National Board of Accreditation

Self-Assessment Report (SAR)

DEPARTMENT OF MECHANICAL ENGINEERING
KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(Kalasalingam University)
KRISHNANKOIL 626 126

SAR Contents

Kalasalingam University (Kalasalingam Academy of Research and Education)

SELF ASSESSMENT REPORT(TIER - I)

Part A : Institutional Information

1 Name and Address of the Institution

Kalasalingam University (Kalasalingam Academy of Research and Education),
Kalasalingam University Anand Nagar, Krishnankoil- 626 126 Srivilliputtur(via) Virudhunagar (Dist.) Tamil Nadu

2 Name and Address of Affiliating University

Kalasalingam University

3 Year of establishment of the Institution:

1984

4 Type of the Institution:

○ Institute of National Infortance	○ Autonomous
○ University	○ Any other(please specify)
◉ Deemed University	

5 Ownership Status:

○ Central Government	☐ Trust
○ State Government	☐ Society
○ Government Aided	☐ Section 25 Company
◉ Self financing	☐ Any Other(Please Specify)

6 Details of all the programs being offered by the Institution under consideration:

Name of Program	Program Applied level	Start of year	Year of AICTE approval	Initial Intake	Intake Increase	Current Intake	Accreditation status	From	To	Program for consideration	Program for Duration
B.Tech. Computer Science and Engineering	UG	2007	2007	300	Yes	240	Granted accreditation for 3 years for the period (specify period)	2022	2025	No	4
B.Tech. Computer Science and Engineering - Artificial Intelligence and Machine Learning	UG	2020	2020	60	No	60	Not eligible for accreditation	--	--	No	4
B.Tech. Computer Science and Engineering - Data Science	UG	2020	2020	60	No	120	Not eligible for accreditation	--	--	No	4
B.Tech. Computer Science and Engineering - Cyber Security	UG	2020	2020	60	No	180	Not eligible for accreditation	--	--	No	4
B.Tech. Computer Science and Engineering - Internet of Things and Cyber Security Including Block Cha	UG	2020	2020	60	No	60	Not eligible for accreditation	--	--	No	4
M.Tech. Computer Science and Engineering	PG	2007	2007	18	Yes	12	Not eligible for accreditation	--	--	No	2
B.Tech. Agricultural Engineering	UG	2017	2017	60	No	60	Not accredited (specify visit dates, year)	--	--	No	4
B.Tech. Aeronautical Engineering	UG	2017	2017	30	No	30	Not accredited (specify visit dates, year)	--	--	No	4
B.Tech. Automobile Engineering	UG	2011	2011	60	Yes	30	Not accredited (specify visit dates, year)	--	--	No	4

Sanctioned Intake for Last Five Years for the B.Tech. Automobile Engineering

Academic Year	Sanctioned Intake
2021-22	30
2020-21	30
2019-20	30
2018-19	30
2017-18	30
2016-17	60

B.Tech. Biomedical Engineering	UG	2015	2015	90	Yes	60	Not accredited (specify visit dates, year)	--	--	No	4

Name of Program	Program Applied level	Start of year	Year of AICTE approval	Initial Intake	Intake Increase	Current Intake	Accreditation status	From	To	Program for consideration	Program for Duration
Sanctioned Intake for Last Five Years for the B.Tech. Biomedical Engineering											
Academic Year			**Sanctioned Intake**								
2021-22			60								
2020-21			60								
2019-20			90								
2018-19			90								
2017-18			90								
2016-17			90								
B.Tech. Chemical Engineering	UG	2014	2014	60	Yes	30	Not accredited (specify visit dates, year)	--	--	No	4
Sanctioned Intake for Last Five Years for the B.Tech. Chemical Engineering											
Academic Year			**Sanctioned Intake**								
2021-22			30								
2020-21			30								
2019-20			30								
2018-19			30								
2017-18			30								
2016-17			60								
B.Tech. Food Technology	UG	2015	2015	90	No	90	Applying first time	--	--	Yes	4
B.Tech. Mechanical Engineering	UG	2007	2007	180	Yes	120	Granted accreditation for 6 years for the period (specify period)	2017	2023	No	4
Sanctioned Intake for Last Five Years for the B.Tech. Mechanical Engineering											
Academic Year			**Sanctioned Intake**								
2021-22			120								
2020-21			180								
2019-20			180								
2018-19			180								
2017-18			180								
2016-17			240								
M.Tech. Biotechnology	PG	2007	2007	12	No	12	Applying first time	--	--	Yes	2

Name of Program	Program Applied level	Start of year	Year of AICTE approval	Initial Intake	Intake Increase	Current Intake	Accreditation status	From	To	Program for consideration	Program for Duration
M.Tech. Industrial Safety & Engineering	PG	2011	2011	12	No	12	Applying first time	--	--	Yes	2
M.Tech. Manufacturing Engineering	PG	2014	2014	12	No	12	Not accredited (specify visit dates, year)	--	--	No	2
M.Tech. Renewable Energy Technologies	PG	2015	2015	12	No	12	Not accredited (specify visit dates, year)	--	--	No	2
M.Tech. Structural Engineering	PG	2015	2015	12	No	12	Applying first time	--	--	Yes	2
M.Tech. VLSI Design	PG	2007	2007	12	No	12	Eligible but not applied	--	--	No	2
M.Tech. Automotive Systems Engineering	PG	2009	2009	12	No	12	Not accredited (specify visit dates, year)	--	--	No	2
MCA. Computer Applications	PG	2007	2007	30	No	30	Not accredited (specify visit dates, year)	--	--	No	2
MBA. Business Administration	PG	2007	2007	120	No	120	Not accredited (specify visit dates, year)	--	--	No	2
MBA. Insurance and Risk Management	PG	2007	2007	18	No	18	Not accredited (specify visit dates, year)	--	--	No	2
B.Tech. Civil Engineering	UG	2007	2007	60	Yes	60	Granted accreditation for 3 years for the period (specify period)	2020	2023	No	4

Sanctioned Intake for Last Five Years for the B.Tech. Civil Engineering

Academic Year	Sanctioned Intake
2021-22	60
2020-21	60
2019-20	60
2018-19	60
2017-18	60
2016-17	90

B.Tech. Biotechnology	UG	2007	2007	120	No	120	Granted accreditation for 3 years for the period (specify period)	2022	2025	No	4
B.Tech. Electronics and Communication Engineering	UG	2007	2007	300	Yes	240	Granted accreditation for 6 years for the period (specify period)	2022	2028	No	4

Name of Program	Program Applied level	Start of year	Year of AICTE approval	Initial Intake	Intake Increase	Current Intake	Accreditation status	From	To	Program for consideration	Program for Duration
Sanctioned Intake for Last Five Years for the B.Tech. Electronics and Communication Engineering											
Academic Year			**Sanctioned Intake**								
2021-22			240								
2020-21			240								
2019-20			240								
2018-19			240								
2017-18			240								
2016-17			240								
B.Tech. Electrical and Electronics Engineering	UG	2007	2007	60	No	30	Granted accreditation for 3 years for the period (specify period)	2020	2023	No	4
B.Tech. Information Technology	UG	2007	2007	300	Yes	60	Applying first time	--	--	Yes	4

7 Programs to be considered for Accreditation vide this application:

S No	Level	Discipline	Program	Current Year Sanctioned Intake	Current Year Admission (in Nos.)
1	Post Graduate	Engineering & Technology	Bio technology	12	8
2	Post Graduate	Engineering & Technology	Industrial Safety Engg.	12	12
3	Post Graduate	Engineering & Technology	Structural Engineering	12	6

8 Vision of the Institution:

To be a University of Excellence of International Repute in Education and Research.

9 Mission of the Institution:

1. To provide a scholarly teaching-learning ambience which results in creating graduates equipped with skills and acumen to solve real-life problems.
2. To promote research and create knowledge for human welfare, rural and societal development.
3. To nurture entrepreneurial ambition, industrial and societal connect by creating an environment through which innovators and leaders emerge.

10 Contact Information of the Head of the Institution and NBA coordinator, if designated:

Head of the Institution	
Name	Dr. V. Vasudevan
Designation	Registrar
Mobile No.	9487551111
Email ID	registrar@klu.ac.in

NBA Coordinator, If Designated

PART B: DEPARTMENT INFORMATION

1. State the Vision and Mission of the Department

University Vision

To be a University of Excellence of International Repute in Education and Research.

University Mission

1. To provide a scholarly teaching-learning ambience which results in creating graduates equipped with skills and acumen to solve real-life problems.
2. To promote research and create knowledge for human welfare, rural and societal development.
3. To nurture entrepreneurial ambition, industrial and societal connect by creating an environment through which innovators and leaders emerge.

Department Vision

To be recognized globally as a lead in Mechanical Engineering through excellence in education and innovative research in emerging areas.

Department Mission

1. To mold a graduate in mechanical engineering capable of solving contemporary problems through technical skills, lifelong learning and cutting-edge research

2.To impart interdisciplinary domain knowledge through collaboration with industry.

3.To inculcate ability to provide sustainable solutions and practice ethics through scholarship and innovation.

2. Justification of consistency of the Department Vision and Mission with the Institute Vision and Mission

The following table shows the consistency between the institute and department vision and it is evident from the mapping, the department aim to meet the institute vision and mission.

Institute / Department			University's Vision & Mission Key Components					
			Vision			Mission		
			Excellence in academic	International reputation	Research Competency	Real life problems	Leadership	Research Promotion
Key Components	Vision	Excellence in Global Education	☑	☑				
		Innovative research			☑			
	Mission	Life long learning				☑	☑	
		Interdisciplinary Knowledge				☑		☑
		Cutting edge Research				☑		☑

3. Details of all UG & PG programs offered by the department

S. No	PG Program Name	Corresponding UG Program/ Department	Current Year Sanctioned Intake	Current Year Admission
1.	Industrial Safety Engineering	Mechanical Engineering	12	12

4. State the Program Educational Objectives (PEOs) for the PG Program(s) under consideration for accreditation.

Industrial Safety Engineering (ISE) Program Educational Objectives (PEO) is framedbased on various stake holders' feedback and analysis in such a way to meet out the mission and vision of the department.

Program Educational Objectives

PEO 1: Graduate will serve as a solution provider through interactive learning to prevent accidents in industry by adapting latest technology.

PEO 2: Graduate will be able to apply research knowledge gained from safety analytics to develop unique safety models and protocols across industries.

PEO 3: Graduate will be able to formulate sustainable safety policy documents as per the need of the industries based on prescribed principles and acts.

Criteria Summary

Name of the program Industrial Safety Engineering

Criteria No.	Criteria	Mark/Weightage
1.	Program Curriculum and Teaching –Learning Processes	125
2.	Program Outcomes and Course Outcomes	75
3.	Students' Performance	75
4.	Faculty Contributions	75
5.	Laboratories and Research Facilities	75
6.	Continuous Improvement	75
	Total	**500**

NBA-ISE SELF EVALUATION SHEET

Criteria	Criteria components	Allotted marks	Expected marks
1. Program Curriculum and Teaching – Learning processes			
1.1.1	State the process for designing the program curriculum	10	10
1.1.2	Structure of the Curriculum	5	5
1.1.3	State the components of the curriculum	10	10
1.1.4	Overall quality and level of program curriculum	10	9
1.2.1	Quality of end semester examination, internal semester question papers, assignments and evaluation	20	20
1.2.2	Quality of student projects	30	29
1.2.3	Initiatives related to industry interaction including industry internship/summer training	10	9
1.2.4	Participation of Industry professionals in curriculum development, as examiners, in major projects	10	9
1.2.5	Quality of laboratory work given	20	20
	Total	**125**	**121**
2. Program Outcomes and Course outcomes			
2.1	Establish the connect between the courses and POs	15	15
2.2	Attainment of POs		
2.2.1	Describe the assessment tools and processes used to gather the data upon whichthe evaluation of Program Outcome is based	20	17
2.2.2	POs attainment levels with observations	40	37
	Total	**75**	**69**
3. Students' Performance			
3.1	Enrolment Ratio through GATE	20	0
3.2	Success Rate in the stipulated period of the program	20	20
3.3	Placement, Higher Studies and Entrepreneurship	20	20
3.4	Professional Activities	15	15

	Total	**75**	**55**
4. Faculty Contributions			
4.1	Student – Faculty Ratio (SFR)	10	10
4.2	Faculty competencies in the area of Program specialization		
4.2.1	Faculty name and specialization for the program under consideration	10	10
4.2.2	Faculty Research Publication	10	10
4.2.3	Faculty Development work	10	10
4.3	Faculty as participants in Faculty development/training activities/STTPs	5	5
4.4	Research and Development		
4.4.1	Sponsored Research	15	15
4.4.2	Consultancy (from Industry)	15	15
	Total	**75**	**75**
5. Laboratories and Research Facilities			
5.1	Adequate and well-equipped laboratories in the area of program specialization	30	30
5.2	Research facilities/centre of excellence	30	30
	Total	**60**	**60**
6. Continuous Improvement			
6.1	Actions taken based on the results ofevaluation of each of the POs	25	23
6.2	Improvement in Quality of Projects	10	10
6.3	Improvement in Placement, HigherStudies and Entrepreneurship	10	8
6.4	Improvement in the quality of studentsadmitted to the program	10	0
6.5	Improvement in quality of paper publication	10	8
6.6	Improvement in laboratories	10	7
	Total	**75**	**56**
	Over all Total	**500**	**436**

CRITERION I	Program Curriculum and Teaching – Learning processes

1.1 Program curriculum

1.1.1 State the process for designing the program curriculum

(Describe the process that periodically documents and demonstrates how the program curriculum is evolved or give the process of gap analysis, whichever is applicable, considering POs)

A. Process used to evolve the program curriculum

The process of curriculum development for M. Tech in Industrial Safety Engineering (ISE) is carried out based on the standard procedure followed in our university. Accordingly, the draft curriculum structure is designed by referring the bench mark institutes which are well known for offering ISE programs in national/international levels. Figure 1 depicts the process and steps followed in developing the program curriculum. The ISE program curriculum is evolved in four stages and it is described in the subsequent sections.

Stage – I Draft Curriculum & Syllabus Framework

- The draft curriculum and syllabi is framed based on referring the inputs from various bench mark institutes and recommendation and guidelines suggested by the regulatory bodies and accrediting authorities such **as *Directorate General Factory Advisory Service and Labour Institute (DGFASLI), Regional Labour Institute (RLI)*, *Petroleum Explosive Safety Organization (PESO)*** AICTE, NBA, ABET and NAAC.
- Further, the draft curriculum was prepared in accordance with national and top ranked international institutes in the domain of ISE.
- The emerging areas in industrial safety engineering also referred with international certification training providers such as ***NEBOSH, National Safety Council, and Safety Engineering Association*** so as to ensure the latest context of safety engineering in the draft curriculum.
- The content of the syllabus and curriculum structure were developed by considering the industries requirement by collecting the feedback from the industrial safety experts as well as the experienced academic personals.

Stage II - Evaluation and Refinement of Curriculum and Syllabus

- In stage II, the draft copy of the curriculum and syllabus is submitted to Program Advisory Board (PAB) to examine the quality and fulfilling all the requirements. This committee consists of the following members; Head of the Department (HoD), Program Coordinator (PC) and Module Coordinator (MC).
- After the internal evaluation of the first draft copy of the curriculum and syllabus by the PAB, draft curriculum is sent to the external experts for their suggestions. The external experts include alumni, industry experts, employers, professional society office bearers and working parents. The modification suggested by the external stakeholders are incorporated and the revised version of the draft curriculum is submitted to Board of Studies (BoS).

Stage III –Board of Studies

- The revised version of the curriculum is placed in Board of Studies meeting to ascertain the quality of the curriculum. The BoS committee comprises the following members; Head of the Department, Program Coordinator, one industry expert and one senior academician from premier university/institute/regulatory bodies. With their valuable suggestions the required modification is carried out and it is submitted for final approval to the Academic Council (AC).

Stage IV – Academic Council

- In Academic council, the invited external members from industry and senior academicians from reputed educational institutions will discuss the framed curriculum and syllabus. The external members are invited from reputed institutes such as IITs, NITs and from frontline industries. Based on their recommendations and approval the final curriculum and syllabus will be implemented.

The process of curriculum development is presented as Figure 1.1.

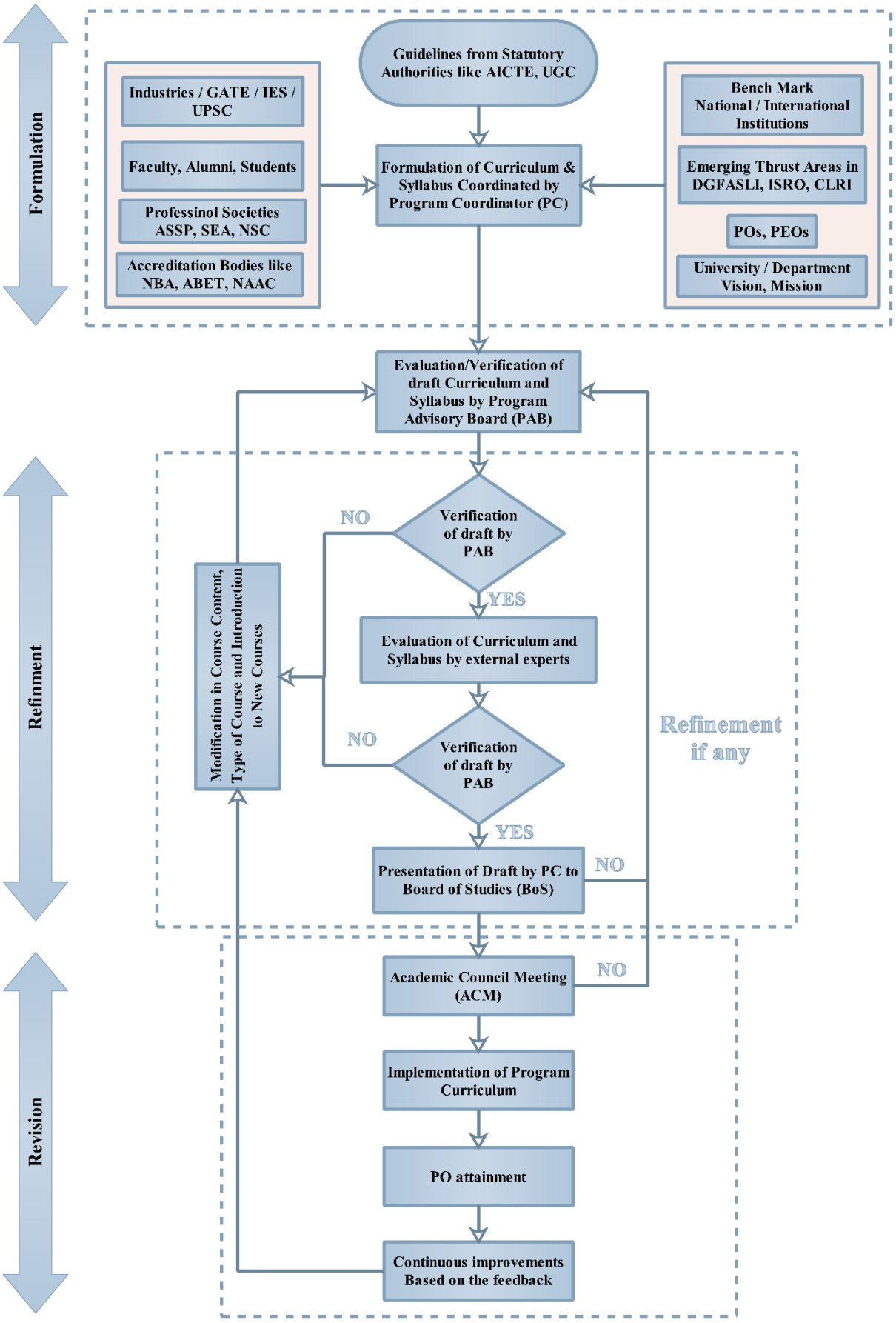


Figure 1.1 Process of curriculum development

B. Compliance of Curriculum for attaining the Program Outcomes and Program Specific Outcomes. (Process for "Curriculum GAP ANALYSIS")

The program outcome prescribed by the NBA is taken to understand the compliance between curriculum and program outcome. The Standard POs recommended by NBA itself taken for the attainment.The compliance of all the COs with POs is studied step by step and it is shown in Figure 1.2

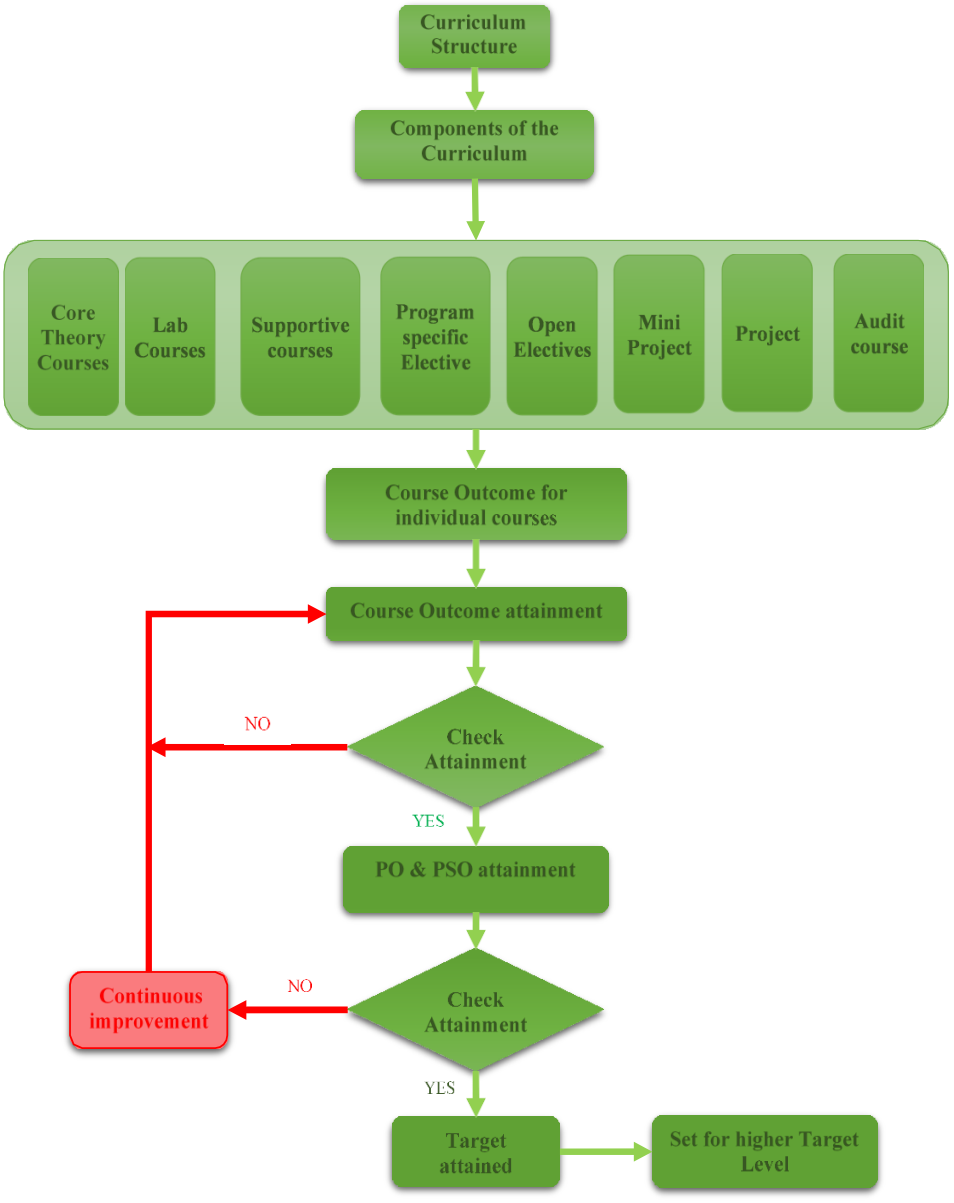


Figure 1.2 Process of Evaluating the Program Attainment

Additionally, the extent of compliance of the curriculum is evaluated based on the program outcome attainment for each course component in curriculum in such a way to ensure the level of compliance between curriculum and POs.

