRICT Rotary

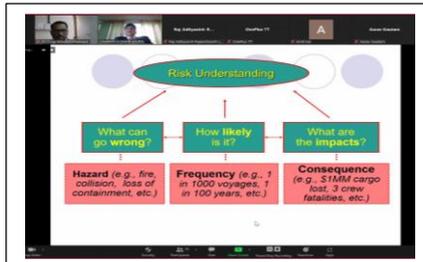
Shroff S.R. Rotary Institute of Chemical Technology

UPL Center of Excellence in Process Safety

ORGANISES ONLINE WEBINAR ON

"Evolution of Risk Based Process Safety"

21st December, 2021
Time 11.00 am to 1.00 pm



A risk based process safety (RBPS) approach recognizes all hazards and risks in an operation or facility are not equal; consequently, apportioning resources in a manner that focuses effort on greater hazards and higher hazards is appropriate. Risk-based approaches are approaches that focus our attention on the risk of the tasks that we do and a constant and continuous drive to reduce the risk of our tasks to the lowest or most acceptable level for our organization. It also reduces the potential for assigning ganuudue amount of resources to managing lower-risk activities, there by freeing up resources for tasks that address higher-risk activities. This training program provided an overview considering risk approach to evaluate and analyse a process for it's potential risk. There were total 144 professionals were registered for this webinar.



MoU has been signed between SRICT -CoE and DISH (Director Industrial Safety and Health) Government of Gujarat on 28th October 2021. The scope of the MoU includes the development of MIS system for the DISH officers. This MIS software would be one of the unique system to update the information related to Industrial safety to all officers of the DISH. Thanks to Shri P. M. Shah Director, DISH for their extensive help for translating the process of MoU into reality.

Indian CHEMICAL News

Home » General »

SRICT establishes UPL Centre of Excellence in Safety

The Centre of Excellence will be helpful for SRICT students as well as industries located in and around Ankleshwar on matters related to industrial safety

By ICN Group | September 11, 2021

Shroff S.R. Rotary Institute of Chemical Technology (SRICT), Ankleshwar has established UPL Center of Excellence (CoE) in Safety in collaboration with Gexcon, Norway.

November 17, 2021

Indian CHEMICAL News

UPL CMD conferred with Padma Bhushan award

Rajnikant Devidasbhai Shroff was bestowed with Padma Bhushan for his contribution to trade and industry

Meghmani Organics to invest Rs. 400 Cr for titanium dioxide plant

The Titanium Dioxide plant is expected to be commissioned by Q1 FY24 adding Rs. 700 crore to MOL's topline on a full financial year basis



Mr. Amol Lakare, CoE Member and Manager, Process Safety, UPL Ltd. has participated in International Process Safety Conference 2021 at Delhi. He has given the presentation on topic "3D Consequence modelling strategies for better estimation". The aim of this conference was to tackle the most prevalent issues facing the global process safety industry.

EXPLOSION IN AFGHANISTAN'S CAPITAL KABUL



An explosion occurred in Afghanistan's capital Kabul, reported local media.

LOW INTENSITY EXPLOSION IN DELHI'S ROHINI COURT; 1 PERSON INJURED



One person was injured in a low-intensity explosion that took place inside courtroom 102 in Rohini district court, fire officials said.

5 KILLED, 2 HURT IN LPG CYLINDER BLAST IN TN



Chennai, Nov 23 Five people, were killed and 12 others sustained burns and injuries in a LPG cooking cylinder blast in salem district of Tamil Nadu.

Scenario Selection for Quantitative Risk Assessment Study



Mr. Amol Lakare
Manager, Process Safety, UPL Ltd.

All Scenarios to be identified & considered for QRA study, however applicability of each scenario to be assessed.

Selection of Chemical methodology for Quantitative Risk Assessment study is based on the below points:

- > Physical state of chemical in operation
- > Toxicity of chemical considering conservative approach (~IDLH 500ppm or less)
- > Flammable chemical having flash point up to 55°C at its operating temp.
- > High Operating Pressure
- > Potential decomposition or Runaway reaction condition/s in the process/ reactor/ vessel
- > Selection number calculation as per CPR-18E
 - Process/ Storage inventory
 - Position of release (indoor/ outdoor)
 - Release phase of the chemical/ Vapour pressure at process temperature
 - Toxicity/ Flammability of release chemical
 - Potential Explosive energy equivalent to 1000 Kg TNT (explosion energy 4600 kJ/kg).