To ensure the level of compliance of the curriculum with the attainment of CO and PO, the numerical data is taken for the batch 2018-2020 as reference. From that the significance of compliance in accordance with the percentage of contribution for each course component in curriculum has been obtained. However, it has been noticed that a particular program outcome have not met out the maximum limit. It could be further improved considering the continuous improvement based on the previous batch attainment.

List of Program Outcomes (POs):

PO1: An ability to independently carry out research /investigation and development work to solve practical problems

PO2: An ability to write and present a substantial technical report/document

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

1.1.2 Structure of the curriculum

The curriculum of Industrial Safety Engineering is framed based on the guide lines suggested and recommended by AICTE. The structure of the curriculum is shown in Table 1.1.2.

Table 1.1.2 M. Tech (Industrial Safety Engineering) curriculum Structure

S. No	Course Category	Credits
1.	Core theory courses	15
2.	Lab Courses	6
3.	Supportive courses (Mathematics & Research methodology)	4
4.	Program Specific Elective courses	15
5.	Open Elective (Interdisciplinary/General Elective)	3
6.	Mini Project	2
7.	Project work	26
8.	Audit courses (2 courses)	-
	Total	**71**

Semester I

Course code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
MAT18R5002	Statistics and Computational techniques	3	0	0	3	3
MEC18R5001	Safety Management	3	0	0	3	3
MEC18R5002	Occupational Health and Hygiene	3	0	0	3	3
MEC18Rxxxx	Program Specific Elective – I	3	0	0	3	3
MEC18Rxxxx	Program Specific Elective- II	3	0	0	3	3
AUD18R5001	English for Research Paper Writing	2	-	-	2	0
MEC18R5081	Industrial Safety Lab	0	0	4	4	2
MEC18R5082	Technical Seminar - I	0	0	4	4	2
	Total	17	0	8	25	19

Semester II

Course code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
PGM18R5001	Research Methodology for Engineers	1	0	0	1	1
MEC18R5003	Regulation for Health, Safety and Environment	3	0	0	3	3
MEC18R5005	Fire Engineering and Explosion Control	3	0	0	3	3
MEC18Rxxxx	Program Specific Elective- III	3	0	0	3	3
MEC18Rxxxx	Program Specific Elective- IV	3	0	0	3	3
AUD18R5002	Pedagogy Studies	2	-	-	2	0
MEC18R5083	Technical Seminar - II	0	0	3	3	2
MEC18R6097	Mini-Project	-	-	4	4	2
	Total	15	0	7	22	17

Semester III

Course code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
MEC18R6007	OHSAS 18000 and ISO 14000	3	0	0	3	3
MEC18Rxxxx	Program Specific Elective- V	3	0	0	3	3
	Open Elective	3	0	0	3	3
MEC18R6098	Dissertation Phase – I	0	0	20	20	10
	Total	9	0	20	29	19

Semester IV

Course code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
MEC18R6099	Dissertation Phase – II	-	-	32	32	16
	Total	0	0	32	32	16

The list of program specific elective and open elective courses are also listed in Table 1.1.3 and 1.1.4.

TABLE 1.1.4 LIST OF PROGRAM SPECIFIC ELECTIVES

Course Code	Course Title	L	T	P	C
MEC18R5004	Computer Aided Hazard Analysis	3	0	0	3
MEC18R5006	Safety In Engineering Industry	3	0	0	3
MEC18R5007	Safety in Plant Layout and Material Handling	3	0	0	3
MEC18R5009	Human Factors Engineering	3	0	0	3
MEC18R5010	Transport Safety	3	0	0	3
MEC18R5011	Fireworks Safety	3	0	0	3
MEC18R5012	Safety in On and Off Shore Drilling	3	0	0	3
MEC18R5013	Safety in Textile Industry	3	0	0	3
MEC18R5014	Industrial Noise and Vibration Control	3	0	0	3
MEC18R5015	Work Study and Ergonomics	3	0	0	3
MEC18R5016	Reliability Engineering	3	0	0	3
MEC18R5017	Probabilistic Safety Assessment	3	0	0	3
MEC18R5018	Biomechanics and Human Body Vibration	3	0	0	3
MEC18R5019	Corrosion Engineering	3	0	0	3
MEC18R5020	Risk and Reliability for offshore structure	3	0	0	3
MEC18R5021	Safety in chemical industries	3	0	0	3
MEC18R5022	Electrical safety	3	0	0	3
MEC18R5023	Environmental safety	3	0	0	3
MEC18R6001	Nuclear Engineering Safety	3	0	0	3
MEC18R6002	Safety in Mines	3	0	0	3
MEC18R6003	Dock Safety	3	0	0	3
MEC18R6004	Safety in Powder Handling	3	0	0	3
MEC18R6005	Quality Engineering	3	0	0	3
MEC18R6006	Radiographic Testing and Radiation Safety	3	0	0	3
MEC18R6008	Intelligent Industrial Systems	3	0	0	3
MEC18R6009	Safety in Petrochemical industries	3	0	0	3
MEC18R6010	Quantitative risk analysis in chemical process	3	0	0	3
MEC18R6011	Sensitivity measurement and evaluation of energetic material	3	0	0	3
MEC18R6012	Solid and Hazardous Waste Management	3	0	0	3
MEC18R6013	Maintainability Engineering	3	0	0	3
MEC18R6014	Air Pollution Control Equipment Design	3	0	0	3
MEC18R6015	Automotive Systems Safety, Quality and Reliability	3	0	0	3

TABLE 1.1.4 OPEN ELECTIVE COURSES

Course Code	Course Title	L	T	P	C
MEC18R6051	Disaster Management	3	0	0	3
MEC18R6052	Safety in Construction	3	0	0	3
MEC18R6053	Environmental Impact Assessment	3	0	0	3

1.1.3 State the components of the curriculum

The Industrial Safety Engineering program curriculum consists of various course components such as Program Core, Lab courses, Supportive course, various electives and the same is listed in Table 1.1.3A

Table 1.1.3A Curriculum components

Course component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Program Core	21.1	225	15
Lab courses	8.5	165	6
Supportive courses (Mathematics and Research Methodology)	5.6	60	4
Program Electives	21.1	225	15
Open Electives	4.3	45	3
Mini Project	2.8	60	2
Major Project	36.6	780	26
Audit courses	0	60	0
Total number of credits			**71**

The Course components of KARE is compared with that of NITs, IITs and the percentage of curriculum matching is shown in Table 1.1.3B.

Table 1.1.3 B Comparison of course components

S.No	Course component	KARE (out of 71Credits)		NIT, Trichy (Out of 64 Credits)	
	Course work/Course Area	Total Credits	Curriculum Content (% of total number of credits of the program)	Total Credits	Curriculum Content (% of total number of credits of the program)
1.	Program Core	15	21	15	23
2.	Lab courses	6	8	4	6
3.	Supportive courses (Mathematics and Research Methodology)	4	6	3	5
4.	Program Electives	15	21	18	28
5.	Open Electives	3	4	0	0
6.	Mini Project	2	3	0	0
7.	Major Project	26	37	24	38
8.	Audit courses	0	0	-	-
		71	**100**	**64**	**100**

1.1.4. Overall quality and level of program curriculum

The framed ISE Curriculum maintains a good balance in the composition of professional courses and the distribution in offering core and elective courses which makes the graduates ready for the industry environment, also the curriculum covers other necessary supportive courses with a focus on improving the analytical and research skills of the graduates.

ISE curriculum also provides space to select open elective courses based on the interest of the students to gain knowledge on other domain courses and for applying their safety domain knowledge to solve their real time problems. This also improve interdisciplinary knowledge. Since, students from various engineering discipline are pursuing ISE program they may require specific elective course to strengthen their knowledge in their domain and to apply the learned knowledge in safety perceptive.

Industrial experts are invited to take specific topics on particular courses, also based on their opinion recent advanced topics included in the course content to improve the quality of the syllabus in such a way that the curriculum also refined with minor changes during the Board of Studies meeting.

1.2 Teaching Learning Process (80)

1.2.1. Quality of end semester examination, internal semester question papers, assignments and evaluation

To ascertain the quality of the question papers and evaluation methods, the following process is adopted.

The course teacher who is the subject expert prepares the question bank. The Sessional and end semester examination question paper generated by the course teacher is verified and approved by the module coordinator and program coordinator for further processing by COE office. The following items are ensured,

- Coverage of syllabus as per the course plan
- Complexity as recommended by Blooms taxonomy
- Implementation of case study-based questions which includes,
    - Situation based questions and its analytical ability
    - Incident investigation kind of questions
    - Field visits are related with courses and accordingly questions are framed
    - Extension activity-based questions
    - Discussion and analysis walk-through audits

Program Coordinator also verifies the question paper preparation based on the guidelines framed by the department. The details of the rubrics for verifying the quality of the questions are shown in Table 1.1. If there is any correction or recommendation in the quality of the question paper, the corresponding course teachers are suggested to take necessary action. This is the process adopted to ensure the quality of internal question papers

Table 1.1 Rubrics for Internal Question Paper Audit

S.No	Rubrics for Internal question paper audit					
	Rating	**4**	**3**	**2**	**1**	**0**
1	Questions framed on Blooms Taxonomy/OBE	All questions are framed based on blooms taxonomy verb/OBE and mapping of pattern is fully correct	All questions are framed based on blooms taxonomy verb/OBE and mapping of pattern is more than 90% correct	All questions are framed based on blooms taxonomy verb/OBE and mapping of pattern is more than 80% correct	All questions are framed based on blooms taxonomy verb/OBE and mapping of pattern is less than 80% correct	No blooms taxonomy
2	Question paper is free from grammatical and technical mistakes/error	100% free from technical and grammatical error	100% free from technical error and 90% free from grammatical error	100% free from technical error and > 80% free from grammatical error	100% free from technical error and 80% free from grammatical error	Less than 100% free from technical error and <80% free from grammatical error
3	There is no repetition/similarities of question papers in the past three years	Absolutely no repetition in the past three years	10% repetition from the questions given in the past three years	10% repetition from the questions given in the past two years	10% repetition from the questions given in the last one year	>10% repetition
4	Question papers can be solved by students in the stipulated time	Question papers can be solved exactly by students in the stipulated time	Question papers can be solved in 95% of the stipulated time	Question papers can be solved in 90% of the stipulated time	Question papers can be solved in 80% of the stipulated time	Question papers can be solved in > 80% of the stipulated time

Office of the Controller of Examination (CoE) verifies the quality of the end semester question paper in terms of CO mapping and an external audit and scrutiny is done inviting experts from leading institutions to ascertain the level of question paper. After external audit internal audit is done through the department senior faculty member to verify the question paper. After the completion of auditing and scrutiny process the final question paper printing is done by the office of COE. A sample of the same is shown in Figure 1.4 and 1.5.

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Anand Nagar, Krishnankoil – 626 126.

SESSIONAL EXAMINATION – I – EVEN SEMESTER [2018-2019]

Course Code/ Name	:	MEC18R5006-Safety in Engineering Industry	Date & Session	:	14.2.19/FN
Degree/Branch	:	M.Tech./MECHISE	Duration	:	90 Minutes
Semester/Section	:	II-ALL	Max. Marks	:	50 Marks

Assessment Pattern as per Bloom's Taxonomy:

Remember	Understand	Apply	Analyze	Evaluate	Create	Total
6	20	24	0	0	0	50

Course Outcomes for Assessment in this Test:

COs	Course Outcome
CO1	Understand the safety rules, standard and codes in various mechanical engineering processes
CO2	Design machine guarding system for various machines such as lathe, drilling, boring, milling etc.

	PART – A (5 x 2 = 10 Marks) Answer All Questions	Pattern	Mapping COs	
1.	Why safety is essential in engineering industry?	Understand	CO1	
2.	Write the safety rules for power hand saw.	Remember	CO1	
3.	What type of safety is required for CNC machines?	Understand	CO1	
4.	Define ZMS.	Remember	CO2	
5.	What requirements apply to guarding transmission system?	Remember	CO2	
	PART – B (2 ½ x 16 = 40 Marks) Answer All Questions	**Pattern**	**Mapping COs**	
6.	Discuss the safety, prevention to be followed in woodworking industries.	Apply	CO1	(16)
7.	How guarding is important explain with examples?	Understand	CO2	(16)
8.	Discuss the guarding for the following machines a) Lathe b) Drilling machine	Apply	CO2	(8)

Assessment Summary:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	2	4	16	0	0	0	22
CO2	4	16	8	0	0	0	28

*****

Figure. 1.4 Model copy of Sessional Exam Question paper

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Anand Nagar, Krishnankoil – 626 126.

M.Tech. DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2019

II Semester

MEC18R5006-Safety in Engineering Industry

(Common To All Sections)

Time : 180 Minutes	**Dept: MECHISE**	Maximum : 100 Marks

(Answer ALL Questions of PART A and PART B)

Assessment Pattern as per Bloom's Taxonomy:

Remember	Understand	Apply	Analyze	Evaluate	Create	Total
8	120	34	18	0	0	180

Course Outcomes for Assessment in this Test:

COs	Course Outcome
CO1	Understand the safety rules, standards and codes in various mechanical engineering processes.
CO2	Design machine guarding systems for various machine such as lathe ,drilling, boring, milling etc.
CO3	Apply safety concepts in welding , gas cutting, storage and handling of gas cylinders.
CO4	Apply safety rules for inspecting the boilers ,heat treatment operations etc.
CO5	Understand to protect measures in health and welfare of work in engineering industry.

	PART – A (10 × 2 = 20 Marks)	**Pattern**	**Mapping COs**	
1.	Write the safety rules for grinding.	Remember	CO1	
2.	What are the codes used in CNC machines.	Remember	CO1	
3.	List the policy for ZMS	Understand	CO2	
4.	Where we use fixed guards?	Understand	CO2	
5.	Differentiate cutting and welding.	Analyze	CO3	
6.	Define brazing.	Remember	CO3	
7.	----------is the primary operation of power press?	Apply	CO4	
8.	Sate the advantages of hot working.	Understand	CO4	
9.	List the heat treatment operation.	Understand	CO5	
10.	Classify types of inspection.	Remember	CO5	
	PART – B (5 × 16 = 80 Marks)	**Pattern**	**Mapping COs**	
11a	List out the lathe safety rules in detail.	Understand	CO1	(16)
	[OR]			
11b	Discuss the safety, prevention to be followed in wood working industry.	Understand	CO1	(16)
12a	Brief about selection and suitability of machine guarding.	Understand	CO2	(16)
	[OR]			
12b	What are the types of guard. Explain each in detail.	Understand	CO2	(16)

13a	What are the hazards involved in welding, also give the remedial measures of it.	Apply	CO3	(16)
	[OR]			
13b	How equipment is checked and what are the precautions to be followed in electric arc welding.	Understand	CO3	(16)
14a	Brief in detail about safe procedures for setting and removing dies for presses?	Apply	CO4	(16)
	[OR]			
14b	Explain in detail about hot rolling process and safety precautions to be followed.	Understand	CO4	(16)
15a	How air leak test is done in pressure vessels .Mention the safety precautions.	Understand	CO5	(16)
	[OR]			
15b	What are the radiation hazards involved. How to reduce or prevent it?	Analyze	CO5	(16)

Assessment Summary:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	4	32	0	0	0	0	36
CO2	0	36	0	0	0	0	36
CO3	2	16	16	2	0	0	36
CO4	0	18	18	0	0	0	36
CO5	2	18	0	16	0	0	36
TOTAL	8	120	34	18	0	0	180

*****

Figure. 1.5 Model copy of End Semester Exam Question paper

Evaluation:

The Internal exam evaluation (Sessional Exams) is done by the course teacher. The evaluation is done based on a detailed answer key prepared by the course teacher and approved by the Program Coordinator and the Module Coordinator.

Assignments:

Assignments are also evaluated directly by the course teacher based on the rubrics framed and the same is presented in Table1.2. The course teacher has full autonomy in deciding the type of assignment method for a particular course. The weightage given for assignments can be distributed over to other assessment methods such as technical seminar, field report, case studies etc.

The evaluation methods for such advanced assessment methods are also decided by the concerned course teacher. In the case of evaluation of technical seminar, case studies etc an internal expert committee is formed by the course teacher for such evaluations and a rubric given to the experts for assessment of the students.

Table 1.2 Rubrics for assignment audit

S.No	Rubrics for quality of assignment					
		10	**8**	**6**	**4**	**0**
1	Assignments are given on all units	All 5 units	4 units only	3 units only	2 units only	1 unit only
2	Specific constructive comments are given on the assignment	Detailed comments are given to help students improve their knowledge and way of communication	Detailed comments are given only in technical content	Comments are given which is less but meaningful to students	Comments are generic	No Comments
3	Self-learning is ensured through assignments	Each assignment carries one or more questions on self-learning or one full assignment is based on self-learning	3 questions in the total assignments check students self-learning	2 questions in the total assignments check students self-learning	1 question in the total assignments check students self-learning	No self-learning
4	Quality of questions in assignments	Questions are designed based on real time problems/situations which require applications of principle learnt/case studies	Questions are not designed based on regular text books and challenging enough for students to think and solve.	Questions are designed based on regular text books unsolved portion	Questions are designed similar to the ones discussed in the class	Questions designed don't require any thought process

1.2.2 Quality of student Projects

The Quality of student projects is ensured by focusing on the thrust areas that categorize into,

- Industrial Sector projects
- Government sector need based projects
- Projects with high relevance to safety practices in practical scenario
- Research based projects with high relevance to Industrial safety

The students are expected to spend majority of their time in the respective plant for

industry related / Government sector projects. One senior expert from the concern industry will act as external guide to the students and shall acknowledge the student's contribution in the project to the internal guide allotted by the department. The expert will aid the students and will evaluate the project in order to obtain a clear and precise methodology with all the essential steps. The expert will evaluate the students on their awareness of moderntools and the latest industry practices. The expert will also evaluate the students intheir methodology of procuring essential laboratory facilities and tools essential for the project.

The model/prototype-based projects work depicting the safety related issues of private / government sectors are to be presented by the students in renowned exhibitions. The concept of the models are also be presented in renowned conferences and the level of coverage of the project directly link with the grading of the students.

In the case of research-based projects the students are expected to present the outcome of their project in a conference conducted by renowned institutes / societies. The conferences must enable the publication of articles in journals. The students can also directly publish their work in renowned SCI/SCOPUS journals through proper means. These conferences and publications will be considered during the grading process of the project.

Quality projects are also disseminated and published to the safety domains in the following aspects,

- Filing patents for novel technical idea.
- Forwarding the best project to science competition

The sample project dissertation submitted by the student is shown in Figure 1.6

THE RISK ASSESSMENT FOR CHEMICAL STORAGE BY SAFETY TOOLS AND SOFTWARE SUCH AS JHARA, BOW-TIE AND ALOHA SOFTWARE

Submitted by

ATHUL SAJEEV

(9919120003)

In partial fulfilment for the award of the degree

of

MASTER OF TECHNOLOGY

IN

INDUSTRIAL SAFETY ENGINEERING

DEPARTMENT OF MECHANICAL

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(DEEMED TO BE UNIVERSITY) KRISHNANKOIL 626 126

2020-2021

Figure 1.6 Sample Project report

1.2.3 Initiatives related to industry interaction including industry internship/summer training.

a. Industry supported laboratories

KARE- Bosch Joint LAB

KARE has signed an MoU with the world's leading automotive parts manufacturer-BOSCH, and has started in the areas of diesel systems, gasoline systems, diagnostics and auto electrical system at KARE campus. Spread across 3600 sq.ft, the joint certification centre has been set-up to provide quality training to students. With an aim to impart quality skills that would help the youth of India to build a sustainable future, the training material has been developed and provided by Bosch. The centre has been equipped with the latest Bosch Equipment, such as, Fuel Injection Test Bench, Auto Electrical Test Bench, Diagnostic Scanner, Bosch vehicle lift among others. The training centre will provide joint certification programs to students, technicians and service personnel alike. This Training Centre will organize and conduct specific training modules for students, faculty and institution staff along with customer from outside the campus.

Bosch's Training programs are recognized globally for the high quality pedagogy and training structure. It has been providing training services to thousands of technicians, service personnel, and lately, educational institutions for over a decade. Training courses from the group offer in-depth knowledge of the evolving technologies and at the same time provide hands-on experience with the latest equipment, by staff who are highly knowledgeable and experienced. The centre is offering a highly job-oriented skill development programmes in the field of automotive electrical & electronic systems, Air Conditioning System and Modern Diesel Systems.