An scenario will be selected for analysis in a QRA if the selection number of an scenario is larger than one at a location on the boundary of the establishment (or on the bank side situated opposite the establishment) and larger than 50% of the maximum selection number at that location Or the selection number of an scenario is larger than one at a location in the residential area, existing or planned, closest to the installation.

SN	Scenario	Q (Process/ Released Inventory)	Unit	O1	O2	Psat @ Process temp (bar)	Factor X (based on Psat)	Δ (Evaporation factor)	O3	Boiling Point of Liquid	Phase @ 25 °C	LCSO (mg/m ³)	G (limit Value) Toxic	G (limit Value) Flammable	Heat of combustion (Kj/Kg)	G (limit Value) Explosive	Indication number (flam) (Af)	Indication number (Explos) (Ae)	Indication number (Toxic) (At)	Selection number (Flammable) (Sf)	Selection number (Explosion) (Se)	Selection number (Toxic) (St)	Selection for QRA
1	Ethylene Dichloride (from Transfer Pipeline)	37500	Kg	0.1	0.1	0.13	-2.90	0	0.13	83.5	Liq (M)	1177	3000	10000	1236	0.27	0.00499	185.64	0.017	0.005	185.64	0.0166	Yes
2	Toluene (from Transfer Pipeline)	804	Kg	0.1	0.1	0.05	-	0	0.1	110.6	Liq (H)	3769	infinity	10000	3920	0.85	0.00008	0.944	NA	0.0001	0.944	NA	No
3	Chlorine (From Tonner)	900	Kg	0.1	1	-	-	1	10	-	Gas	850	300	NA	NA	NA	NA	NA	3.00	NA	NA	3.00	Yes
4	Phosphorus (P4 Drum)	1000	Kg	1	0.1	0.001	-3.50	0	0.1	1022	Solid	2350	infinity	10000	23968	5.21	0.00100	1.92	NA	0.001	1.92	NA	Yes
5	Phosphorus Pentaoxide (P2O5)	24.67	Kg	1	1	-	-	1	10	-	Gas	1217	300	NA	NA	NA	NA	NA	0.8223	NA	NA	0.8223	No
6	Phosphine	18	Kg	1	1	-	-	1	10	-	Gas	80	3	NA	NA	NA	NA	NA	60	NA	NA	60	Yes
7	Acetonitrile from Storage	10000	Kg	0.1	1	0.15	-2.82	0	0.15	81.6	Liq (M)	2693	10000	10000	30975	6.73	0.01516	22.52	0.02	0.0152	22.52	0.02	Yes
8	Acetonitrile from transferring piping	600	Kg	1	0.1	0.15	-2.82	0	0.15	81.6	Liq (M)	2693	10000	10000	30975	6.73	0.00091	1.35	0.00	0.0009	1.35	0.00	Yes



ONE DEAD, 5 INJURED IN TWO FIRE INCIDENTS IN DELHI



New Delhi: A 12 year-old-boy was killed while five firemen were injured in two separate fire incidents in the national capital.

3 DEAD IN JAPAN BUILDING FIRE, ARSON SUSPECTED



Three people were killed and 28 others severely injured after a fire broke out in a building in Japan.

AT LEAST 27 PEOPLE FEARED DEAD IN BLAZE AT CLINIC IN JAPAN



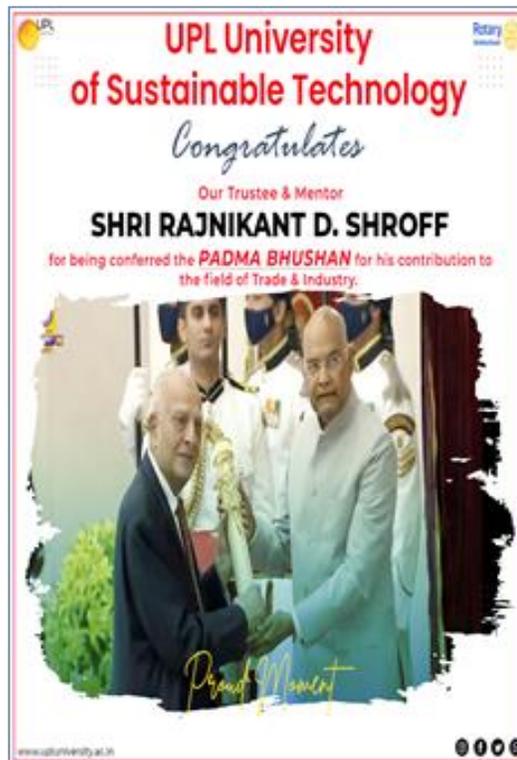
At least 27 people were feared dead after a fire broke out at a psychiatry clinic in the Japanese city of Osaka.