Training Modules:

- Basic Diesel System Management
- Automotive Electrical Systems
- Air Conditioning Service
- Electrical and Electronic Diagnostics

b. Curriculum Delivery by Industry Expert

Industry involvement in the program design and Curriculum

Curriculum enrichment done by means of engaging industry engagement. Few courses are regulation for safety health environment, Safety in Chemical industries and Computer aided hazard analysis

c. Content Delivery by Industry Expert

The industry experts also engaged effectively in handling few topics for our students. Few example courses are safety in engineering industry and OHSAS 18000 and ISO 14000

d . Impact Analysis of Institute and Industry Interactions

Industry expert	Suggestion	Impact analysis	Action taken
Mr.C.Arunpandian, Murugappa groups	Computer Aided Hazard analysis	Analysed the suggestion and it was identified incorporating the software can help the students to gain the knowledge	Software's like risk assessment, HIRA , ETA , FTA and HAZOP analysis
Mr.J.Prabhu, RAMCO mills Pvt Ltd.,	Safety in textile industries	Need of field visits for the better understanding of the course	Field visit happened and evaluation of student involvement also noted.
Mr.A.Sivagurunathan, DCW Pvt Ltd.,	Safety in chemical industries	Case study analysis can provide experiential learning to address similar kind of real time problems.	Case study conducted and report on the same submitted by the students at the time of evaluation
Mr.Karthick , Sunmar chemicals PVT	Fire engineering and explosion control	Real time survey and problem identification in fireworks sectors can help to avoid the unexpected accidents	Visited firework industries and detailed report submitted
Mr.Shanmugasundaram, Hyundai mobis	Safety in Engineering industry	Recommendations for the safety measures for the identified industry problems	Real time industry problems taken by the student and case study analysis done.

e. Industrial training/tours for students

The initiatives for industry interaction starts by the coordination from office of Director (Industrial Relations) and Director (Training and Placement) with the department.

They are responsible for establishing the contact between the industries and the university, once the contact is established requests are raised for the benefit of students in the form of,

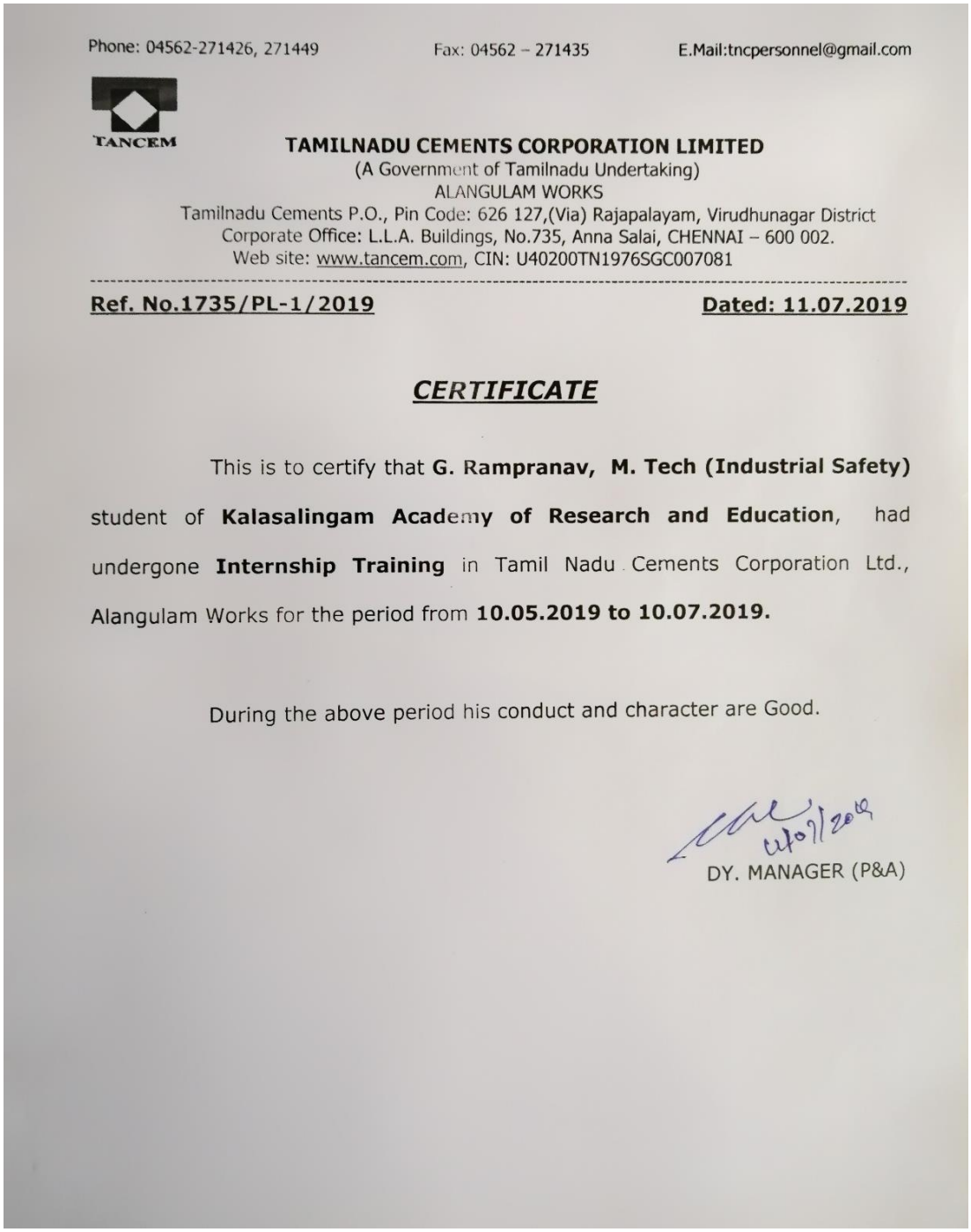
- Internship / summer training programs
- Regular Industrial Visits by the students and evaluation through detailed reports
- Industry based expert trainings in the plant
- Industry Expert lectures planned in the campus with necessary assessments
- Membership to common professional societies for better socializing in the industry network
- Industrial projects targeting certain specific industrial based problems

f. Industrial /internship /summer training of more than two weeks and post training Assessment

Table 1.2.3 presents the details of students of 2018-2020 Batch who had undergone internship training. The practice and knowledge gained by the students during their internship duration helps them to score better in their theory as well as project courses. In addition,it also helps them for placement. Figure 1.8 shows the certificate issued by the industry on the completion of internship by Mr. G. Rampranav during his course of study.

Table 1.2.3 Details of students undergone Internship (2018-2020 Batch)

S. No	NAME OF THE STUDENTS	REGISTER NUMBER	NAME/ADDRESS OF THE COMPANY	DURATION
1.	9918120001	Saravanamani M	Wabco India Limited Chennai	4 weeks
			Shanthi Gears Coimbatore	4 weeks
2.	9918120002	Rampranav G	TANCEM Alanagulam	12 weeks
			Madura Coats Papanasam	16 weeks
3.	9918120003	Roopa Ann Koshy	Manglore Chemical Fertilizers – Mangalore Kerela	1.5 week
			Shanthi Gears Coimbatore	16 weeks
4.	9918120004	Pradeep Kannan P	TANCEM Alanagulam	12 weeks
5.	9918120005	Ramapandian A	Wabco India Limited Chennai	4 weeks
			Shanthi Gears Coimbatore	16 weeks



Phone: 04562-271426, 271449 Fax: 04562 – 271435 E.Mail:tncpersonnel@gmail.com

TANCEM

TAMILNADU CEMENTS CORPORATION LIMITED
(A Government of Tamilnadu Undertaking)
ALANGULAM WORKS
Tamilnadu Cements P.O., Pin Code: 626 127,(Via) Rajapalayam, Virudhunagar District
Corporate Office: L.L.A. Buildings, No.735, Anna Salai, CHENNAI – 600 002.
Web site: www.tancem.com, CIN: U40200TN1976SGC007081

Ref. No.1735/PL-1/2019 **Dated: 11.07.2019**

CERTIFICATE

This is to certify that **G. Rampranav, M. Tech (Industrial Safety)** student of **Kalasalingam Academy of Research and Education**, had undergone **Internship Training** in Tamil Nadu Cements Corporation Ltd., Alangulam Works for the period from **10.05.2019 to 10.07.2019.**

During the above period his conduct and character are Good.

11/07/2019
DY. MANAGER (P&A)

Figure 1.8 Sample internship certificate

g. Impact Analysis of Industrial Training

The impact of industrial training, industrial visits by the students leads to the following:

- Good Placements in core sectors
- Able to carry out quality projects in industries
- Leads to be an entrepreneur
- Understand the courses in a effective manner due to the practical exposure

1.2.4 Participation of Industry professionals in curriculum development, as examiners, in major projects:

- Industry professionals are an integral part of the curriculum development process in our university.
- Industry experts are sought during the preparation of the rough draft of curriculum in order to provide expert opinion for enhancement of the curriculum.
- Industry experts are mandatorily a part of the Board of Studies and are essential in providing feedback on the various revisions and implementations related to the curriculum.
- The other industrial contacts that have been developed by the department over the years are,
    - Alumni in prominent Industrial positions
    - Students who have been placed in Industries
    - Parents of the students who are in prominent industrial positions
    - Industries with which MoU's have been signed
- Such industrial resource persons are invited for various events and roles such as,
    - External expert for the development of question paper
    - External expert for evaluation
    - Guest for delivering of lecture during workshops / technical training programs etc.
    - Guest for adjudging of competitions that are conducted in the campus
    - Industrial expert for evaluation of student projects
    - Industrial supervisor for the student's project
- The current status of Industry-Academia interaction is very encouraging and show lot of potential for further interaction in terms of
    - Providing additional training and skills to enhance their employability
    - Providing additional training to the faculty and supporting their R & D activities
    - Providing readily employable students to the industries.

1.2.5. Quality of laboratory work given

In addition to the Industrial Safety Laboratory, Laboratories have been integrated with individual subjects through assignments where the student is expected to carry out detailed case studies and investigations in the issues of society in and around the University.

Occupational Health and Hygiene (MEC18R5002) is one such course where the student is expected to visit the local small-scale industries in and around the university. The student is expected to prepare a detailed report based on his observations and investigations. The reports must highlight the various shortfalls that have been observed by

the students andthe various means and methods to overcome these shortfalls.

Another instance of such a course is Regulation for Health, Safety and Environment (MEC18R5003). Here the various areas where the student can visit for investigation purposes are the medical camps, dispensaries placed in and around the university. Also, dumping grounds and waste recovery systems are places of interest where the students can come out with innovative solutions for real time problems.

Also, there are many small-scale fireworks factories in and around our university which is much helpful for conducting investigations and are relevant to courses such as Fire Engineering and Explosions Control (MEC18R5005). The reports must highlight the ensuing problems these industry face and must bring forth methods and techniques to avoid accidents in such scenarios.

Industrial Noise and Vibration control (MEC18R5014) is another course of great scope where the students have visited industries such as Raj Weaving industry Kappalur Madurai, Sidco industrial Estate and have made detailed reports on the effect ofnoise and vibrations on the machine working environment. This scope also covers local facilities such as the various laboratories inside the campus including the garages and workshops.

CRITERION II	PROGRAM OUTCOMES AND COURSE OUTCOMES

2.1 Establish the connect between courses and PO (15)

The Program Articulation Matrix below in table shows the mapping of the various PO/PSOs with the individual course which are being offered in the ISE curriculum. The average value of individual POs is rounded to the next whole number. The unmapped CO and PO columns are left empty. The same procedure is followed for all the courses and listed in the table below. From the program articulation matrix, the number of courses contributing towards the PO attainment for P.G Industrial Safety Engineering program be identified. The majority of the courses in ISE are influenced by PO1 and PO3. In the program articulation matrix, the course outcome is mapped with the program outcome in a 3-point scale rating where 3 indicates high correlation, 2 indicates medium correlation and 1 indicates low correlation. The full course list of ISE with PO mapping listed in Table in 2,1

Table 2.1 Courses List with POs Mapping

S. NO	COURSE CODE	COURSE NAME	PO1	PO2	PO3
1	MAT18R5002	Statistics and ComputationalTechniques	1	0	1
2	MEC18R5001	Safety Management	2	2	2
3	MEC18R5002	Occupational Health and Hygiene	2	2	2
4	MEC18R5081	Industrial Safety Lab	3	3	3
5	PGM18R5001	Research Methodology For Engineers	2	2	2
6	MEC18R5003	Regulations For Health Safety & Environment	3	1	2
7	MEC18R5005	Fire Engineering and Explosion Control	2	2	2
8	MEC18R6007	OHSAS 18000 and ISO 14000	2	3	2
9	MEC18R6099	Dissertation Phase – II	2	3	3
10	MEC18R5004	Computer Aided Hazard Analysis	3	3	2
11	MEC18R5006	Safety in Engineering Industry	2	3	2
12	MEC18R5007	Safety In Plant Layout and Material Handling	2	2	1

13	MEC18R5009	Human Factors Engineering	2	3	2
14	MEC18R5010	Transport Safety	3	2	2
15	MEC18R5011	Fireworks Safety	2	2	2
16	MEC18R5012	Safety in ON and Off Shore Drilling	2	3	3
17	MEC18R5013	Safety in Textile Industry	3	3	2
18	MEC18R5014	Industrial Noise and Vibration Control	2	2	1
19	MEC18R5015	Work Study and Ergonomics	2	3	2
20	MEC18R5016	Reliability Engineering	2	1	2
21	MEC18R5017	Probabilistic Safety Assessment	2	2	2
22	MEC18R5018	Biomechanics and Human Body Vibration	2	1	2
23	MEC18R5019	Corrosion Engineering	3	1	1
24	MEC18R5020	Risk and Reliability for Offshore Structure	2	3	2
25	MEC18R5021	Safety in Chemical Industries	2	2	2
26	MEC18R5022	Electrical Safety	2	3	3
27	MEC18R5023	Environmental Safety	2	2	1
28	MEC18R6001	Nuclear Engineering and Safety	2	2	3
29	MEC18R6002	Safety in Mines	2	3	2
30	MEC18R6003	Dock Safety	2	3	2
31	MEC18R6004	Safety in Powder Handling	2	3	3
32	MEC18R6005	Quality Engineering	3	1	3
33	MEC18R6006	Radiographic Testing and Radiation Safety	2	3	2
34	MEC18R6008	Intelligent Industrial Systems	2	3	3
35	MEC18R6009	Safety in Petrochemical Industries	2	3	3
36	MEC18R6010	Quantitative Risk Analysis in Chemical Process	2	3	3
37	MEC18R6011	Sensitivity Measurement and Evaluation Of Energetic Material	2	3	3
38	MEC18R6012	Solid and Hazardous Waste Management	1	2	2

39	MEC18R6013	Maintainability Engineering	3	3	2
40	MEC18R6014	Air Pollution Control Equipment Design	0	0	2
41	MEC18R6015	Automotive Systems Safety, Quality and Reliability	3	2	3
42	MEC18R6051	Disaster Management	3	0	3
43	MEC18R6052	Safety in Construction	1	3	2
44	MEC18R6053	Environmental Impact Assessment	2	1	3
45	EEE18R5020	Soft Computing Techniques	2	2	3
46	EEE18R5021	Optimization Techniques	3	2	2
47	EEE18R6013	Evolutionary Computation Techniques	3	2	2
48	CSE18R5051	Cloud Computing	2	2	2
49	CSE18R5052	IOT And Applications	2	2	2
50	CSE18R5053	Big Data Analytics	2	2	2

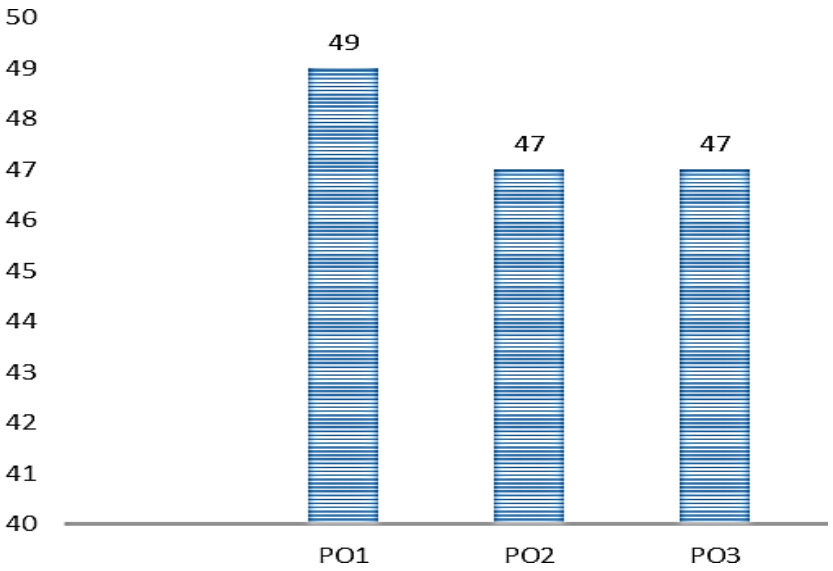


Figure 2.1 Number of courses contributing to PO

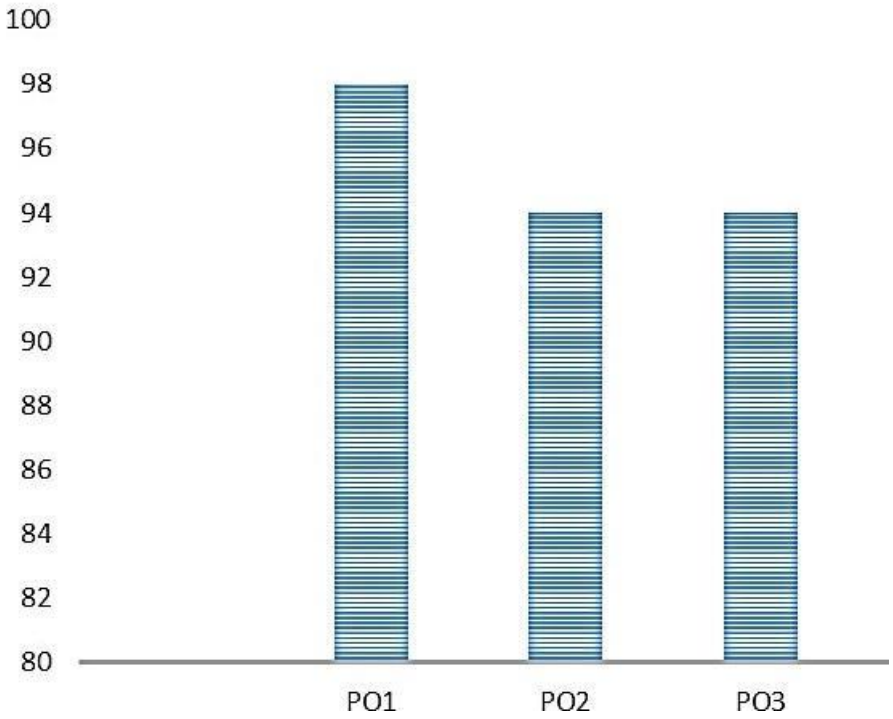


Figure 2.2 Weighted Percentage of courses contributing to PO

Figure 2.1 and 2.2 depicts the percentage of courses contributing to each POs are presented. Also in the below table 2.2 the number of courses correlation with various levels are presented

Table 2.2 Courses correlation with POs

PO	No. of courses contributing to PO	Weighted % of courses contributing to PO	No. of courses with correlation		
			1(Low)	2 (Medium)	3 (High)
PO1	49	98	3	34	12
PO2	47	94	3	22	22
PO3	47	94	6	27	14

The correlation between the course outcomes of each course and the programme outcomes is as follows:

MAT18R5002	STATISTICS AND COMPUTATIONAL TECHNIQUES	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Construct discrete and continuous probability distribution for the appropriate random variable and make further predictions on the probability.	1	2	
CO2	Calculate correlation and regression for the given data for presenting necessary interpretations.	1	2	
CO3	Estimate parameter using multiple criteria such as estimator, maximum likelihood estimate, method of moments and least square principles from sample data.	1	2	
CO4	Perform hypothesis testing for small, large samples which are identified as Parametric Test and do Testing of Goodness of Fit, Independence of attributes which are identified as Non-Parametric Test.	1	2	
CO5	Design experiment and appropriately interpret results of analysis of variance tests.	1	2	

MEC18R5001	SAFETY MANAGEMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand and Apply the basic principles of safety management in an organization / industries	2	3	1
CO2	Identify the different unsafe act and unsafe conditions and gather knowledge on method of accident investigations and report writing.	2	1	3
CO3	Explain the importance of safety education, training and performance monitoring.	3	2	2
CO4	Identify and Apply the suitable personal protective equipment’s for various hazards conditions.	1	3	2
CO5	Analyse the human behaviour based safety and explain the role of safety supervisor.	2	1	2

MEC18R5002	OCCUPATIONAL HEALTH AND HYGIENE	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the physical hazards and safety standards for industries.	2	2	1
CO2	Articulate suitable techniques to control chemical hazards	2	2	2
CO3	Identify safety tools to control biological and ergonomic hazards	3	2	3
CO4	Develop the concept for health hazard control and toxicology	2	3	2
CO5	Devise a parameter to increase the strength of physiology	2	2	2

MEC18R5081	INDUSTRIAL SAFETY LAB	L	T	P	C
		0	0	4	2

CO	CO Statement	PO		
		1	2	
CO1	Remember the basic safety concepts and definitions to incorporate practical potential Industrial problems.	3		2
CO2	Analyse the Unsafe acts, unsafe conditions to minimize the accidents and incidents encountered in industry.		3	2
CO3	Evaluate the various parameters like sound, lighting, vibration, temperatures, Air level with the help of basic safety Instrumentation systems.		3	3
CO4	Demonstrate the working practice for firefighting equipment and fire safety systems physically and Handling of fire extinguishers techniques.	2	3	3
CO5	Design and Develop the various safety Models with the help of basic safety terminologies concepts		3	3

PGM18R5001	RESEARCH METHODOLOGY FOR ENGINEERS	Credits			
		L	T	P	Total
		1	0	0	1

CO	CO Statement	PO		
		1	2	3
CO1	Understand purpose, role, types, importance and formulate research	1	2	2
CO2	Apply suitable statistical methods to research studies	2	2	2
CO3	Understand and apply research data presentation and analysis methods	1	1	1
CO4	Understand and Develop algorithms to optimize the variables and to solve the problems in research	2	2	1
CO5	Understand and Apply the knowledge acquired in writing and generating the a research report	2	1	1

MEC18R5003	REGULATIONS FOR HEALTH SAFETY & ENVIRONMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Discuss statutory authorities, special provisions and penalties in Factories Act and Tamilnadu Factories Rules	3	1	
CO2	Interpret legislative requirements, latest amendments and procedures in Environment Act	3	1	
CO3	Summarize definitions, duties of authorities and responsibilities of Occupiers of Hazardous Chemicals Rules	3	1	
CO4	Illustrate various other acts and rules and latest amendments	3	1	
CO5	Differentiate Indian standards and International standards on Health and Safety	3	1	

MEC18R5005	FIRE ENGINEERING AND EXPLOSION CONTROL	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the concept of fire, explosion and behaviour of fire.	1		1
CO2	Develop various fire prevention and protection systems to control the rate of fire.	3	3	2
CO3	Develop various firefighting systems used to control the industrial fire.	3	3	2
CO4	Analyze the requirements of fire safety measures in high rise and other building	2	1	1
CO5	Compare the various methods of explosion protection systems used in industry	3		

MEC18R6007	OHSAS 18000 and ISO 14000	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the elements, features and scope of Occupational health and safety management system	2	2	2
CO2	Develop an Occupational health and safety policy and for planning methodology to reduce the occupational hazards.	3	3	1
CO3	Recognize the responsibilities of safety professionals and organizations to promote health and safety of the employees in the workplace.	3	3	
CO4	Illustrate the elements, features and scope of Environmental Management system (ISO 14001)	1		
CO5	Evaluate the Environmental Impacts by conducting an EIA methodologies to ensure that whether the proposed project will affect the environment or not.			

MEC18R6098	DISSERTATION PHASE - I	L	T	P	C
		0	0	20	10

CO	CO Statement	PO		
		1	2	3
CO1	Know the real Industrial Scenarios and Safety Activities followed in reputed MNC and Process Industries.	2		1
CO2	Identify the potential problems and Hazards Encountered in the Industries through the physical inspections of various departments.	3	2	
CO3	Conduct a real time survey from the workers and collect accident data from the identified Problems.		3	2
CO4	Apply the suitable methodology and techniques for the potential Hazardous scenarios and risk environments.	1	3	
CO5	Recommend and Innovate the Safety precautions that can be followed in the recent Industrial Hazardous Situations and Plan for publishing his/her work in Scopus Index Journals.	2		1

MEC18R6099	DISSERTATION PHASE – II	L	T	P	C
		0	0	32	16

CO	CO Statement	PO		
		1	2	3
CO1	Select the real time industrial safety related problems and focus research work in that field effectively.	2		1
CO2	Design and develop the safety tools and techniques for providing the safety measures to the industrial safety related problems.	3	2	
CO3	Familiarize with design standards, calculations for mechanical components or systems and compliance with safety standards.		3	2
CO4	Develop the presentation and communication skills to deliver the project ideas and suggestion to improve the project.	1	3	
CO5	Choose a reputed journal or conference for publishing the project work	2		1

MEC18R5004	COMPUTER AIDED HAZARD ANALYSIS	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Identify the types of hazard, risk issues and various assessment methods.	3	2	1
CO2	Analyze thermal behavior of different materials using advanced instruments.	3	3	3
CO3	Select suitable qualitative assessment methods to reduce hazards and risk issues.	3	3	3
CO4	Apply the methods of prevention of fire and explosions.	3	3	3
CO5	Analyze problems in which many of the parameters are non-deterministic in nature	1	2	2

MEC18R5006	SAFETY IN ENGINEERING INDUSTRY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the basic safety Rules and Regulations followed in Shop floors, Grinding, Milling and Lathe workshop.	2		1
CO2	Demonstrate working principle of the Machine guarding System and identify the suitable guarding system for the various Machines.	2		2
CO3	Analyze the safety accidents encountered in Gas cutting and welding activities and suggest suitable safety precautions.	1	3	2
CO4	Investigate the Problems Encountered in Cold working and Hot working environments activities and apply the safety measures for both activities.		3	2
CO5	Check and Validate the safety measures applied in the finishing and foundry operations and compared with the legal safety regulations and standards		3	3

MEC18R5007	SAFETY IN PLANT LAYOUT AND MATERIAL HANDLING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Classify the safety parameters taken into considerations for selecting the plant location.		2	1
CO2	Examine the diverse types of plant layout for different industries in accordance with safety requirements.	2	2	1
CO3	Illustrate the working conditions to be provided to the workers with safety considerations for better work quality.			
CO4	Demonstrate the safety procedures to be followed in manual material handling process.		1	
CO5	Summarize the hazard prevention techniques that to be implemented in mechanical handling process for avoiding accidents in the industry		1	

MEC18R5009	HUMAN FACTORS ENGINEERING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the Basic Human Body Postures activities and definitions of ergonomics and awkward postures and biomechanical principles.	2		1
CO2	Identify the causes of human stress, Fatigue and improvement of safety culture in Industries.		2	1
CO3	Design the Anthropometry design for workers to prevent the physical discomfort from the machines.	2	3	3
CO4	Apply the safety systems and procedures to minimize the manual material handling and man-machine interface hazards.		3	3
CO5	Simulate the awkward postures using various ergonomics online tools to solve the problems occurred in the workplace.		2	

MEC18R5010	TRANSPORT SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Identify the various safety measures to be followed during transportation of hazardous materials.	3	3	2
CO2	Analyze the causes of road accidents and preventive measures to avoid the accidents in future.	3	2	2
CO3	Recognize the responsibilities of drivers to improve their performance during driving	2	2	2
CO4	Develop the safety recommendations to promote the road safety	3	3	3
CO5	Identify the safety measures and suggestions to improve the efficiency of the shop floor.	3	2	2

MEC18R5011	FIREWORKS SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Identify the various chemicals and its properties used in the production of Fireworks.	2	2	1
CO2	Explain the concept of static friction in fireworks processing and its importance in the safety aspect. .	2	2	2
CO3	Narrate the process adopted in manufacturing of fireworks and the safety measures to be followed. .	3	2	3
CO4	Elaborate the various procedures involved in the material handling process of the fireworks industry.	2	3	2
CO5	Apply the various procedures involved in the transportation and waste disposal safety process of the fireworks industry	2	2	2

MEC18R5012	SAFETY IN ON AND OFF SHORE DRILLING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the Basic knowledge in the oil extraction process in ON and off Shore Manufacturing sectors.	2		
CO2	Identify the hazards encountered in the On and OFF Shore construction drilling process.		2	2
CO3	Investigate the safety precautions and ensure the preventive procedures for Drilling equipment used in Oil extraction process.		3	3
CO4	Evaluate the hazards and risk encountered in the transportation of oil and drilling processes.		3	2
CO5	Formulate the safety Operating Procedures for the oil and Gas Drilling Technology process	2	3	3

MEC18R5013	SAFETY IN TEXTILE INDUSTRY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Narrate the various principle and processes involved in the textile industries.	3	3	2
CO2	Identify the various hazards and safety procedures involved in the looming section of textile sectors.	3	3	
CO3	Classify the various hazards involved in the effluent treatment process and its safety precaution.	3	3	
CO4	Explain the solution to various problems that affected human health and welfare in the textile industry.	3	3	
CO5	Know and apply the various factories act and rules to be followed in the textile industry	3	3	2

MEC18R5014	INDUSTRIAL NOISE AND VIBRATION CONTROL	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Elaborate the various terms related to noise and vibration hazards.		2	1
CO2	Explain various equipment and the process involved in human ear instrumentation and auditory.	2	2	1
CO3	Analyze the impact of various noise sources as well as the propagation impact.			
CO4	Differentiate the various noise control methods and prevention from its hazards.		1	
CO5	Outline about the formation of noise abatement and its hazards.		1	

MEC18R5015	WORK STUDY AND ERGONOMICS	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the role of work study, need of Human factors applications and Method Study concepts in the workplace.	2		1
CO2	Explicate the causes of Physical comforts and ergonomic hazards encountered in Industries.		2	
CO3	Apply the suitable Personal Protective equipment used in the workplace and Recommend the various factors considered to design the PPE.		3	3
CO4	Design and Fabricate the suitable safety System with the Standards for Inspections and Maintenance Training Procedures.		3	2
CO5	Differentiate between the Man-Machine System and improvement of safety cultures in the workplace	1	2	

MEC18R5016	RELIABILITY ENGINEERING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the basic concept of reliability, maintainability and availability.	2	2	2
CO2	Recognize the concept of failure data analysis and severity ranking using risk priority number.	2	1	2
CO3	Develop safety tools and techniques to determine the reliability of the components or system.	2	1	
CO4	Analyze the risk assessment techniques for the component or system using reliability concepts.	3		
CO5	Identify the likelihood of human error for the given task using HRA technique.			

MEC18R5017	PROBABILISTIC SAFETY ASSESSMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the basic concepts of mathematical probability analysis.	2	2	1
CO2	Develop the various hazards analysis techniques to prevent the accidents.	3	1	3
CO3	Analyze the consequences of various accidents using accidents consequence analysis techniques.			
CO4	Compare the various levels of Probabilistic Safety Assessment.	2	2	
CO5	Develop the application of Probabilistic Safety Assessment to various industries		3	3

MEC18R5018	BIOMECHANICS AND HUMAN BODY VIBRATION	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the basic principle of vibration mechanisms and measurement techniques involved in the workers Bio-mechanics postures.	2		1
CO2	Analyze the Musculoskeletal system and anthropometry biomechanics hazards encountered in the workplace.		3	2
CO3	Evaluate the Posture analysis using the various Biomedical Instrumentation measuring devices.		3	3
CO4	Evaluate the societal impact of biomechanical models in safety engineering.		3	3
CO5	Improve the fundamental bio engineering approaches to health related biomedical research using the vibration exciters in the safety domain	1	2	1

MEC18R5019	CORROSION ENGINEERING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the basic principles of corrosion phenomenon	3	2	1
CO2	Outline the different forms of corrosion	3	2	1
CO3	Illustrate the various techniques to prevent the corrosion	3	2	1
CO4	Infer the forms of corrosion by appropriate testing methods.	3	2	1
CO5	Summarize the corrosion in various industry	3	2	1

MEC18R5020	RISK AND RELIABILITY FOR OFFSHORE STRUCTURE	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Identify the Environmental problems involved in Offshore structures and assess by using various Management Tools.	2		
CO2	Develop a Risk Assessment Model using Various safety Tools and Techniques.		3	1
CO3	Investigate the types of risks present in the workplace using the Reliability Concepts.		3	3
CO4	Identify the safety Precautions Followed in Off Shore Wells for operation and maintenance work.	2	2	1
CO5	Apply the safety techniques to predict the various types of risk involved in Off Shore Structures.	1	3	3

MEC18R5021	SAFETY IN CHEMICAL INDUSTRIES	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the various pressure control equipments and controls with safety standards	2	1	
CO2	Interpret various plant commissioning inspection procedures in industries	2	2	3
CO3	Explain the concepts of planning and maintenance and disaster situations.	2	3	3
CO4	Distinguish the various storage methods of petroleum products in chemical industries	3	2	2
CO5	Formulate the methods of start and run the industries with safety standards	3	2	1

MEC18R5022	ELECTRICAL SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the basic Knowledge of basic concepts of electrical systems, safety Norms and Regulations employed in Electrical Inspectorate.	2		3
CO2	Analyze the causes of electrical hazards involved in electrical Equipments used in industries.		2	3
CO3	Examine the electrical Equipments from various types of safety protection systems used in industries.		3	
CO4	Identify the selection and maintenance procedures to install new equipment in Industries.	1	2	
CO5	Categorize the various hazardous zones for electrical hazards and suggest suitable recommendations		3	2

MEC18R5023	ENVIRONMENTAL SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the basics with principles, effects and hazards of air pollution.	3	2	2
CO2	Analyze the classification, treatments, effluents and disposal of water pollution.	1	3	1
CO3	Interpret the various characteristics of solid and hazardous waste management.	1	2	2
CO4	Identify the suitable environmental measurement and control devices for the analysis.	2	1	1
CO5	Develop the pollution control strategies and suitable measures in process industries.	2	2	1

MEC18R6001	NUCLEAR ENGINEERING AND SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Remember the basic knowledge of Nuclear physics and nomenclature and measuring instruments related to Nuclear safety.	2		
CO2	Identify the various safety control systems used to prevent the accidents and incidents inside the Nuclear Reactor.	2	2	
CO3	Analyze various events in globe happened nuclear reactors and facilities	2	3	3
CO4	Match the suitable regulations related to safety followed by international bodies and standards.	2	2	
CO5	Apply various safety regulations followed in India during employment as per AERB Body.	1		2

MEC18R6002	SAFETY IN MINES	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Identify the causes of accidents and hazards encountered in open cast mining processes.	2		1
CO2	Investigate the causes of Explosion and fire hazards in the underground mining operations.	1	3	2
CO3	Examine the hazards and risk involved in underground Tunneling ming activities.\		3	2
CO4	Conduct Risk assessment for coal mining activities by applying various quantitative risk analysis tools.		3	3
CO5	Analyse the various disasters encountered in mining activities and predict the suitable lesson learnings	2	3	3

MEC18R6003	DOCK SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the various safety rules and regulations applicable for Dock safety.	2		3
CO2	Analyze the hazards associated with various processes involved in the ship work.	2		
CO3	Compare the different types of lifting appliances used in ship work.		3	2
CO4	Analyze the different types of material handling equipment used in the dock.	1		2
CO5	Develop the roles and responsibilities of the workers involved in the ship work	2	2	

MEC18R6004	SAFETY IN POWDER HANDLING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the various properties of metallic and nonmetallic chemical powder.	2	2	
CO2	Analyze the ignition characteristics of various chemical powders and methods used to control the dust generation.	2	1	
CO3	Analyze the various hazards associated with handling of powders in industry.	2		
CO4	Identify the hazards and assess the risk during handling with the powders in industry.		2	2
CO5	Develop the various safety measures and practices to be followed in powder industries	2	3	3

MEC18R6005	QUALITY ENGINEERING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the loss function derivation in quality engineering, product design and loss functions..	2	1	3
CO2	Develop their knowledge in on-line quality control.			
CO3	Analyze the various control attributes and its method of improvement.	2	1	3
CO4	Recognize the quality in maintenance engineering.	3		2
CO5	Develop the activities for six sigma implementation and its improvement.	2	1	

MEC18R6006	RADIOGRAPHIC TESTING AND RADIATION SAFETY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the working principle and characteristics of radiography.	1	1	1
CO2	Compare the different types of industrial radiography used in industrial applications.	2	2	
CO3	Identify the quality of radiographic images using appropriate inspection techniques.			
CO4	Develop the various types of advanced radiographic techniques used to overcome the problems.	2	2	
CO5	Develop the various safety measures and precautions to avoid the exposure from radiation		3	3

MEC18R6008	INTELLIGENT INDUSTRIAL SYSTEMS	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Remember the basic concepts of artificial intelligence systems and architectures process flow diagrams.	1		2
CO2	Illustrate the applications of expert and Knowledge systems able to be applied in safety domain research.	2	2	
CO3	Identify the suitable material for the fabrication process applied in an expert system.	1		1
CO4	Evaluate the problems using the various fault diagnosis control systems in safety domains.	2	3	3
CO5	Apply the artificial Intelligence system for the Real time applications problems.	1	2	3

MEC18R6009	SAFETY IN PETROCHEMICAL INDUSTRIES	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Elucidate the various risk management strategies and planning involved in Petrochemical Extraction Process.	2		1
CO2	Identify the Suitable Control system techniques to minimize the hazards involved in the petrochemical refineries.		3	
CO3	Catergorize the safety systems used in the petrochemical process and design the suitable safety operating procedures adopted in the oil and refineries.		3	3
CO4	Apply and select the suitable safety Tools and techniques used to minimize the serious explosions encountered in Petrochemical process operations.		3	3
CO5	Identify the leakages and Spills present in the various LPG and LNG Gas Tanks and able to control the associated Hazards.		3	3

MEC18R6010	QUANTITATIVE RISK ANALYSIS IN CHEMICAL PROCESS	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the basic concepts of Quantitative Risk Analysis and Various models to solve the failures encountered in safety systems.	1		1
CO2	Analyse the causes of fire and explosion in industries by using the various consequences models.		3	2
CO3	Investigate the ranges and level of exposures occurred in the incident frequency accidents in the workplace.	2	2	3
CO4	Evaluate the risk encountered in the industry using the risk estimation procedures.	1	3	3
CO5	Examine the special approach of various analysis used to solve the safety critical problems related to the equipment designs.		2	2

MEC18R6011	SENSITIVITY MEASUREMENT AND EVALUATION OF ENERGETIC MATERIAL	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Remember the basic compositions and Pyrotechnics properties of various Energetic materials used in industries.	1		
CO2	Analyse the mechanical sensitivity of various Energetic materials using various Thermal Reactivity Instruments.	2	2	2
CO3	Examine and check the properties of materials using various thermal analysis instruments.	2	3	3
CO4	Examine and check the kinetic properties of materials using various thermal analysis instruments.	2	3	3
CO5	Evaluate the explosion properties of various energetic materials using thermal mechanism techniques	1	3	3

MEC18R6012	SOLID AND HAZARDOUS WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Understand the characteristics of various types of solid and hazardous waste and variance factors	1	2	
CO2	Apply expertise of waste disposal and waste transportation in recycling / reuse.	1	2	
CO3	Categorize the various techniques for waste processing	1	2	
CO4	Examine the different waste treatment disposal methods	1	2	
CO5	Establish expertise of the integrated method of waste management	1	2	

MEC18R6013	MAINTAINABILITY ENGINEERING	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Recognize the concept of maintenance.	2	3	2
CO2	Demonstrates the various models of maintenance.	2	2	
CO3	Discuss about the maintenance logistics and their control.	3		2
CO4	Evaluate the maintenance quality and their concept.	2		
CO5	Explain the concept of total productive maintenance.	3	3	2

MEC18R6014	AIR POLLUTION CONTROL EQUIPMENT DESIGN	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the environmental protection scope of simple principles.			2
CO2	Identify ethical behavior guidelines published by professional security associations and credential bodies.			2
CO3	Examine how environmental health issues emerged due to air and water pollution			2
CO4	Illustrate environmental policy approach			2
CO5	Describe the water pollution classification and its attributes			2

MEC18R6015	AUTOMOTIVE SYSTEMS SAFETY, QUALITY AND RELIABILITY	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Discuss about the safety management practices in the automotive industries.	3	2	3
CO2	Examine the safety system analysis and its control.			1
CO3	Indicates the hazards and risks in automotive industries.	3	2	2
CO4	Discuss about transport safety and some case studies.	3	2	1
CO5	Assess the reliability control and quality control.	2		2

MEC18R6051	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Remember the various types of Man- Made and Natural Disaster encountered in the current scenario and review the various philosophies in disaster management process.	2		1
CO2	Conduct Investigations about Industrial Man-Made Disaster in various locations and identify the suitable lesson learnings.		3	2
CO3	Recommend and Ensure the Sustainable development methodology for various biodiversity species to prevent the environmental disaster.	1		2
CO4	Illustrate the various Oil and Refineries Hazards and reviewed the case study for analyzing the Human errors.	1		2
CO5	Conduct the risk assessment for the man-made and Natural disasters by comparing the legal standards and acts related to the environments	3		3

MEC18R6052	SAFETY IN CONSTRUCTION	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Categorize the basic design, quality and construction regulations		1	
CO2	Investigate the various levels of construction and hazards measures		2	2
CO3	Prevent the accidents and rules of very height work	1	3	1
CO4	Perceive the various construction machinery used in Industries.		1	2
CO5	Explain about health hazards in demolition work.	1		1

MEC18R6053	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

CO	CO Statement	PO		
		1	2	3
CO1	Illustrate the fundamentals of the determination of the environmental effects and its legal and regulatory significance.	2		3
CO2	Identify different EIA part methodologies involved in balanced environmental maintenance.	2		3
CO3	Discuss the EIA and the framework criteria for tracking the various safety tests.	2		3
CO4	Analysis of the EIA with the proper guideline and requirements for assessment.	2		3
CO5	Create the definition, execute the method, and excellently evaluate the environmental effects in the implementation of the key work project.	2		3

2.2. ATTAINMENT OF PROGRAM OUTCOMES (60)

2.2.1. DESCRIBE THE ASSESSMENT TOOLS AND PROCESSES USED TO GATHER THE DATA UPON WHICH THE EVALUATION OF PROGRAM OUTCOME IS BASED (20)

The M.Tech. Industrial Safety Engineering program of Kalasalingam Academy of Research and Education follows the Direct Assessment method and Indirect Assessment method for evaluating the program outcome.

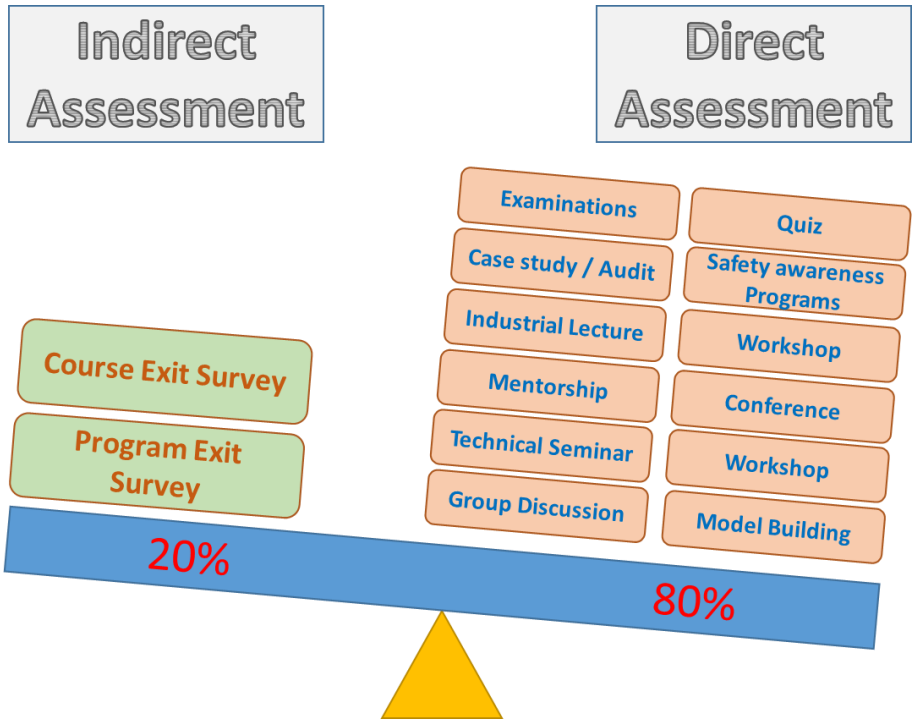


Figure 2.1 Weightage of Direct and Indirect Assessment of POs

Direct Assessment Methods:

Direct assessment methods are applicable to **Theory courses, Laboratory Course, Mini Project and Major Project work**. Both theory and laboratory courses follow the conventional and advanced pedagogical techniques with a flexible evaluation system. Also new type of courses are introduced into the curriculum based on the feedback from the stakeholders.