ELEMENTS OF PROCESS SAFETY

In the 1st Issue of SAFEXCELLENCE, SRICT CoE has selected 17 process safety elements and based on these elements and published literature, an attempt is made to analyze the disasters taken place during the month for the probable cause/s. SAFEXCELLENCE team points out the missing process safety element/s in the events that happened.

MISSING PSM ELEMENTS WHICH CAUSED The Accidents, Nov-Dec 2021

Accidents	Missing PSM elements																
Gujarat Fluorochemicals Limited (GFL), Goghamba	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at ICU in civil hospital of Ahmednagar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ambuja Cement, Nagaur	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RP Industries' Panoli GIDC, Bharuch	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion in Afghanistan's capital Kabul	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Low intensity explosion in Delhi's Rohini court	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LPG cylinder blast, Chennai	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire incidents in Delhi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Building fire, Japan	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at a psychiatry clinic Osaka, Japan	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17



India's one of the highest civilian awards The Padma Bhushan is conferred on **Shri Rajnikant Devidasbhai Shroff** (Trustee & Mentor, UPL University of Sustainable Technology) for his contribution to the field of trade and industry.

PROCESS SAFETY MANAGEMENT

Part-III



Mr. Ashok Dashputre
Consultant of Process Safety Management

Improvements Difficult to Quantify

Unfortunately, in these data-driven times, the improvements have been anecdotal and difficult to quantify. Industry has tried to measure the effectiveness of PSM activities and their improvements, with various standards and metrics. While lagging metrics—measures of performance based on analysis of past results—have generally been easy to identify and analyze, leading metrics have proven to be more elusive. Understanding weaknesses or gaps in processes and management systems before they lead to problems is unquestionably the better way to understand where improvement priorities should be placed. But getting that information has been a challenge.

What we have learned—or maybe it's better to say, what we have been *told*—is that if we do everything in a *consistent* manner, in a single system or tool, we'll be able to better analyze where we've been and where we're headed.

The path will become clear. Technology will be the panacea that gets us back on track. (Never mind that PHA studies are, to a large degree, an analysis of our reactions to technological failures ... but that's another blog). Consistency and commonality are positioned as essential to PSM success. But is that the whole story?

Doing something consistently does not necessarily mean that you are doing it well. It just means you are always doing it in the same way. Remember, you can consistently follow a bad process in an accurate manner. Is it better to follow a bad process well or to follow a good process badly? In an arena as important as process safety—where the health, safety and quality of your personnel, the public, the environment

Audits and Assessments

Those familiar with the safety lifecycle approach know that effective management requires both audits and assessments. Audits allow you to confirm that you have been correctly following your process. Assessments help you better understand the quality of that process and the activities involved at each step of that process. They will also give you better insight into effectiveness of your processes.

Expanding this concept to larger PSM systems and the drive to monitor, measure and improve their performance, the key point is really this: Do not confuse *consistency* with *quality*.

Audits—something with which we're all familiar—will tell you if everyone is following your PSM approach consistently, or if they are having difficulty. Audit results really tell you if people are following the processes, and if the data captured from those processes is good enough to be analyzed.

Assessments—something we're likely less familiar with—help us to compare the quality of the data collected and how the processes were followed to determine where shortcomings exist, so solutions can be proposed.

Consistency-focused

It has been noticed that organisations are increasingly talking about their need and desire to improve consistency in their safety management initiatives. But it is observed that confusion in these discussion as well. Solutions can help you improve both, but it's important to understand that consistency and quality are different things to manage, and that you need to manage one before you can understand how well you are managing the other. Simply put, think of lagging metrics as giving you insight into consistency; think of leading metrics as giving you insight into quality.

The PHA is very much the cornerstone of your PSM program. It is where the Major Accident Hazards in your facility are identified and where the scenarios by which each can unfold are developed. Whether a project must be a managed change as part of your Management of Change process will be determined in part by whether it is related to something discussed in your PHA study. Whether an accident or event in your facility requires a formal investigation will also relate, in many cases, to whether it was an issue originally identified or discussed in the PHA. Need a hot work permit? The PHA identified a lot of areas where ignition is part of a Major Accident Hazard scenario. Worried about whether operator intervention in the process can pose safety risks? The PHA should tell

Good Data Needed

How do you know the data is good quality? In an ideal world, you'd have a standard against which data can be compared. That doesn't quite work with a PHA. Every plant is different—from its process design to its operational history and experience to its process safety information and even its operating environment. There simply is not one set of data against which you can make a comparison. Instead, you need to compare data from among many studies, facilities and operations. If everyone is doing their studies in different ways, following different methods and developing scenarios using different criteria that makes a valuable comparison very difficult.