Indirect Assessment Methods:

Methods of indirect assessment followed by the M. Tech Industrial Safety Engineering Program comprise of **course exit survey and program exit survey**. The course exit survey for individual course is undertaken at the end of each semester and it is the responsibility of the course teacher to conduct the same. The aim of the survey is to obtain the feedback of the students in a

5point scale. This rating helps in predicting the level of understanding a student

acquires with respect to the course outcome which is in line with the program outcome. The programexit survey is another effective indirect assessment technique which is obtained from the studentsat the end of program. This survey also follows a 5 point rating system, and this directly indicatesthe technical skill/practical knowledge of the student with respect to the attainment of the studentoutcomes of M. Tech Industrial Safety Engineering Program. This survey is under the responsibility of the Class coordinator who is the mentor for the particular batch of students during their complete course of study.

The weightage of assessments and the corresponding distribution of marks across the courses have been described below in the table,

Assessment Methodologies

Assessment Tool		Description
Direct Assessment (Theory Courses & Lab Courses)	**Sessional Exams**	Sessional Examination is a part of the continuous assessment process which is conducted twice in the semester. Sessional examination is applicable only for the theory based courses which contains lecture hours in the curriculum. 2 – 3 COs will be assessed in each sessional examination. Partial attainment of COs are achieved via sessional examination. Further actions will be taken to improve the CO attainment in the end semester examination / other assessment tools. The marks for examinations is shown below **Sessional Examination I : 50 marks** **Sessional Examination II : 50 marks**
	Assignment	An assignment is a qualitative performance assessment tool designed to assess student's knowledge of engineering practices.An analytic rubric was developed to assess student's knowledge with respect to the learning outcomes. **Assignment : 50 marks**
	Internal Lab / Practical	The internal mark for laboratory courses are awarded based on observation, experimentation, interpretation, submission of reports and viva voce during the model examination. **Internal marks : 50 marks**
	End Semester Examination	End semester examination is a metric for assessing the attainment of COs for a particular course at the end of the semester. End Semester questions are framed considering all COs for the assessment **End semester Examination : 100 marks**

External Lab / Practical	The external examination for laboratory courses is conducted at the end of the semester for 3 hours. It is evaluated based on rubrics framed by course teacher for the corresponding lab experiments. **End Examination : 100 marks**
Technical Seminar	Technical seminar is conducted at the end of the course on a topic of choice as selected by the student. The CO is adjudged by the presentation of the student and the technical skills displayed by the students. **Marks: 5 – 10**
Quiz	Quiz is given to the students through written or online model to assess the students understanding on a particular topic **Marks: 5 – 10**
Field Report	Student is expected to visit an industry of their choice and the outcome of the visit is assessed by a expert committee where the student present the findings and outcomes from the industrial visit. **Marks: 5 – 10**
Model Building	As a part of the assessment process, course teachers recommend the students to undertake model building activities where the students go through research articles and through the literature study for the identified gap they come up with analytical solutions to solve real life problems. The solutions are reviewed by an expert committee through presentations. **Marks: 5 – 10**
Conference Presentation	Students are expected to present a review paper or short technical articles in conferences as a part of the assessment process. The conferences conducted at reputed institutions will given more weightage in the allocation of marks. **Marks: 5 – 10**
Workshop	Students must participate in reputed workshops held across the country. The outcome of the workshop is assessed by a committee where the student present the outcomes of the workshop. **Marks: 5 – 10**
Group Discussion	Group discussions are carried out by creating break out rooms where the students pitch their thoughts and ideas among themselves. The discussion is assessed by the faculty based on the clarity of thought, justification presented, technical background etc. **Marks: 5 – 10**

	Case study /Audit reportpresentation	Case study on safety aspects in commercial buildings or industries is prepared by the students as a report and the findings are presented by the student in front of a committee. **Marks: 5 – 10**
	Industrial lecture based assessment	Industrial experts are invited for lectures to discuss about the latest developments related to safety practices. The assessment is carried out by the expert at the end of the session in the form of descriptive questions or quiz. **Marks: 5 – 10**
	Industrial / Social awareness event based assessment	Mini scale events are to be planned by the students either as groups or individuals in order to create small camps to create awareness among a social community or industrial community. The event is assessed through presentations depicting the scale of work done. **Marks: 5 – 10**
	Mentorship Activities	Post graduate students are expected to mentor the under graduate students through sessions for creating awareness among the students regarding safety aspects in the domestic as well as official environments. The assessments is evaluated through the feedback received from the undergraduate students **Marks: 5 – 10**
	Safety awareness events planning and execution	Awareness Camps arranged by the students as groups or as individuals in the campus as an extension of the club activities. Camps are set to educate the school students, society and authorities regarding the safety aspects. The evaluation is done based on report submission and feedback after visit of the camps by students. **Marks: 5 – 10**
Indirect Assessment	**Course end Survey**	At the end of every semester, every student is asked to give report about the courses they have studied with assigned rubrics. The course end survey is assessed based on rubrics that will bedesigned by the course coordinator.
	Program Exit Survey	At the end of the program every student is asked to give report aboutthe courses they have studied with assigned rubrics. The survey is assessed based on rubrics that will be designed by the program/course coordinator.

However the **mini project and major project** are assessed through the conduction of periodic reviews in which the student's technical and soft-skill proficiencies are evaluated. Some of the advanced modes of assessment used are **model building** where in a student displays his understanding of the subject by display and demonstration of student-built models. Also, the certificates obtained by the students through participation in workshops relevant to the subject are

also a component in the assessment. **Workshops** organized by reputed institution only the students are encouraged to participate also in themes related to their program course and the assessment done giving more weightage to this component. The evaluation scores from the workshop are also used for the attainment assessment purpose. It is also mandatory that the students have to present their technical articles in reputed **International Conferences.** The presentation of such articles is mandated as it is part of their curriculum and the attainment of a course might be complete only if the presentation has been done. The acceptance of the articles in very prominent conferences leading to publication or securing best paper / presentation award leads to securing higher grades. **Field reports** are also a part of the direct assessment. The student is required to visit an industry of his/her choice and a report has to be prepared documenting the various activities carried out by the students. The assessment has been done based on the report submission duly attested by the industry expert, quality of the report and based on the feedback from the industry. The students must submit the report individually which will be considered for grading. **Technical seminars** are also a part of the assessment process and the various components through which a student is assessed has been described in the flowchart below,

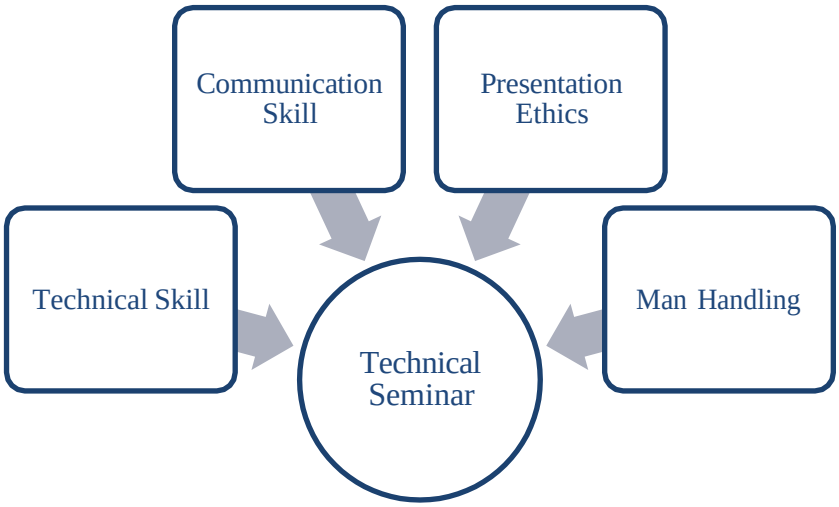


Figure 2.2 Skills Assessed through Technical Seminar

The categories of direct assessment includes the following:

- Sessional Examinations
- End Semester Exam
- Assignments
- Technical Seminar
- Practical Examinations
- Quiz

- Field Report
- Model Building
- Conference Presentation
- Workshop
- Group Discussion
- Case study / Audit report presentation
- Industrial lecture based assessment
- Industrial / Social awareness event based assessment
- Mentorship Activities
- Safety awareness events planning and execution

Though the standard assessment types are specified for the courses, the student evaluation scheme for each course completely depends upon the individual faculty handling that course. As an outcome, the collective suggestions for continuous improvement will be concluded and put forwarded for the approval of Program Advisory Committee (PAC). Finally, suggestions approved by the PAC will be followed and implemented by the faculty members who are handling the same course in the next academic year.

2.2.2. PO'S ATTAINMENT LEVELS WITH OBSERVATIONS (40)

The assessment procedure for CO attainment is based on Direct and Indirect assessment method. The Direct Assessment is completely based on the examinations and indirect assessment is basedon the survey / report taken for the particular course.

Assessment Type		Mode of Assessment	Documentation in-charge / frequency of assessment
Direct Assessment	Theory course	Written examination, Seminar, Mini project, Field work, Quiz, Workshop, Conference Presentation	Course Teacher / Once in a semester
	Laboratory Course	Written and oral examination	Course Teacher / Once in a semester
	Mini Project/ Major Project	Review process	Project coordinator / Thrice in a semester

Direct Attainment

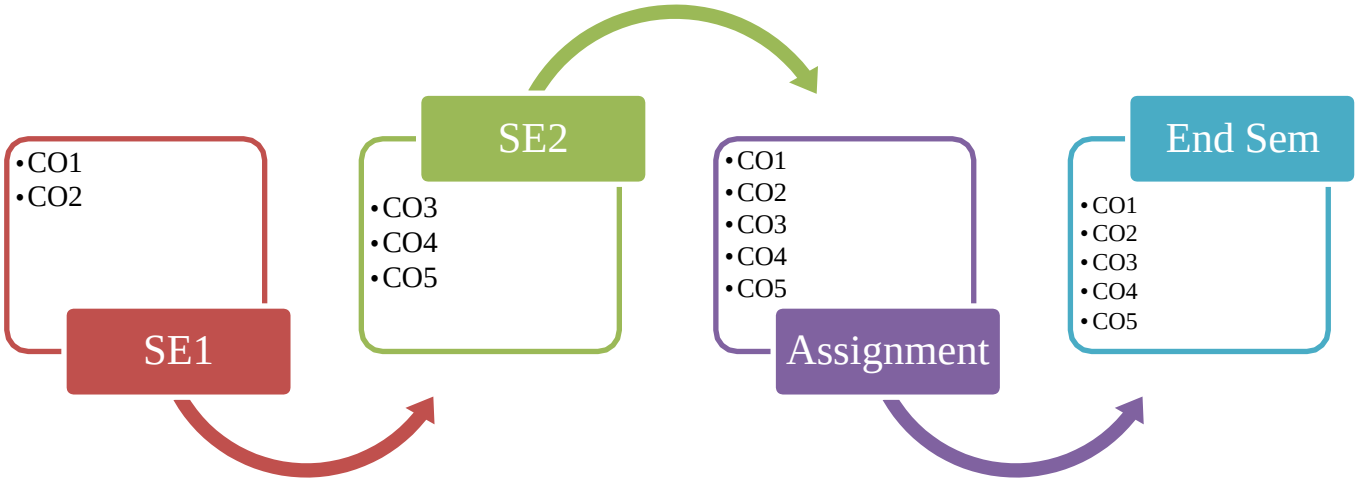


Figure 2.3 Conventional Assessment Plan of Course Outcomes through Direct Assessment

There are 5 COs for each and every courses in the curriculum. The following are the steps that shows the calculation of CO attainment for a particular CO of a course.

STEP 1. Setting Bench mark score for the course to measure the attainment level.

The bench mark score is fixed by considering the previous end semester mark average at thebeginning of the course.

STEP 2. Calculating number of students scored above benchmark score (i.e., Total no of students attained the particular CO of the course)

STEP 3. Calculating percentage of attainment for the particular CO of the course

$$= \frac{Total\ number\ of\ students\ attained\ the\ particular\ CO\ of\ the\ course}{Total\ number\ of\ students\ appeared\ for\ the\ course}$$

STEP 4. Calculating level of attainment for the particular CO of the course

Percentage of Attainment	Level
Less than 69.9%	0
70 – 79.9%	1
80 – 89.9%	2
Greater than 90%	3

STEP 5. Calculating CO attainment for the particular CO of the course using the weightage for the required assessment method

STEP 6. Similarly, all other CO attainment has calculated by repeating STEP 1 to STEP 5.

STEP 7. Calculation of Direct CO attainment i.e., Average of attainment of all COs

Assessment tools used for evaluation (2018-2020 Batch)

COURSE CODE	NAME	SE-I	SE-II	ASSIGNMENT	END SEM	QUIZ	TECHNICAL SEMINAR	PAPER PRESENTATION	WORKSHOP	FIELD REPORT
MAT18R5002	STATISTICS AND COMPUTATIONAL TECHNIQUES	✓	✓	✓	✓	✓	✓			
MEC18R5001	SAFETY MANAGEMENT	✓	✓	✓	✓	✓	✓			
MEC18R5002	OCCUPATIONAL HEALTH AND HYGIENE	✓	✓	✓	✓	✓	✓			
MEC18R5081	INDUSTRIAL SAFETY LAB				✓					
MEC18R5082	TECHNICAL SEMINAR-I				✓		✓	✓		
PGM18R5001	RESEARCH METHODOLOGY FOR ENGINEERS	✓	✓	✓	✓	✓			✓	
MEC18R5003	REGULATIONS FOR HEALTH SAFETY & ENVIRONMENT	✓	✓	✓	✓	✓	✓			
MEC18R5005	FIRE ENGINEERING AND EXPLOSION CONTROL	✓	✓	✓	✓	✓				
MEC18R5083	TECHNICAL SEMINAR-II				✓		✓	✓		
MEC18R6097	MINI PROJECT				✓			✓		✓
MEC18R6007	OHSAS 18000 and ISO 14000	✓	✓	✓	✓	✓	✓			

MEC18R6098	DISSERTATION PHASE - I				✓			✓		✓
MEC18R6099	DISSERTATION PHASE – II				✓			✓		✓
MEC18R5006	SAFETY IN ENGINEERING INDUSTRY	✓	✓	✓	✓	✓				✓
MEC18R5013	SAFETY IN TEXTILE INDUSTRY	✓	✓	✓	✓		✓			✓
MEC18R5015	WORK STUDY AND ERGONOMICS	✓	✓	✓	✓	✓	✓			
MEC18R5021	SAFETY IN CHEMICAL INDUSTRIES	✓	✓	✓	✓	✓	✓			
MEC18R5022	ELECTRICAL SAFETY	✓	✓	✓	✓		✓			✓
BIT18R5022	BIOLOGY FOR NON-BIOLOGISTS	✓	✓	✓	✓	✓	✓			
ECE18R6141	DIGITAL DESIGN USING VERILOG HDL	✓	✓	✓	✓	✓	✓			

Assessment tools used for evaluation (2019-2021 Batch)

COURSE CODE	NAME	SE-I	SE-II	ASSG	End Sem	Quiz	Technical seminar	Paper presentation	Work-shop	Field report	Case study/ Audit	Industrial Lecture	Mentor-ship	Technical Seminar	Group Discussion	Programs organized	Conference	Model Building	Social awareness
MAT18R5002	STATISTICS AND COMPUTATIONAL TECHNIQUES	✓	✓	✓	✓	✓	✓						✓						
MEC18R5001	SAFETY MANAGEMENT	✓	✓	✓	✓	✓	✓									✓		✓	
MEC18R5002	OCCUPATIONAL HEALTH AND HYGIENE	✓	✓	✓	✓	✓	✓								✓				
MEC18R5081	INDUSTRIAL SAFETY LAB				✓														
MEC18R5082	TECHNICAL SEMINAR-I				✓		✓	✓							✓				
PGM18R5001	RESEARCH METHODOLOGY FOR ENGINEERS	✓	✓	✓	✓	✓		✓	✓										
MEC18R5003	REGULATIONS FOR HEALTH SAFETY & ENVIRONMENT	✓	✓	✓	✓	✓	✓					✓			✓				
MEC18R5005	FIRE ENGINEERING AND EXPLOSION CONTROL	✓	✓	✓	✓	✓												✓	✓
MEC18R5083	TECHNICAL SEMINAR-II				✓		✓	✓					✓		✓				
MEC18R6097	MINI PROJECT				✓		✓			✓								✓	
MEC18R6007	OHSAS 18000 and ISO 14000	✓	✓	✓	✓	✓	✓	✓				✓							
MEC18R6098	DISSERTATION PHASE - I							✓		✓									✓
MEC18R6099	DISSERTATION PHASE – II							✓		✓									✓
MEC18R5006	SAFETY IN ENGINEERING INDUSTRY	✓	✓	✓	✓	✓				✓	✓					✓			

COURSE CODE	NAME	SE-I	SE-II	ASSG	End Sem	Quiz	Technical seminar	Paper presentation	Workshop	Field report	Case study/ Audit	Industrial Lecture	Mentorship	Technical Seminar	Group Discussion	Programs organized	Conference	Model Building	Social awareness
MEC18R5013	SAFETY IN TEXTILE INDUSTRY	✓	✓	✓	✓		✓			✓	✓								
MEC18R5015	WORK STUDY AND ERGONOMICS	✓	✓	✓	✓	✓	✓												
MEC18R5021	SAFETY IN CHEMICAL INDUSTRIES	✓	✓	✓	✓	✓	✓					✓			✓				
MEC18R5022	ELECTRICAL SAFETY	✓	✓	✓	✓		✓			✓		✓							
BIT18R5022	BIOLOGY FOR NON-BIOLOGISTS	✓	✓	✓	✓	✓	✓												
ECE18R6141	DIGITAL DESIGN USING VERILOG HDL	✓	✓	✓	✓	✓	✓												

Overall CO Attainment

The overall CO attainment is obtained with a weighted average of 100% for Direct attainment Sample attainment calculation and the attainment levels are listed in the below table

S.No	Course Code	Course Name	CO attainment
1	MAT18R5002	Statistics and Computational Techniques	1.72
2	MEC18R5001	Safety Management	2.19
3	MEC18R5002	Occupational Health and Hygiene	1.94
4	MEC18R5081	Industrial Safety Lab	2.83
5	MEC18R5082	Technical Seminar-I	2.94
6	PGM18R5001	Research Methodology for Engineers	1.93
7	MEC18R5003	Regulations for Health Safety & Environment	2.86
8	MEC18R5005	Fire Engineering and Explosion Control	1.76
9	MEC18R6097	Mini Project	2.59
10	MEC18R6007	OHSAS 18000 and ISO 14000	1.54
11	MEC18R6098	Dissertation Phase - I	1.74
12	MEC18R6099	Dissertation Phase – II	2.02
13	MEC18R5006	Safety in Engineering Industry	1.7
14	MEC18R5013	Safety in Textile Industry	2.1
15	MEC18R5015	Work Study and Ergonomics	2.25
16	MEC18R5021	Safety in Chemical Industries	1.78
17	MEC18R5022	Electrical Safety	1.74
18	MEC18R5083	Technical Seminar-II	2.81

PO Attainment:

Overall PO attainment is calculated by taking weighted average of,

80% Direct attainment + 20% Indirect Attainment

Direct Attainment:

PO attainment is calculated based on the formula,

$$Po\ Attainment = \frac{\sum_{i=1}^{n} CO_i\ Attainment\ \times (\frac{Correlation}{3})}{\sum_{i=1}^{n} Course\ outcomes}$$

POs Attainment has been calculated for the courses offered in the academic year 2018-2020 and the final PO attainment has been listed in the table below,

S.No	Name of the Course	Course Code	PO1	PO2	PO3
1	Statistics and Computational Techniques	MAT18R5002	1	2	
2	Research Methodology For Engineers	PGM18R5001	1.56	1.56	1.36
3	Dissertation Phase – II	MEC18R6099	1.8	2.66	1.2
4	Dissertation Phase – I	MEC18R6098	1.9	2.66	1.26
5	Mini-Project	MEC18R6097	2	2.66	1.33
6	OHSAS 18000 and ISO 14000	MEC18R6007	1.95	2.26	1.5
7	Technical Seminar - II	MEC18R5083	1.66	2.5	1.66
8	Industrial Safety Lab	MEC18R5081		1.8	1.2
9	Electrical Safety	MEC18R5022	2	2.5	2.66
10	Safety in chemical industries	MEC18R5021	2.08	1.72	1.9
11	Work Study and Ergonomics	MEC18R5015	1.5	2.2	1.66
12	Safety in Textile Industry	MEC18R5013	2.88	2.88	2
13	Safety in Engineering Industry	MEC18R5006	1.6	2.6	1.84
14	Fire Engineering and Explosion Control	MEC18R5005	2.2	2.06	1.35
15	Regulation for Health, Safety and Environment	MEC18R5003	2.76	0.92	

16	Occupational Health and Hygiene	MEC18R5002	0.86	1.73	
17	Safety Management	MEC18R5001	2	1.66	2
18	Technical Seminar - I	MEC18R5082	2.5	3	2.6

The Indirect attainment of POs and PSOs are quantitatively calculated by taking Graduate survey and the calculating process as follows.

STEP 1. Preparation of Questionnaires.

STEP 2. Average score of each PO/PSO calculated out of 3 and taken as In-direct attainment.

The sample calculations have also been attached.

Attainment Level

S. No	Parameter	PO1	PO2	PO3
1	Direct Attainment	1.90	2.19	1.70
2	Indirect Attainment	3	3	3
3	PO Attainment	2.12	2.35	1.96

Course Title	Safety in Engineering Industry
Course Code	MEC18R5006
Month/Year of Examination	APR/MAY 2019
Batch	2018

BENCHMARK SCORE:	75

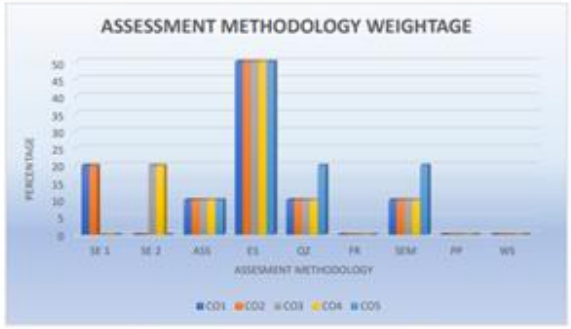
CONSOLIDATION OF THE ATTAINMENT

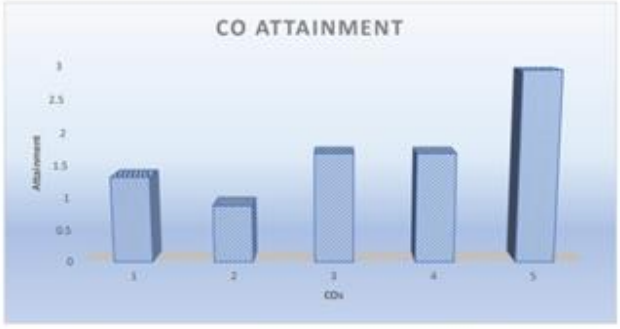
ASSESSMENT METHODOLOGY WEIGHTAGE

	SE 1	SE 2	ASS	ES	QZ	FR	SEM	PP	WS	TOT
CO1	20	0	10	50	10	10	0	0	0	100
CO2	20	0	10	50	10	10	0	0	0	100
CO3	0	20	10	50	10	10	0	0	0	100
CO4	0	20	10	50	10	10	0	0	0	100
CO5	0	0	20	50	20	10	0	0	0	100

THE ATTAINMET CALCULATED WITH THE WEIGHT PERCENTAGE OF 80% FROM THE DIRECT ATTAINMETN AND 20% FROM THE INDIRECT ATTAINMENT

DA	IAD	OA
0.9	3	1.32
0.5	2.4	0.88
1.4	2.8	1.68
1.5	2.4	1.68
3	2.6	2.92
		1.7





		SE-I						SE II						ASSIGNMENT										END SEMESTER										QUIZ									
	COs	CO1	Attainment	CO2	Attainment	Total	Total	CO3	Attainment	CO4	Attainment	Total	Total	CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total	Total	CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total	CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total
S.No	Reg No	30		20		50	100	30		20		50	100	10		10		10		10		10		50	100	20		20		20		20		20		100	20		20		20		20		20		
1	9918120001	26	Y	17	Y	43	86	26	Y	18	Y	44	88	8.5	Y	8.5	Y	8.5	Y	8.5	Y	8.5	Y	42.5	85	15	Y	15	Y	14	N	15	Y	16	Y	75	16	Y	15	Y	16	Y	16	Y	17	Y	80
2	9918120002	23	Y	16	Y	39	78	26	Y	17	Y	43	86	8	Y	8	Y	8	Y	8	Y	8	Y	40	80	14	N	14	N	13	N	14	N	15	Y	70	15	Y	14	N	15	Y	15	Y	16	Y	75
3	9918120003	23	Y	14.5	N	37.5	75	25	Y	16	Y	41	82	8.6	Y	8.6	Y	8.6	Y	8.6	Y	8.6	Y	43	86	14	N	14	N	14	N	14	N	16	Y	72	15	Y	14	N	15	Y	15	Y	16	Y	75
4	9918120004	20	N	18	Y	38	76	24	Y	16.5	Y	40.5	81	8.8	Y	8.8	Y	8.8	Y	8.8	Y	8.8	Y	44	88	17	Y	16	Y	17	Y	17	Y	18	Y	85	17	Y	13	N	17	Y	16	Y	21	Y	84
5	9918120005	22	N	14.5	N	36.5	73	25	Y	16	Y	41	82	8.6	Y	8.6	Y	8.6	Y	8.6	Y	8.6	Y	43	86	16	Y	16	Y	15	Y	16	Y	17	Y	80	17	Y	13	N	16	Y	16	Y	20	Y	82
		Y	3	Y	3			Y	5	Y	5			Y	5	Y	5	Y	5	Y	5	Y	5			Y	3	Y	3	Y	2	Y	3	Y	3		Y	5	Y	1	Y	5	Y	5	Y	5		
		N	2	N	2			N	0	N	0			N	0	N	0	N	0	N	0	N	0			N	2	N	2	N	3	N	2	N	0		N	0	N	4	N	0	N	0	N	0		
		NA	0	NA	0			NA	0	NA	0			NA	0	NA	0	NA	0	NA	0	NA	0			NA	0	NA	0	NA	0	NA	0	NA	0		NA	0	NA	0	NA	0	NA	0	NA	0		
Appeared			5		5				5		5				5		5		5		5		5				5		5		5		5				5		5		5		5			
CO Attainment			0.60		0.60				1.00		1.00				1.00		1.00		1.00		1.00		1.00				0.60		0.60		0.40		0.60		1.00		1.00		0.20		1.00		1.00		1.00	
Attainment Level			0		0				3		3				3		3		3		3		3				0		0		0		0		3		3		0		3		3		3	

PO					
1	2	3	4	5	6
2	3	2	2	1	2

		FIELD REPORT										SEMINAR										PAPER PRESENTATION										WORKSHOP										COURSE EXIT SURVEY					
		CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total		CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total		CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total		CO1	Attainment	CO2	Attainment	CO3	Attainment	CO4	Attainment	CO5	Attainment	Total		CO1	CO2	CO3	CO4	CO5	
S.No	Reg No	20		20		20		20		20				20		20		20		20		20				20		20		20		20		20				20		20		20		20		20				5	5	5	5	5	
1	9916120001	17	Y	17	Y	17	Y	17	Y	17	Y	85		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		5	4	4	3	4	
2	9916120002	16	Y	15	Y	15	Y	16	Y	18	Y	80		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		5	5	3	5	4	
3	9916120003	18	Y	18	Y	18	Y	18	Y	18	Y	90		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		5	3	4	3	3	
4	9916120004	18	Y	17	Y	17	Y	18	Y	16	Y	86		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		5	3	4	3	3	
5	9916120005	15	Y	14	N	14	N	15	Y	17	Y	75		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		0	N	0	N	0	N	0	N	0	N	0		4	3	5	5	4	
		Y	5	Y	4	Y	4	Y	5	Y	5	5		Y	0	Y	0	Y	0	Y	0	Y	0	0		Y	0	Y	0	Y	0	Y	0	Y	0	0		Y	0	Y	0	Y	0	Y	0	Y	0	0		4	1	1	2	0	
		N	0	N	1	N	1	N	0	N	0	4		N	5	N	5	N	5	N	5	N	5	5		N	5	N	5	N	5	N	5	N	5	5		N	5	N	5	N	5	N	5	N	5	5		1	1	3	0	3	
		NA	0	NA	0	NA	0	NA	0	NA	0	3		NA	0	NA	0	NA	0	NA	0	NA	0	0		NA	0	NA	0	NA	0	NA	0	NA	0	0		NA	0	NA	0	NA	0	NA	0	NA	0	0		0	3	1	3	2	
			5		5		5		5		5	2			5		5		5		5		5	5			5		5		5		5		5	5			5		5		5		5		5	5		0	0	0	0	0	
			1.00		0.80		0.80		1.00		1.00	1			0.00		0.00		0.00		0.00		0.00	0			0.00		0.00		0.00		0.00		0.00	0			0.00		0.00		0.00		0.00		0.00	0		0	0	0	0	0	
			3		2		2		3		3				0		0		0		0		0				0		0		0		0		0				0		0		0		0		0			15	12	14	12	13	
																																																	5	5	5	5	5	
																																																	3	2.4	2.8	2.4	2.6	

Kalasalingam Academy of Research and Education SAR- Industrial Safety Engineering 2022

CRITERION III	STUDENTS' PERFORMANCE

Table: 3.1 Details of students' intake and admitted strength

Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	CAY (2021-22)	CAYm1 (2020-21)	CAY*m*2 (LYG) (2019-20)	CAY*m*3 (LYGm1) (2018-19)	CAYm4 (LYGm2) (2017-18)
Sanctioned intake of the program **(N)**	12	12	12	12	12
Total number of students admitted through GATE ($\mathbf{N_1}$)	0	0	0	0	0
Total number of students admitted through PG Entrance and others ($\mathbf{N_2}$)	12	12	07	05	01
Total number of students admitted in the Program ($\mathbf{N_1 + N_2}$)	12	12	07	05	01

CAY – Current Academic Year; CAYm1- Current Academic Year minus1; CAYm2 - Current Academic Year minus2; LYG – Last Year Graduate; LYGm1 – Last Year Graduate minus 1; LYGm2 – Last Year Graduate minus 2

Table 3.1 represents the intake and the admitted strength of the M. Tech Industrial Safety Engineering program. The admission to the program is done by two different ways,

1. The students having the eligible GATE score
2. The students having the eligible KLU – PG Entrance Examination score

Students having eligible GATE score

Step 1. The students having the eligible GATE score may apply for the M. Tech Industrial Safety Engineering program through both online/offline mode.

Step 2. After the receipt of application (either by online /offline), verification of the details in the filled application done by the admission office.

Step 3. After verification, if the student met the eligibility criteria, he/she will be called for the further admission process.

Students having the eligible KLU – PG Entrance Examination score

Step 1. Students shall apply for the M. Tech Industrial Safety Engineering program through the KEEE examination (entrance examination conducted by Kalasalingam Academy of Research and Education). The application for the KEEE examination is available in website and the same available in the University admission office.

Step 2. After the receipt of filled application, for the eligible students, date and time of examination will be intimated through e-mail and the admit card for the examination also been sent through online mode (i.e., e. mail ID).

Step 3. After the examination, mark report of the students who have taken the examination will be sent through the e-mail.

Step 4. Based on the eligibility, the students are called for certificate verification. On successful completion of the admission process, based on the merit score the students can avail scholarship as the University norms.

Table: 3.2 Details of students successfully graduated in minimum period

Year of entry	**($N_1 + N_2$) (As defined above)**	**Number of students who have successfully graduated**	
		I Year	II Year
CAY	**12**	12	
CAY*m*1	**12**	12	07
CAY*m*2 (LYG)	**07**	07	05
CAY*m3* (LYG*m*1)	**05**	05	01
CAYm4 (LYG*m2*)	**01**	01	10

3.1. Enrolment Ratio through GATE (20)

The enrolment ratio for the batch is calculated using the formula represented in eq (1). The reference score for the calculation of Enrolment ratio is shown in table 3.3.

$$\textbf{Enrolment ratio} = \frac{\mathbf{N_1}}{\mathbf{N}} \quad \ldots(\mathbf{1})$$

N − Total number of sanctioned intake

N_1 − Total number of students admitted through GATE

Table: 3.3 Reference score for the student enrolment ratio

Item (Students enrolled at the First Year Level on average basis during the last three years staring from Current Academic Year)	**Marks**
>=80% students enrolled through GATE	20
>=60% students enrolled through GATE	16
>=50% students enrolled through GATE	12
>=40% students enrolled through GATE	8
>=20% students enrolled through GATE	6
< 20% students enrolled through GATE	0

Enrolment Ratio:

Example calculation for the Enrolment Ratio (ER)

For,

CAY (2020-2021) (Refer Table 3.1)

$$\boldsymbol{Enrolment\ ratio} = \frac{N_1}{N} = \frac{0}{12} = 0$$

Similarly, Enrolment ratio calculated for all mentioned academic year and tabulated in Table 3.4.

Table: 3.4 Student enrolment ratio for CAY, CAYm1, CAYm2, CAYm3, CAYm4

Item	CAY (2021-22)	CAY*m*1 (2020-21)	CAY*m*2 (LYG) (2019-20)	CAYm3 (LYGm1) (2018-19)	CAYm4 (LYGm2) (2017-18)
Sanctioned intake of the program (***N***)	12	12	12	12	18
Total number of students admitted through GATE (***N*1**)	0	0	0	0	0
$\boldsymbol{Enrolment\ ratio = \frac{N_1}{N}}$	$\mathbf{ER_{20} = \frac{0}{12} = 0}$	$\mathbf{ER_{19} = \frac{0}{12} = 0}$	$\mathbf{ER_{18} = \frac{0}{12} = 0}$	$\mathbf{ER_{18} = \frac{0}{12} = 0}$	$\mathbf{ER_{16} = \frac{0}{12} = 0}$

Cumulative Enrolment Ratio:

$$= \frac{\mathbf{ER_{20} + ER_{19} + ER_{18} + ER_{18} + ER_{16}}}{\mathbf{5}}$$

$$= \frac{\mathbf{0 + 0 + 0 + 0 + 0}}{\mathbf{5}}$$

$$= \mathbf{0}$$

3.1 Marks Scored – 0 Marks

3.2. Success Rate in the stipulated period of the program (20)

The examination for the M. Tech Industrial safety program conducted as semester pattern in a year, for each subject there will be two sessional (Internal) and the one end (External) semester examination.

The success of the students was based on the cumulative marks scored in Internal, External examination and also assignments.

The students secured the minimum required score is graded as pass and the for those not met the requirement graded as fail. The students can appear for the arrear examination without affecting the current semester study progress.

At the end of the second-year students those who completed all the requirements of the University examination process awarded as the graduate.

The Success Index (SI) for the batch is calculated using the formula represented in eq (2). The Success Index (SI) for all the batches is shown in table 3.5.

$$\textbf{Success Index (SI)} = \frac{\textbf{No. of students completing program in minimum duration (C)}}{\textbf{No. of students admitted in first year of same batch } (N_1 + N_2)} \quad ..(2)$$

C - Number of students completing program in minimum duration

The minimum time for the graduation is 2 years.

Cumulative S.I.= Mean of SI for past 3 Batches

$$\textbf{Cumulative Success Index (CSI)} = \frac{SI_{2020} + SI_{2019} + SI_{2018}}{3}$$

$$\textbf{Assessment points} = 20 \times \textbf{CSI}$$

Success Index (SI)

Example calculation for the Success Index (SI)

For,

2019-2020 (2018 BATCH)

$$(\mathbf{SI_{2020}}) = \frac{\textbf{No. of students completing program in minimum duration } (\mathbf{C})}{\textbf{No. of students admitted in first year of same batch } (\mathbf{N_1 + N_2})} = \frac{\mathbf{5}}{\mathbf{5}} = \mathbf{1}$$

Similarly, Success Index calculated for all mentioned academic year and tabulated in Table 3.5.

Table: 3.5 Student Success Index for CAY, CAYm1, CAYm2, CAYm3

Item	CAY (2021-22)	CAY*m*1 (2020-21)	CAY*m*2 (LYG) (2019-20)	CAYm3 (LYGm1) (2018-19)
No. of students admitted in first year $(\mathbf{N_1 + N_2})$	12	7	5	1
No. of students completing program in minimum duration $(\mathbf{C})$	12	7	5	1
$\mathbf{SI} = \frac{\mathbf{C}}{\mathbf{N_1 + N_2}}$	$\mathbf{SI_{2021}} = \frac{12}{12} = \mathbf{1}$	$\mathbf{SI_{2020}} = \frac{7}{7} = \mathbf{1}$	$\mathbf{SI_{2019}} = \frac{5}{5} = \mathbf{1}$	$\mathbf{SI_{2018}} = \frac{1}{\mathbf{1}} = 1$

$$\textbf{Cumulative Success Index } (\mathbf{CSI}) = \frac{\mathbf{SI_{2021} + SI_{2020} + SI_{2019}}}{\mathbf{3}}$$

$$\textbf{Cumulative Success Index } (\mathbf{CSI}) = \frac{\mathbf{1} + \mathbf{1} + 1}{\mathbf{3}}$$

$$\textbf{Cumulative Success Index } (\mathbf{CSI}) = 1$$

$$\textbf{Assessment points} = 20 \times \textbf{CSI} = 20 \times 1 = 20$$

3.2 Marks Scored – 20 Marks

3.3. Placement, Higher Studies and Entrepreneurship (20)

The placement for the students is managed by the Placement and Training Cell, table 3.6 shows the details of students places in industries, pursuing higher studies and started their own industry. The placement index for the academic year was calculated using the formula shown in eq 3.

During the Course of time, the students are encouraged to undergo Interns and industrial training following the University norms. From the intern and / or industrial training, a chance of entrepreneurship (as a start-up) and industrial knowledge are inculcated among the student's. Subsequently, few of those industries also interested to offer placement for the students at the end of their course period.

$$\textbf{Placement Index (PI)} = \frac{x + y + z}{N_1 + N_2}$$

$$\textbf{Cumulative Placement Index (CPI)} = \frac{PI_{2020} + PI_{2019} + PI_{2018}}{3}$$

$$\textbf{Assessment points} = 20 \times \textbf{CPI}$$

Table: 3.6 Student Placement Index for CAYm1, CAYm2, CAYm3

Item	CAY*m*1 (2020-21)	CAY*m*2 (2019-20)	CAYm3 (2018-19)
No. of students placed in companies or Government Sector (x)	7	5	1
No. of students pursuing Ph.D. / JRF/ SRF (y)	0	0	0
No. of students turned entrepreneur in engineering/technology (z)	0	0	0
Placement Index (PI) $= \frac{x+y+z}{N_1+N_2}$	$PI_{2021} = \frac{7}{7} = 1$	$PI_{2020} = \frac{5}{5} = 1$	$PI_{2019} = \frac{1}{1} = 1$

Placement Index (PI)

Example calculation for the Placement Index (PI)

For,

CAYm1 (2019-20)

$$\textbf{Placement Index (PI)} = \frac{x+y+z}{N_1+N_2} = \frac{2+0+3}{5} = 1$$

$$\textbf{Cumulative Placement Index (CPI)} = \frac{PI_{2020} + PI_{2019} + PI_{2018}}{3}$$

$$\textbf{Cumulative Placement Index (CPI)} = \frac{1 + 1 + 1}{3} = 1$$

$$\textbf{Assessment points} = 20 \times \textbf{CPI}$$

$$\textbf{Assessment points} = 20 \times 1 = 20$$

3.3 Mark Scored: 20 marks

3. 3.1a. Provide the placement data in the below mentioned format with the name of the program and the assessment year:

M. Tech (Industrial Safety Engineering) 2019-2021				
S. No.	**Name of the student placed**	**Enrol. no.**	**Name of the Employer**	**App no.**
1	ABUTHAKIR N	9919120001	EVERSENDAI Construction Pvt Ltd-Chennai	OFF/ECI/2022-09 4TH MAY 2022
2	JOSHUA SUJITH T	9919120002	HI Sense systems and Services	HI/OFFER/JOSUA/101
3	ATHUL SAJEEV	9919120003	HI Sense systems and Services	HI/OFFER/ATHUL SAJEEV/102
4	JAYASURIYAN R	9919120004	Safety Officer, Dhivya Fireworks,	LR/Safety Officer / D10
5	SUBASH K	9919120005	Randstad India Private Ltd -Chennai	Empcode 1482991
6	SRIRAM HARIHARASUDHAN K	9919120006	The Asian Sparklers, Fireworks Industries	Empcode: 1461
7	JERENDRAN J	9919120007	The Asian Sparklers, Fireworks Industries	Empcode: 1462
M. Tech (Industrial Safety Engineering) 2018-2020				
S. No.	**Name of the student placed**	**Enrol. no.**	**Name of the Employer**	**App no.**
1	SARAVANA MANI M	9918120001	Shanthi Gears pvt Ltd-Coimbatore	HR/App.Order/2022
2	RAMPRANAV G	9918120002	Sri Jayajothi and Company pvt Ltd-Rajapalayam	Employer ID 10234
3	ROOPA ANN KOSHY	9918120003	Quantum Knits , KPR mills Ltd, Coimbatore	Employer ID - TPR 18366
4	PRADEEP KANNAN P	9918120004	Sri Meenabika Industries	MI/SO/02/2020
5	RAMAPANDIAN A	9918120005	Steel Strips Pvt Ltd, Chennai	SSWL/Admin/8467
M. Tech (Industrial Safety Engineering) 2017 - 2019				
S. No.	**Name of the student placed**	**Enrol. no.**	**Name of the Employer**	**App no.**
1	VINOTH R	9917120001	M.S. (CQ University Australia)	Student ID: 12136847
. Tech (Industrial Safety Engineering) 2016-2018				
S. No.	**Name of the student placed**	**Enrol. no.**	**Name of the Employer**	**App no.**
1	BALAMANIKANDAN M	9916120001	Entrepreneur (Karuppa E-bikes)	GSTIN: 33CMQPN5029J1ZO
2	MOHANASUNDAR M	9916120002	Color Jerseys Pvt Ltd.,	Empl No. 9100461
3	PRABHU J	9916120003	Steel Strips Pvt Ltd, Chennai	SSWL/Admin/4526, 02.04.2018
4	SUDHAKARAN K	9916120004	HI Sense systems and Services	HI/OFFER/SUDHAKARAN/

				99
5	SURESH MARIAPPAN D R	9916120005	Safety Officer, Dhivya Fireworks,	LR/Safety Officer / D08
6	THILLAINATARAJAN G	9916120006	Ultratech Cement Limited, Ariyalur	RDCW/HR/REC/12/2018/15
7	VINODHANAN S	9916120007	CBRE South Asia Pvt Ltd, Chennai	(Code: CAN364143) 23.09.21
8	BASKARAN S	9916120008	The Asian Sparklers, Fireworks Industries	AS/Baskaran/05
9	ARUN FRANCIS	9916120009	ISRO off Role, Trivandrum, Kerala	SCS/LPSC/195
10	ARAVINDRAJ J	9916120010	Entrepreneur **(**Sree Sarabheswar Auto Components)	Registration Number : 33CJIPJ0698E1Z8 Date of issue of Certificate 16/09/2021

3.4 Professional Activities (15)

3.4.1 Student's participation in Professional societies/chapters and organizing engineering events (5)

The students of Industrial safety Engineering are members of the society ISEA (Industrial Safety Engineering Association). The ISEA is a non-profitable organization striving to enhance occupational safety culture and achieve highest levels of safety standards, managed by Kalasalingam Academy of Research and Education. Also through social media safety related activities/information shared to the society (Facebook URL: https://www.facebook.com/safetyklu/)

S. No	Name of the event	Academic year	Number of students	Professional society / Organization	Type of event
1	One day National Level Workshop on Live Surgery of IC Engines "Petrol Head and prevention of leakage"	2017 – 2018	57	SAE India, Kalasalingam Academy of Research and Education	Workshop
2	Engineers day-2017	2017 – 2018	200	Mechanical Engineering Association Kalasalingam Academy of Research and Education	Colloquium
3	Road Safety Program	2017 – 2018	126	ISEA (Industrial Safety Engineering Association) CLUB, Kalasalingam Academy of Research and Education	Field Event
4	Productivity Week Celebration	2017 – 2018	25	ISEA (Industrial Safety Engineering Association) CLUB, Kalasalingam Academy of Research and Education	Field Event