Therefore, it is important to have a consistent approach to the PHA to make sure everyone is identifying and analyzing scenarios in roughly the same way. If the approach is the same, that tells you that comparing data from different studies will be a fair comparison. This in turn will allow you to analyze all the components of the approach to determine where factors impacting the quality of the data may exist and if there are parts of the process that discourage people from following the process. The relative quality of the data then also lets you figure out if there are parts of the process that inhibit progress. Knowing how PSM relates to other business processes and management systems, and understanding that PSM is not a true "big data" system, allows you to then compare processes to find roadblocks and figure out if all the data is getting captured in the first place.

Continuous Improvement Process

So, in the PHA world, this means that a continuous improvement process looks something like this:

- *Developing and enforcing a consistent process to follow for risk assessments that allows for a sound basis of comparison between studies, no matter what the process, business or geography.*
- *Comparing results of studies to determine which elements of the methodology and process may be contributing to quality issues—whether that's related to data accuracy, data completeness or both.*
- *Comparing results with other business systems to verify that data have not been overlooked or left out and figuring out why if they have.*

Revising the method to address points from above, and continuing in an iterative manner.

Consistent Approach Does Not Always Mean Good Results

Consistency of the approach or method is key. But keep in mind that a consistent approach doesn't necessarily give you good results; it simply gives you data that can be analyzed to figure out if the results are, in fact, as good as they need to be. Many people are concerned about the fact that teams might not necessarily be consistently identifying the correct hazardous scenarios, developing consequences consistently or applying effective safeguards in the same way. While consistency issues may be at play here, it's really more an issue with the data quality. If there was a way to force consistency on scenario development, you could write a computer program to automate the Hazard and Operability study (HAZOP) process. With all the variables related to personnel experience, management philosophy, equipment condition and so on, this really isn't possible. The team approach is necessary, and the engagement of every member is key.

Your goal shouldn't necessarily be developing tools that let teams consistently arrive at the same consequences, same severity assessments or same number of safeguards for a given set of process hazards. Instead, it should be about having a consistent method to follow that allows a competent team to arrive at accurate, actual results (not necessarily results that follow a formula). As long as the method followed to get to the conclusions is the same, and it includes the key items you need to assess overall data quality, the journey, as they say, is just as important as the destination. And if laid out well, everyone who needs to will take that journey, and no one will take a shortcut. So it's a challenge. Organizations will have to work on.

12 KILLED AS BLAST IN UNDERGROUND SEWAGE SYSTEM RIPS THROUGH BANK IN KARACHI



At least 12 people were killed and an equal number injured when a massive blast, apparently triggered by a gas explosion in a sewage system, ripped through the premises of a private bank situated on it, according to media reports.

BASRA EXPLOSION: SEVERAL KILLED AS BLAST ROCKS IRAQI CITY



At least four people have been killed and four others wounded in an explosion that rocked the centre of Iraq's southern city of Basra, the Iraqi military said.

FOUR INFANTS DEAD IN FIRE AT BHOPAL



At least four infants died in a fire that broke out in the children's ward of the Kamla Nehru Hospital.

SIGNIFICANCE OF OPERATIONAL FACTORS ASSOCIATED WITH INCIDENT & ACCIDENT IN CHEMICAL INDUSTRY

The chemical industries in India are meant as Process industries. These industries are working in operation of conversion of raw material into intermediate goods or final goods by the way of physical or chemical ways. This business operation consists of manufacturing work, handling and packing work, storage and transportation of hazardous chemicals in bulk quantity or back condition to the final consumer if it is final goods or to other business operations if it is intermediate goods. The chemical industry in India is growing. With increasing numbers, the chemical industry is also becoming more complex in nature. These industries are increasing hazard and harm directly or indirectly to the workers and employees in the industries, resident people who are staying nearby as well as the surrounding environment consisting of animals, trees, etc. The risk in chemical industries is sometimes compounded by unsafe handling of operation at the chemical units which are not ready to handle the extreme condition (Subramaniam, et.al., 2016). There may be adverse effects that can result in chemical explosion, industrial fire, blasts, etc. that can result in loss of various life, injuries as well as loss of property on a large scale. Many times the harmful or hazardous substances which are released by this industry into water or air can travel very long distances, which means long distance habitats can also get affected. If that water is used for agriculture on soil or crops or for livestock then that is also too dangerous.

So it is necessary to avoid such hazards and accidents, for this it is essential first to identify them. An important way for identifying those hazards before accidents take place is to determine "Leading" criteria such as: safety culture or climate, this is an indication of total safety state. After the Chernobyl accident at Soviet Union on 26th April 1986, the safety culture was introduced. Safety cultures of various beliefs, values and attitudes in a group (Wang, et.al 2020). Safety culture also gave rise to the concept of safety climate that is the appearance of the hidden parts of the safety culture in behavior and expressed attitudes by the workers and the employees; besides, safety climate can be assumed as attitudes and perceptions of people about safety conditions in an organization. Safety climate could be considered as the outer layer of safety culture. For correcting the problem from the base level, it is important to consider the current situation of the organization and its workers and employees, which would reflect in their behavior (Zhang, et.al.2019). When the employees and worker believes in the safety measures taken by the organization then it could be termed as a Safety attitude. This evaluation is necessary because this is an early warning of the failure of the system in the organization.



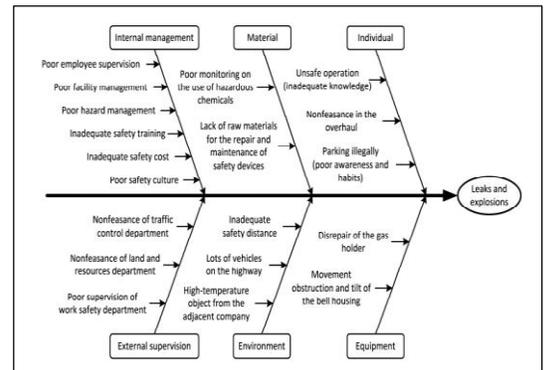
Gopal Gajananrao Pishe
Manager HSE, UPL Ltd.

Different causes associated with Industrial Incidents :

- There are different RCA (Root Cause Analysis Tools) to identify the Causes Associated to Industrial Incidents.
- Some of the causes associated with Industrial Incidents are mentioned in below Fish Bone Diagram.
- Operational failures are the causes of the Incident in most of the cases.
- Failure pertaining to Human Factor and System Factor leads to Operational Failures.

Actions to avoid Incidents due to Operational Failures:

- Risk Assessment of activities being carried out in Industry
- Identify the control measures in terms of Engineering Control, Administrative Controls and PPE
- Development of Training Modules for all levels of employees
- Training Need Identification for each employee
- To provide training to all employees with validation
- Verification of all implemented control measures for its effectiveness
- Periodic review of effectiveness of control measures



CERTIFICATION COURSES AND CONSULTING SERVICES OFFERED BY SRICT - CoE

FOR MORE INFORMATION ABOUT TOTAL SAFETY SOLUTION MODEL, CONTACT US



(SCAN QR CODE)

OR

DR. OMPRAKASH MAHADWAD
(CoE-COORDINATOR)
+918975033066
OMPRAKASH.MAHADWAD@SRICT.IN

TRAINING PROGRAMME ON PROCESS SAFETY MANAGEMENT



ASSISTING INDUSTRIES IN IMPLEMENTATION OF PROCESS SAFETY MANAGEMENT

PSM CONSULTING ASSIGNMENTS TO MEDIUM/LARGE CHEMICAL COMPANIES



ASSISTING INDUSTRIES TO CONDUCT HAZARD AND OPERABILITY STUDY (HAZOP)

ASSISTING INDUSTRY SPONSORED RESEARCH PROJECTS IN PROCESS SAFETY



Corrigendum

We hereby clarify that the content published in *SafeExcellence Issue-8* about the PSM Wheel used in the article written by **Mr. Ashok Dashputre, Consultant of Process Safety Management** (on Page No. 7) belongs to intellectual property ("IP") rights holder of DuPont Sustainable solutions.

COE NEWSLETTER EDITORIAL BOARD

EDITORS IN CHIEF

Mr. Piyush Shah
(Head-Health & Safety, UPL Ltd.)

Prof. Shrikant J. Wagh
(Principal, SRICT)

EDITOR AND DESIGNER

Prof. Omprakash Mahadwad
(CoE Coordinator, SRICT)

CONVENERS

Dr. Shina A. Gautam
(Associate Professor, SRICT)

Ms. Monika Patel
(Assistant Professor, SRICT)

EXECUTIVE STUDENT MEMBERS

July Pawaday
(Chemical Engineering, Designer)

Ankita Shah
(Environment Science & Technology)

Richa Patel
(Chemical Technology)