S. No	Name of the event	Academic year	Number of students	Professional society / Organization	Type of event
5	Nutpam18 - Tamil Technical conference	2018 – 2019	250	Engineers without Borders (EWB) India and EWB – KARE Chapter, Kalasalingam Academy of Research and Education	Seminars and Conference
6	Workshop on Distillation and Industrial Ergonomics	2018 – 2019	100	Safety Engineering Association (SEA)	Workshop
7	One day workshop on 3D modelling using fusion 360	2018 – 2019	27	Mechanical Engineering Association Kalasalingam Academy of Research and Education	Workshop
8	Industrial Lecture on Quality Concepts	2018 – 2019	118	Safety Engineering Association (SEA)	Lecture Series
9	Industrial Lecture on Supply chain Management	2018 – 2019	126	Safety Engineering Association (SEA)	Lecture Series
10	Industrial Lecture on Six Sigma	2018 – 2019	140	Safety Engineering Association (SEA)	Lecture Series
11	Workshop on Road a Safety Journey	2019 – 2020	188	ISEA (Industrial Safety Engineering Association) CLUB, Kalasalingam Academy of Research and Education	Field Event
12	Workstudy – Entrepreneurship And Ergonomics	2019 – 2020	44	ISEA (Industrial Safety Engineering Association) CLUB, Kalasalingam Academy of Research and Education	Workshop
13	Quality – An Industrial Aspect”	2019 – 2020	59	Safety Engineering Association (SEA)	Lecture Series
14	“Higher studies option for graduates”	2019 – 2020	36	Mechanical Engineering Association Kalasalingam Academy of Research and Education	Lecture Series
15	"Studies in Abroad”	2019 – 2020	315	Mechanical Engineering Association Kalasalingam Academy of Research and Education	Lecture Series
16	Occupational Safety and Health 2017(OHSE)	2016-17	10	SEA (Safety Engineering Association), Sundaramurthy Gramani Street, Chennai.	Workshop

S. No	Name of the event	Academic year	Number of students	Professional society / Organization	Type of event
17	CRISIS 2018	2017-18	5	SEA (Safety Engineering Association),	First Aid Training Program
18	CRISIS 2020	2019-20	12	Tamilnadu Safety Professionals welfare Association (TN-SPAA)	Hands on Training Program
19	CRISIS 2021	2020-21	15	ISEA-KARE	Covid 19 Awareness Program
20	International Safety Day 2022	2021-22	15	ISEA-KARE	Safety Day Pledge and Awareness

3.4.1 Mark Scored: 5 marks

3.4.2 Student's publications (10)

International Conferences

S. No	Register number	Name	Conference	College/ university	Title of the paper
1	9916120006	Thillai Natarajan G	INCAME - 2018	Kalasalingam Academy of Research and Education, Virdhunagar.	Heat Stress Management Program in Construction Industry
2	9916120002	Mohana Sundar M	INCAME 2019	Kalasalingam Academy of Research and Education, Virdhunagar.	Risk Analysis in Textile Plants Using Task Variation and Analysis Using Task Risk Assessment Tool (TARA)
3	9915120003	Vinoth V	ICAMM-2017	Kalasalingam Academy of Research and Education, Virdhunagar.	MITIGATION OF HAZARDS USING SRS IN A MANUFACTURING INDUSTRY

4	9917120001	Vinoth	Humanizing Work and Work Environment 2018 (HWWE 2018)	Cochin University, Kerala	Identification of physical Hazards among Textile Spinning Mill workers
5	9918120001	Saravanamani M	Kalasalingam Global Conference 2019	Kalasalingam Academy of Research and Education, Virdhunagar.	Development of Safety Performance Using Scoring Techniques in Textile Industries.
6	9918120005	Ramapandian A	Kalasalingam Global Conference 2019	Kalasalingam Academy of Research and Education, Virdhunagar.	Identification of Hazards and Safety Measures in Food Processing Industry
7	9918120001	Saravanamani M	Kalasalingam Global Conference 2019	Kalasalingam Academy of Research and Education, Virdhunagar.	Development Modification for Handling, Storage and Transportation of chemicals in Textile plants located in southern India
8	9918120001	Saravanamani M	Kalasalingam Global Conference 2019	Kalasalingam Academy of Research and Education, Virdhunagar.	Hazard Identification Using Risk Assessment for a Tyre Manufacturing Industry
9	9918120001	Saravanamani M	International Conference on Advances in Materials Research 2019 (ICAMR2019)	Bannari Amman Institute of Technology, Sathyamangalam	Risk assessment of machining and assembly line in Automotive industry
10	9918120005	Ramapandian A	International Conference on Advances in Materials Research 2019 (ICAMR2019)	Bannari Amman Institute of Technology, Sathyamangalam	Quantitative Risk Analysis Using HIRA in an Automotive Manufacturing Sector
11	9918120004	Pradeep Kannan	International Conference on Advances in Materials Research 2019 (ICAMR2019)	Bannari Amman Institute of Technology, Sathyamangalam	Risk Assessment using Bow-Tie Tool in cement Industry
12	9918120002	Rampranav G	International Conference on Advances in Materials Research 2019 (ICAMR2019)	Bannari Amman Institute of Technology, Sathyamangalam	Job Safety Analysis for Various Operations in Cement Industry Using Risk Assessment Matrix

International Journals

SNO	Reg. No	Name of the student	Paper Title	Name of the Journal/Conferences
1	9919120002	JOSHUA SUJITH T	Design and development of an industrial firefighting rover	Materials Today Proceedings
2	9919120001	ABUTHAKIR N	An initiative towards sustainability in the petroleum industry: A review	Materials Today Proceedings
3	9919120003	ATHUL SAJEEV	Ergonomic evaluation of workers during manual material handling	Materials Today Proceedings
4	9919120004	JAYASURIYAN R	Ergonomics hazard analysis techniques- A technical review	Materials Today Proceedings
5	9919120005	SUBASH K	Job safety hazard identification and risk analysis in the foundry division of a gear manufacturing industry	Materials Today Proceedings
6	9919120006	SRIRAM HARIHARASUDHAN K	Hypothetical study on waste heat recovery and filtration system of cement manufacturing process in cement industry	Materials Today Proceedings
7	9919120007	JERENDRAN J	Analysis Of Major Hazards In Construction Sites With Mitigation Measures And Guidelines	New Scientific Creations In Engineering and Technology
8	9918120001	SARAVANA MANI M	Risk assessment of machining and assembly line in Automotive industry	Advanced in Materials Research
9	9918120002	RAMPRANAV G	Job Safety Analysis For Various Operations In Cement Industry Using Risk Assessment Matrix	Advanced in Materials Research
10	9918120003	ROOPA ANN KOSHY	Identification of the critical activity in heat treatment process using TISM.	Materials Today Proceedings
11	9918120004	PRADEEP KANNAN P	Risk Assessment Using Bow-Tie Tool in Cement Industry	Advanced in Materials Research

12	9918120005	RAMAPANDIAN A	Quantitative Risk Analysis Using Hira In An Automotive Manufacturing Sector	Advanced in Materials Research

1.04.2022 **Mark**

Scored:10

marks

CRITERION 4	FACULTY CONTRIBUTION

2021-2022

S. No	Name of the faculty member	Qualification			Association with the institution	Designation	Date on which designated as Professor / Associate Professor	Date of joining the institution	Department	Specialization	Academic Research			Currently associated (Y/N) Date of leaving (in case Currently associated " No")	Nature of Association (Regular / Contract
		Degree(highest degree	University	Year of graduation							Research paper publications	Phd guidance	Faculty receiving phd during the Assessment year		
1.	Dr. S. SaravanaSankar	Ph. D	Manonmaniam Sundaranar University	2006		Prof.	01-01-2003	01-06-1998	Mechanical	Ind. Engg.				Y	Regular
2.	Dr. J.T. WinowlinJappes	Ph. D	IITM. Chennai	2004		Prof.	18-10-2004	18-10-2004	Mechanical	Comp. Mater.				Y	Regular
3.	Dr. S. Balasubaramaniyan	Ph. D	IITM. Chennai	1983		Prof.	03-06-2013	25-01-2015	Mechanical	Mater. Engg				Y	Regular
4.	Dr. N. Rajini	Ph. D	Kalasalingam University	2013		Prof.	01-12-2016	02-07-2004	Mechanical	Comp. Mater.				Y	Regular
5.	Dr. I. Siva	Ph. D	Kalasalingam University	2012		Prof.	01-12-2016	09-06-2006	Mechanical	Comp. Mater.				Y	Regular
6.	Dr. D. S. Vincent	Ph. D	Kalasalingam University	2016		Prof.	01-12-2016	09-06-2016	Mechanical	Industrial Safety Engineering				Y	Regular

7.	Dr. A. Alavudeen	Ph. D	Anna University	2013		Prof.	17-07-2017	05-07-2004	Mechanical	Comp. Mater.				Y	Regular
8.	Dr. M. Adam Khan	Ph. D	NIT, Trichy	2015		Asso. Prof.	10-09-2014	10-11-2014	Mechanical	Mater. Engg				Y	Regular
9.	Dr. S. Rajesh	Ph. D	Kalasalingam University	2014		Asso. Prof.	01-01-2015	09-07-2008	Mechanical	Mater. Engg				Y	Regular
10.	Dr. V. Arumugaprabu	Ph. D	Kalasalingam University	2014		Asso. Prof.	02-01-2015	11-06-2007	Mechanical	Comp. Mater.				Y	Regular
11.	Dr. S. Muthuvel	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	11-06-2009	Mechanical	Thermal				Y	Regular
12.	Dr. S. Bathrinath	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	03-03-2010	Mechanical	Ind. Engg.				Y	Regular
13.	Dr. C. Bennet	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-08-2016	04-10-2004	Mechanical	Thermal				Y	Regular
14.	Dr. K. Mayandi	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	01-07-2011	Mechanical	Mater. Engg				Y	Regular
15.	Dr. S. Suresh Kumar	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	08-06-2012	Mechanical	Mach.				Y	Regular
16.	Dr. P. Balamurugan	Ph. D	Kalasalingam University	2017		Asso. Prof.	01-07-2017	03-01-2010	Mechanical	Mach.				Y	Regular
17.	Dr. Anish Nair	Ph. D	NIT Trichy	2018		Asso. Prof.		23-07-2018	Mechanical	Manu				Y	Regular
18.	Dr. S. Kavitha	Ph. D	Kalasalingam University	2020		Asst. Prof.		01-07-2011	Mechanical	Ind. Engg.			Y	Y	Regular
19.	Mr. M. Manoj Prabhakar	M.E	Anna University	2011		Asst. Prof.		12-01-2012	Mechanical	CAD				Y	Regular
20.	Mr. T. Rajpradeesh	M. Tech	Kalasalingam University	2013		Asst. Prof.		13-12-2013	Mechanical	Ind. Safe.				Y	Regular
21.	Dr. D. Chella Ganesh	Ph. D	Kalasalingam University	2020		Asst. Prof.		02-01-2015	Mechanical	Mater. Engg			Y	Y	Regular
22.	Mr. M. Purusothaman	M.E	Anna University	2014		Asst. Prof.		03-01-2015	Mechanical	Engg. Des.				Y	Regular

23.	Mr. R. Manikandan	M.E	Anna University	2014		Asst. Prof.		28-05-2015	Mechanical	Ind. Safe.				Y	Regular
24.	Mr. M. Ramaganesh	M.E	Anna University	2015		Asst. Prof.		18-06-2015	Mechanical	Ind. Engg.				Y	Regular
25.	Dr. S. Sivakumar	Ph. D	Kalasalingam University	2020		Asst. Prof.		18-06-2015	Mechanical	Manu.			Y	Y	Regular
26.	Mr. J. Manivannan	M. Tech	Kalasalingam University	2012		Asst. Prof.		02-07-2015	Mechanical	CAD				Y	Regular
27.	Mr. G. Ebenezer	M.E	Anna University	2011		Asst. Prof.		16-07-2015	Mechanical	Mach.				Y	Regular
28.	Mr. M. Armstrong	M.E	Anna University	2016		Asst. Prof.		30-05-2016	Mechanical	Thermal				Y	Regular
29.	Mr. P. Jayakumar	M.E	Anna University	2010		Asst. Prof.		01-07-2016	Mechanical	Ind. Safe.				Y	Regular
30.	Mr. S. Vignesh	M. E	Anna University	2016		Asst. Prof.		01-09-2016	Mechanical	Manu.				Y	Regular
31.	Mr. K. Vijay rakesh	M. E	Anna University	2013		Asst. Prof.		29.06.2016	Mechanical	Thermal				Y	Regular
32.	Mr. P. Ramkumar	M. E	Anna University	2014		Asst. Prof.		24/06/2015	Mechanical	Thermal				Y	Regular
33.	Dr.S.Jeyakumar	PhD	Anna University	2007		Prof	01/01/2011	28.12.2008	Mechanical	Thermal				Y	Regular
34.	Dr.S.Thirumalaikumaran	PhD	Kalasalingam University	2015		Asso. Prof	01/06/2015		Mechanical	Manuf				Y	Regular

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S. No	Name of the faculty member	Qualification			Association with the institution	Designation	Date on which designated as Professor / Associate Professor	Date of joining the institution	Department	Specialization	Academic Research			Currently associated (Y/N) Date of leaving (in case Currently associated " No")	Nature of Association (Regular / Contract
		Degree(highest degree	University	Year of graduation							Research paper publications	Phd guidance	Faculty receiving phd during the Assessment year		
1.	Dr. P. Venkumar	Ph. D	NIT, Trichy	2006		Prof.	11-07-1997	11-07-1997	Mechanical	Ind. Engg.				Y	Regular
2.	Dr. S. SaravanaSankar	Ph. D	Manonmaniam Sundaranar University	2006		Prof.	01-01-2003	01-06-1998	Mechanical	Ind. Engg.				Y	Regular
3.	Dr. J.T. WinowlinJappes	Ph. D	IITM. Chennai	2004		Prof.	18-10-2004	18-10-2004	Mechanical	Comp. Mater.				Y	Regular
4.	Dr. S. Balasubaramaniyan	Ph. D	IITM. Chennai	1983		Prof.	03-06-2013	25-01-2015	Mechanical	Mater. Engg				Y	Regular
5.	Dr. N. Rajini	Ph. D	Kalasalingam University	2013		Prof.	01-12-2016	02-07-2004	Mechanical	Comp. Mater.				Y	Regular
6.	Dr. I. Siva	Ph. D	Kalasalingam University	2012		Prof.	01-12-2016	09-06-2006	Mechanical	Comp. Mater.				Y	Regular
7.	Dr. D. S. Vincent	Ph. D	Kalasalingam University	2016		Prof.	01-12-2016	09-06-2016	Mechanical	Industrial Safety Engineering				Y	Regular

8.	Dr. A. Alavudeen	Ph. D	Anna University	2013		Prof.	17-07-2017	05-07-2004	Mechanical	Comp. Mater.				Y	Regular
9.	Dr. M. Adam Khan	Ph. D	NIT, Trichy	2015		Asso. Prof.	10-09-2014	10-11-2014	Mechanical	Mater. Engg				Y	Regular
10.	Dr. S. Rajesh	Ph. D	Kalasalingam University	2014		Asso. Prof.	01-01-2015	09-07-2008	Mechanical	Mater. Engg				Y	Regular
11.	Dr. V. Arumugaprabu	Ph. D	Kalasalingam University	2014		Asso. Prof.	02-01-2015	11-06-2007	Mechanical	Comp. Mater.				Y	Regular
12.	Dr. S. Muthuvel	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	11-06-2009	Mechanical	Thermal				Y	Regular
13.	Dr. S. Bathrinath	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	03-03-2010	Mechanical	Ind. Engg.				Y	Regular
14.	Dr. C. Bennet	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-08-2016	04-10-2004	Mechanical	Thermal				Y	Regular
15.	Dr. K. Senthil Kumar	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	13-01-2010	Mechanical	Comp. Mater.				Y	Regular
16.	Dr. K. Mayandi	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	01-07-2011	Mechanical	Mater. Engg				Y	Regular
17.	Dr. S. Suresh Kumar	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	08-06-2012	Mechanical	Mach.				Y	Regular
18.	Dr. P. Balamurugan	Ph. D	Kalasalingam University	2017		Asso. Prof.	01-07-2017	03-01-2010	Mechanical	Mach.				Y	Regular
19.	Dr. Anish Nair	Ph. D	NIT Trichy	2018		Asso. Prof.		23-07-2018	Mechanical	Manu				Y	Regular
20.	Dr. S. Kalirasu	Ph. D	Kalasalingam University	2018		Asso. Prof.		01-06-2012	Mechanical	Comp. Mater.				Y	Regular
21.	Dr. S. Kavitha	Ph. D	Kalasalingam University	2020		Asst. Prof.		01-07-2011	Mechanical	Ind. Engg.			Y	Y	Regular
22.	Mr. T. Premkumar	M.E	Anna University	2011		Asst. Prof.		15-12-2011	Mechanical	CAD				Y	Regular
23.	Mr. M. Manoj Prabhakar	M.E	Anna University	2011		Asst. Prof.		12-01-2012	Mechanical	CAD				Y	Regular
24.	Mr. T. Rajpradeesh	M. Tech	Kalasalingam University	2013		Asst. Prof.		13-12-2013	Mechanical	Ind. Safe.				Y	Regular
25.	Dr. D. Chella Ganesh	Ph. D	Kalasalingam University	2020		Asst. Prof.		02-01-2015	Mechanical	Mater. Engg			Y	Y	Regular
26.	Mr. M. Purusothaman	M.E	Anna University	2014		Asst. Prof.		03-01-2015	Mechanical	Engg. Des.				Y	Regular

27.	Mr. R. Manikandan	M.E	Anna University	2014		Asst. Prof.		28-05-2015	Mechanical	Ind. Safe.				Y	Regular
28.	Mr. M. Ramaganesh	M.E	Anna University	2015		Asst. Prof.		18-06-2015	Mechanical	Ind. Engg.				Y	Regular
29.	Dr. S. Sivakumar	Ph. D	Kalasalingam University	2020		Asst. Prof.		18-06-2015	Mechanical	Manu.			Y	Y	Regular
30.	Mr. J. Manivannan	M. Tech	Kalasalingam University	2012		Asst. Prof.		02-07-2015	Mechanical	CAD				Y	Regular
31.	Mr. G. Ebenezer	M.E	Anna University	2011		Asst. Prof.		16-07-2015	Mechanical	Mach.				Y	Regular
32.	Mr. M. Armstrong	M.E	Anna University	2016		Asst. Prof.		30-05-2016	Mechanical	Thermal				Y	Regular
33.	Mr. P. Jayakumar	M.E	Anna University	2010		Asst. Prof.		01-07-2016	Mechanical	Ind. Safe.				Y	Regular
34.	Mr. M. Selwin	M.E	Anna University	2017		Asst. Prof.		12-06-2017	Mechanical	Manu.				Y	Regular
35.	Mr. I. Rajkumar	M. E	Kalasalingam University	2013		Asst. Prof.		20-06-2015	Mechanical	CAD/CAM				Y	Regular
36.	Mr. G. Poomarimuthukumar	M. E	Anna University	2005		Asst. Prof.		02-05-2016	Mechanical	Manu.				Y	Regular
37.	Mr. S. Vignesh	M. E	Anna University	2016		Asst. Prof.		01-09-2016	Mechanical	Manu.				Y	Regular
38.	Mr. K. Arunprasath	M. E	Anna University	2014		Asst. Prof.		03-06-2016	Mechanical	Manu				Y	Regular
39.	Mr. K. Vijay rakesh	M. E	Anna University	2013		Asst. Prof.		29.06.2016	Mechanical	Thermal				Y	Regular
40.	Mr. B. Sajith	M. E	Anna University	2014		Asst. Prof.		17/12/2014	Mechanical	CAD/CAM				Y	Regular
41.	Mr. C.R.Rajkumar	M. E	Anna University	2015		Asst. Prof.		08/06/2016	Mechanical	CAD/CAM				Y	Regular
42.	Mr. V. Dinesh Kumar	M. E	Anna University	2013		Asst. Prof.		02/05/2016	Mechanical	Manu.				Y	Regular
43.	Mr. P. Ramkumar	M. E	Anna University	2014		Asst. Prof.		24/06/2015	Mechanical	Thermal				Y	Regular
44.	Dr.G. Kalusuraman	M. E	Anna University	2017		Asst. Prof.		01/09/2009	Mechanical	Manu.				Y	Regular

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S. No	Name of the faculty member	Qualification			Association with the institution	Designation	Date on which designated as Professor / Associate Professor	Date of joining the institution	Department	Specialization	Academic Research			Currently associated (Y/N) Date of leaving (in case Currently associated " No")	Nature of Association (Regular / Contract
		Degree (highest degree	University	Year of graduation							Research paper publications	Ph.D. guidance	Faculty receiving PhD during the Assessment year		
1.	Dr. P. Venkumar	Ph. D	NIT, Trichy	2006		Prof.	11-07-1997	11-07-1997	Mechanical	Ind. Engg.				Y	Regular
2.	Dr. S. SaravanaSankar	Ph. D	Manonmaniam Sundaranar University	2006		Prof.	01-01-2003	01-06-1998	Mechanical	Ind. Engg.				Y	Regular
3.	Dr. J.T. WinowlinJappes	Ph. D	IITM. Chennai	2004		Prof.	18-10-2004	18-10-2004	Mechanical	Comp. Mater.				Y	Regular
4.	Dr. S. Balasubaramaniyan	Ph. D	IITM. Chennai	1983		Prof.	03-06-2013	25-01-2015	Mechanical	Mater. Engg				Y	Regular
5.	Dr. N. Rajini	Ph. D	Kalasalingam University	2013		Prof.	01-12-2016	02-07-2004	Mechanical	Comp. Mater.				Y	Regular
6.	Dr. I. Siva	Ph. D	Kalasalingam University	2012		Prof.	01-12-2016	09-06-2006	Mechanical	Comp. Mater.				Y	Regular
7.	Dr. D. S. Vincent	Ph. D	Kalasalingam University	2016		Prof.	01-12-2016	09-06-2006	Mechanical	Industrial Safety Engineering				Y	Regular
8.	Dr. A. Alavudeen	Ph.	Anna	2013		Prof.	17-07-	05-07-	Mechanical	Comp.				Y	Regular

		D	University				2017	2004		Mater.					
9.	Dr. M. Adam Khan	Ph. D	NIT, Trichy	2015		Asso. Prof.	10-09-2014	10-11-2014	Mechanical	Mater. Engg				Y	Regular
10.	Dr. S. Rajesh	Ph. D	Kalasalingam University	2014		Asso. Prof.	01-01-2015	09-07-2008	Mechanical	Mater. Engg				Y	Regular
11.	Dr. V. Arumugaprabu	Ph. D	Kalasalingam University	2014		Asso. Prof.	02-01-2015	11-06-2007	Mechanical	Comp. Mater.				Y	Regular
12.	Dr. S. Muthuvel	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	11-06-2009	Mechanical	Thermal				Y	Regular
13.	Dr. S. Bathrinath	Ph. D	Kalasalingam University	2015		Asso. Prof.	01-09-2015	03-03-2010	Mechanical	Ind. Engg.				Y	Regular
14.	Dr. C. Bennet	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-08-2016	04-10-2004	Mechanical	Thermal				Y	Regular
15.	Dr. K. Senthil Kumar	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	13-01-2010	Mechanical	Comp. Mater.				Y	Regular
16.	Dr. K. Mayandi	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	01-07-2011	Mechanical	Mater. Engg				Y	Regular
17.	Dr. S. Suresh Kumar	Ph. D	Kalasalingam University	2016		Asso. Prof.	01-11-2016	08-06-2012	Mechanical	Mach.				Y	Regular
18.	Dr. P. Balamurugan	Ph. D	Kalasalingam University	2017		Asso. Prof.	01-07-2017	03-01-2010	Mechanical	Mach.				Y	Regular
19.	Dr. Anish Nair	Ph. D	NIT Trichy	2018		Asso. Prof.		23-07-2018	Mechanical	Manu				Y	Regular
20.	Dr. S. Kalusuraman	Ph. D	Kalasalingam University	2018		Asso. Prof.		01-06-2012	Mechanical	Comp. Mater.				Y	Regular
21.	Dr. S. Kavitha	Ph. D	Kalasalingam University	2020		Asst. Prof.		01-07-2011	Mechanical	Ind. Engg.				Y	Regular
22.	Mr. T. Premkumar	M.E	Anna University	2011		Asst. Prof.		15-12-2011	Mechanical	CAD				Y	Regular
23.	Mr. M. Manoj Prabhakar	M.E	Anna University	2011		Asst. Prof.		12-01-2012	Mechanical	CAD				Y	Regular
24.	Mr. T. Rajpradeesh	M. Tech	Kalasalingam University	2013		Asst. Prof.		13-12-2013	Mechanical	Ind. Safe.				Y	Regular
25.	Mr. B. Sajith	M.E	Anna University	2013		Asst. Prof.		17-12-2014	Mechanical	CAD				Y	Regular
26.	Dr. D. Chella Ganesh	Ph. D	Kalasalingam University	2020		Asst. Prof.		02-01-2015	Mechanical	Mater. Engg				Y	Regular
27.	Mr. M. Purusothaman	M.E	Anna	2014		Asst.		03-01-	Mechanical	Engg. Des.				Y	Regular

			University			Prof.		2015							
28.	Mr. R. Manikandan	M.E	Anna University	2014		Asst. Prof.		28-05-2015	Mechanical	Ind. Safe.				Y	Regular
29.	Mr. M. Ramaganesh	M.E	Anna University	2015		Asst. Prof.		18-06-2015	Mechanical	Ind. Engg.				Y	Regular
30.	Dr. S. Sivakumar	Ph. D	Kalasalingam University	2020		Asst. Prof.		18-06-2015	Mechanical	Manu.				Y	Regular
31.	Mr. J. Manivannan	M. Tech	Kalasalingam University	2012		Asst. Prof.		02-07-2015	Mechanical	CAD				Y	Regular
32.	Mr. G. Ebenezer	M.E	Anna University	2011		Asst. Prof.		16-07-2015	Mechanical	Mach.				Y	Regular
33.	Mr. M. Armstrong	M.E	Anna University	2016		Asst. Prof.		30-05-2016	Mechanical	Thermal				Y	Regular
34.	Mr. P. Jayakumar	M.E	Anna University	2010		Asst. Prof.		01-07-2016	Mechanical	Ind. Safe.				Y	Regular
35.	Mr. M. Selwin	M.E	Anna University	2017		Asst. Prof.		12-06-2017	Mechanical	Manu.				Y	Regular
36.	Mr. I. Rajkumar	M. E	Kalasalingam University	2013		Asst. Prof.		20-06-2015		CAD/CAM				Y	Regular
37.	Mr. G. Poomarimuthukumar	M. E	Anna University	2005		Asst. Prof.		02-05-2016		Manu.				Y	Regular
38.	Mr. P. Jothiraj	M. E	Anna University	2016		Asst. Prof.		01-09-2016		Manu.				Y	Regular
39.	Mr. S. Vignesh	M. E	Anna University	2016		Asst. Prof.		01-09-2016		Manu.				Y	Regular
40.	Mr. K. Arunprasath	M. E	Anna University	2014		Asst. Prof.		03-06-2016		Manu				Y	Regular
41.	Mr. K. Vijay rakesh	M. E	Anna University	2013		Asst. Prof.		29.06.2016		Thermal				Y	Regular
42.	Mr. V. Dinesh Kumar	M. E	Anna University	2013		Asst. Prof.		02/05/2016	Mechanical	Manu.				Y	Regular
43.	Mr. P. Ramkumar	M. E	Anna University	2014		Asst. Prof.		24/06/2015	Mechanical	Thermal				Y	Regular
44.	Dr.G. Kalusuraman	M. E	Anna University	2017		Asst. Prof.		01/09/2009	Mechanical	Manu.				Y	Regular
45.	Dr.S.Thirumalaikumaran	PhD	Kalasalingam University	2015		Asso. Prof	01/06/2015		Mechanical	Manuf				Y	Regular

4.1 Student – Faculty Ratio (SFR) (10)

No. of UG Programs in the Department (n): 1

No. of PG Programs in the Department (m): 1

No. of Students in UG 2nd Year= **u1**

No. of Students in UG 3rd Year= **u2**

No. of Students in UG 4th Year= **u3**

No. of Students in PG 1st Year= **p1**

No. of Students in PG 2nd Year= **p2**

No. of Students = Sanctioned Intake + Actual admitted lateral entry students

(The above data to be provided considering all the UG and PG programs of the department)

S=Number of Students in the Department = UG1 + UG2 +.. +Ugn + PG1 + …PGm

F = Total Number of Regular Faculty Members in the Department (excluding first year faculty)

Year	**CAY (2021-22)**	**CAYm1 (2020-21)**	**CAYm2 (2019-20)**
u1.1	120	180	180
u1.2	180	180	180
u1.3	180	180	300
UG1	480	540	600
P1.1	12	12	12
P1.2	12	12	12
PG1	24	24	24
Total No. of Students in the Department **(S)**	504	608	654
No. of Faculty in the Department **(F)**	34	44	45
Student Faculty Ration (SFR)	15	14.36	15.07
Average SFR	**SFR =14.81**		

Provide the information about the regular and contractual faculty as per the formatmentioned below:

Table 4.1.1

	Total number of regular faculty in the department	Total number of contractual faculty in the department
CAY	34	NIL
CAYm1	44	NIL
CAYm2	45	NIL

4.2 Faculty competencies in the area of Program specialization (30)

4.2.1 Faculty name and specialization for the program under consideration (10)

Table 4.2.1.1 Details about faculty and their specialization

Name of the faculty	Relevant Area of Specialization	
	CAY	CAYm 1
Dr. S. SaravanaSankar	Human Error analysis, Risk analysis in Green manufacturing, Fuzzy logic	Human Error analysis, Riskanalysis in Green manufacturing, Fuzzy logic
Dr.Vincent	Safety in Transport Sectors, Industrial Safety Engineering	Safety in Transport Sectors, Industrial Safety Engineering
Dr. V. Arumugaprabu	Safety in chemical and construction, Composite Materials, Redmud based	Safety in chemical Engineering and construction, Composite
Mr. M. Ramaganesh	Risk analysis, industrial engineering	Risk analysis, Industrial engineering
Mr. R. Manikandan	Industrial Safety Engineering, Fireworks safety	Industrial Safety Engineering, Fireworks Safety
Mr.T.Rajpradeesh	Industrial Safety Engineering	Industrial Safety Engineering
Mr.P.Jeyakumar	Industrial Safety Engineering	Industrial Safety Engineering

4.2.2 Faculty Research Publication (10)

Table 4.2.2.1 Number of Publications

	2022	2021	CAYm1 (2020)	CAYm2 (2019)	CAYm3 (2018)
Total Number of Research Articles Publication in Year Wise	**122**	**141**	**101 (44-SCI, 57-Scopus)**	**49 (33-SCI, 14-Scopus, 2-UGC)**	**39 (23-SCI, 13-Scopus, 3-UGC)**

Table 4.2.2.2 Individual faculty publication details

Name of the faculty	Academic Research									
	Number of quality publications in refereed/SCI Journals, citations, Books/Book Chapters etc.					Ph.D. guided /Ph.D. awarded during the assessment period while working in the institute				
	2022	2021	CAYm1 (2020)	CAYm2 (2019)	CAYm3 (2018)	2022	2021	CAYm1 (2020)	CAYm2 (2019)	CAYm3 (2018)
Dr. S. Saravanasankar	5	9	8	6	--	5	4	1	--	--
Dr. J. T. Winowlin jappes	12	21	14	9	14	3	3	6	4	4
Dr. V. Manikandan	--	--	--	2	8	--	--	--	--	--
Dr. P. Venkumar	--	--	**6**	**15**	**4**	--	--	7	6	4
Dr. I. Siva	18	12	17	15	13	3	3	5	5	4
Dr.Vincent	--	--	--	--	01	--	--	--	--	--
Dr. S. Balasubaramaniyan	--	--	--	--	7	--	--	--	--	--
Dr. N. Rajini	21	30	22	31	24	5	5	5	6	7
Dr. A. Alavudeen	--	06	2	2	1	1	1	--	--	--
Dr.S.Rajesh	08	16	03	07	05	5	6	4	4	2
Dr. V. Arumugaprabu	--	--	**16**	**18**	**8**	5	5	4	5	5
Dr. P. Amuthakkannan	--	--	--	2	4	--	--	5	4	3
Dr. S. Bathrinath	18	22	19	11	2	5	5	5	5	5
Dr. S. Muthuvel	3	5	6	-	-	6	6	1	--	--
Dr. M. Muthukannan	--	--	--	1	4	--	--	4	4	3
Dr. C. Bennet	--	01	1	1	2	--	--	5	4	3
Dr. K. Senthilkumar	--	8	24	20	4	--	--	1	1	1
Dr. K. Mayandi	12	15	17	17	5	5	4	3	3	
Dr. S. Suresh kumar	11	12	10	3	1	3	3	1	1	1
Dr. P. Balamurugan	04	04	3	6	2	4	3	4	2	--
Dr. G. Kalusuraman	03	12	6	5	1	1	1	3	3	2
Dr. Anish Nair	08	04	6	1	1	2	2	1	--	--
Mrs. S. Kavitha	01	02	4	--	1	--	--	--	--	--
Mr. M. Manoj prabhakar	--	--	2	4	--	--	--	--	--	--
Mr. S. Kalirasu	--	--	--	--	1	--	--	--	--	--
Mr. J. Manivannan	01	01	2	3	-	--	--	--	--	--
Mr. V. Ganeshmoorthy	--	--	--	--	--	--	--	--	--	--

Mr. R. Mahesh kumar	--	--	1	2	2	--	--	--	--	--
Mr. B. Sajith	--	--	--	--	--	--	--	--	--	--
Mr. G. Ebenezer	**1**	**1**	--	--	--	--	--	--	--	--
Mr. D. Chellaganesh	--	--	--	--	--	--	--	--	--	--
Mr. R. Manikandan	**1**	**1**	**2**	**5**	**--**	--	--	--	--	--
Mr. S. Sivakumar	**-**	**1**	01	--	--	--	--	--	--	--
Mr. M. Ramaganesh	**01**	**02**	--	--	--	--	--	--	--	--
Mr. I. Rajkumar	1	1	1	3	1	--	--	--	--	--
Mr. P. Ramkumar	**7**	**8**	--	--	--	--	--	--	--	--
Mr. G. Poomarimuthukumar	**--**	**--**	--	--	--	--	--	--	--	--
Mr. V. Dinesh kumar	--	01	-	1	--	--	--	--	--	--
Mr. S. Anantha krishnan	--	--	--	--	--	--	--	--	--	--
Mr. K Arun prasath	--	--	--	--	--	--	--	--	--	--
Mr. M. Armstrong	--	**02**	--	--	--	--	--	--	--	--
Mr. P. Jothiraj	--	--	--	--	--	--	--	--	--	--
Mr. S. P. Prasanna	--	--	--	--	--	--	--	--	--	--
Mr. S. Vignesh	**04**	**02**	--	--	--	--	--	--	--	--
Mr. T. Raj pradeesh	**1**	**2**	**--**	**4**	**0**	--	--	--	--	--
Mr. M. Purusothaman	--	--	1	-	2	--	--	--	--	--
Mr. P. Jayakumar	--	--	--	--	--	--	--	--	--	--
Mr. R. Jegadeesan	--	--	--	--	--	--	--	--	--	--
Mr. M. Selwin	--	--	--	--	--	--	--	--	--	--
Mr. G. Karthikeyan	--	--	--	--	--	--	--	--	--	--
Mr. C. Sankar	--	--	--	--	--	--	--	--	--	--
Mr. T. Premkumar	--	--	2	2	--	--	--	--	--	--
Mr. K. Vijay rakesh	--	1	--	--	--	--	--	--	--	--
Dr.S.Jeyakumar										
Dr.S.Thirumalaikumaran										

Table 4.2.2.3
Journal Publications list

S.No	Names of the authors	Title, Year, Vol, Pages	National/International	Impact Factor, if any	Year of Publications
1.	Koppiahraj K, Bathrinath S, Syed Mithun Ali, Priyabrata Chowdhury, Sanjoy Kumar Paul	An integrated approach to modeling the barriers in implementing green manufacturing practices in SMEs, 2020, Vol. 265 https://doi.org/10.1016/j.jclepro.2020.121737	Journal of Cleaner Production	7.246	2020
2.	S. Vigneshwaran, M. Uthayakumar, V. Arumugaprabu	Potential use of industrial waste-red mud in developing hybrid composites: A waste management approach	Journal of Cleaner Production	7.246	2020
3.	S. Vigneshwaran, R. Sundarakannan, K.M. John, R. Deepak Joel Johnson, K. Arun Prasath, S. Ajith, V. Arumugaprabu, M. Uthayakumar	Recent advancement in the natural fiber polymer composites: A comprehensive review	Journal of Cleaner Production	7.246	2020
4.	Mayandi K, N.Rajini, Nadir Ayrilmis, M.P. Indira Devi, Suchart Siengchin	An overview of endurance and ageing performance under various environmental conditions of Hybrid Polymer Composites	Journal of Materials Research and Technology	5.3	2020
5.	Paul ChristopherJE, Mohamed THSultan, Chithirai Pon Selvan, Siva Irulappasamy	Manufacturing challenges in self-healing technology for polymer composites — a review	Journal of Materials Research and Technology	5.3	2020
6.	N Nagaraj, S Balasubramaniam, V Venkataraman, Ravichandran Manickam, Rajini N, Ismail Sikiru Oluwarotimi	Effect of cellulosic filler loading on mechanical and thermal properties of date palm seed/vinyl ester composites, 2020, Vol. 147, pp. 53-66 https://doi.org/10.1016/j.ijbiomac.2019.11.247	International Journal of Biological Macromolecules	4.784	2020
7.	Vigneshwaran Shanmugama, Deepak Joel Johnsonb , Karthik Babuc , Sundarakannan Rajendrana, Arumugaprabu Veerasimmana , Uthayakumar	The mechanical testing and performance analysis of polymer-fibre composites prepared through the additive manufacturing. https://doi.org/10.1016/j.polymertesting.2020.106925	Polymer Testing	3.275	2020

	Marimuthu				
8.	Rendi Kurniawan, Tae Jo Ko, S. Thirumalai Kumaran, Farooq Ahmed	3-DOF ultrasonic elliptical vibration tool holder based on coupled resonance modes for manufacturing micro-groove	Precision Engineering	3.108	2020
9.	G Kalusuraman, I Siva, Yashwant Munde, Cithirai Pon Selvan, S Anand Kumar, Sandro C Amico	Dynamic-mechanical properties as a function of luffa fibre content and adhesion in a polyester composite, 2020, Vol. 87, https://doi.org/10.1016/j.polymertesting.2020.106538	Polymer Testing	2.943	2020
10.	K. M. John & S. Thirumalai Kumaran	A feasible strategy to produce quality holes using temperature-assisted drilling on CFRP	International Journal of Advanced Manufacturing Technology	2.633	2020
11.	S. Sekara, S. Suresh Kumar, S. Vigneshwaran, and G. Velmurugan	Evaluation of Mechanical and Water Absorption Behavior of Natural Fiber-Reinforced Hybrid Biocomposites	Journal of natural fibers	2.622	2020
12.	Dr VEERASIMMAN, V. Arumugaprabu,	Thermal Properties Of Natural Fiber Sisal Based Hybrid Composites- A Brief Review	Journal of natural fibers	2.622	2020
13.	Manikandan Rajendran Rajajeyaganthan Ramanathan · P. Ganesan · Rajesh Shanmugavel	Experimental analysis of tamarind seed powder-based fash powder composition for eco-friendly frecrackers. https://doi.org/10.1007/s10973-012-2749-9	Journal of Thermal Analysis and Calorimetry	2.731	2020
14.	S.Bathrinath, R.K.A.Bhalaji, Syed Mithun Ali, Golam Kabir	Role of Ergonomic Factors Affecting Production of Leather Garment-Based SMEs of India: Implications for Social Sustainability. 10.3390/sym12091414.	Symmetry	2.645	2020
15.	Harshad Pingulkar, Ashok Mache, Yashwant Munde, I. Siva	Synergy Of Interlaminar Glass Fiber Hybridization On Mechanical And Dynamic Characteristics Of Jute And Flax Fabric Reinforced Epoxy Composites. https://doi.org/10.1080/15440478.2020.1856280	Journal Of Natural Fibers	2.622	2020
16.	J Manivannan, S Rajesh, K Mayandi, N Rajini, SO Ismail, F Mohammad,	Animal fiber characterization and fiber loading effect on mechanical behaviors of sheep wool fiber reinforced polyester composites	Journal Of Natural Fibers	2.622	2020
17.	Manikandan R,	Experimental analysis of tamarind	Journal of	2.471	2020

	Rajajeyaganthan R, P. Ganesan, Rajesh S	seed powder-based flash powder composition for eco-friendly firecrackers, 2020, https://doi.org/10.1007/s10973-020-09707-7	Thermal Analysis and Calorimetry		
18.	Milan S, Christopher T, Winowlin Jappes J T, Rajini N, Mayandi K, Sikiru Oluwarotimi Ismail, Faruq Mohammad	Characterization of Novel Lignocellulosic Spinifex littoreus Fibers and Their Composites, 2020, Vol. 17, pp. 393–404 https://doi.org/10.1007/s42235-020-0032-5	Journal of Bionic Engineering	2.463	2020
19.	S.Senthilrajan N.Venkadeswaran Lenin babu M, A.alavudeen	Impact of fibre length and surface modification on the acoustic behavior of jute fibre	Applied acoustics	2.3	2020
20.	P. Sethu Ramalingam, K. Mayandi, N.Rajini	Experimental investigation and statistical analysis of additively manufactured onyx-carbon fiber reinforcedcomposites	Journal of Applied Polymer Science	2.280	2020
21.	B Anush Raj, Dr. J.T. Winowlin Jappes, Dr.M.Adam Khan, V Dillibabu	Studies on SU718 alloy developed using laser sintering on the additive manufacturing Process	OPTIK	2.187	2020
22.	Mr. Anish Nair, Dr.M.Adam Khan,	Studies on effect of laser processed Stellite 6 material and its electrochemical behavior	OPTIK	2.187	2020
23.	M. Chandrasekar, I. Siva, T. Senthilmuthukumar, K. Senthilkumar, Suchart Siengchin, N. Rajini	Infuence of Fibre Inter-ply Orientation on the Mechanical and Free Vibration Properties of Banana Fibre Reinforced Polyester Composite Laminates https://doi.org/10.1007/s10924-020-01814-8	Journal of Polymers and the Environment	2.06	2020
24.	Shanmugam Vigneshwaran, KM John, R Deepak Joel Johnson, Marimuthu Uthayakumar, V Arumugaprabu and Sundaresan T Kumaran	Conventional and unconventional machining performance of natural fibre-reinforced polymer composites: A review. https://doi.org/10.1177%2F0731684420958103	Journal of Reinforced Plastics and Composites	1.987	2020
25.	A. Perumal · A. Azhagurajan · R. Prithivirajan · S. Suresh Kumar	Experimental Investigation and Optimization of Process Parameters in Ti – (6242) Alpha–Beta Alloy Using Electrical Discharge Machining https://doi.org/10.1007/s10904-020-01786-1	Journal of Inorganic and Organometallic Polymers and Materials	1.941	2020

26.	B Anush Raj, JT Winowlin Jappes, M Adam Khan, V Dillibabu, NC Brintha	Direct metal laser sintered (DMLS) process to develop Inconel 718 alloy for turbine engine components, 2020, Vol. 202, https://doi.org/10.1016/j.ijleo.2019.163735	Optik	1.914	2020
27.	D.Chellaganesh, Dr.M.Adam Khan, Nouby M. Ghazaly, P. Madindwa Mashinini	Solid particle erosion studies on thermally deposited alumina–titania coatings over aluminium alloy. https://doi.org/10.1007/s12613-020-2099-8	Minerals Metallurgy and Materials	1.7	2020
28.	K.Koppiahraj , S.Bathrinath, Syed Mithun Ali	A fuzzy ANP-DEMATEL model on faulty behavior risks: Implications for improving safety at the workplace	International Journal of Occupational Safety and Ergonomics	1.601	2020
29.	K Arun Prasath, V Arumugaprabu, P Amuthakkannan, V Manikandan, R Deepak Joel Johnson	Low velocity impact, compression after impact and morphological studies on flax fiber reinforced with basalt powder filled composites, 2020, Vol. 7 (1) pp. 1-10, https://doi.org/10.1088/2053-1591/ab611e	Materials Research Express	1.449	2020
30.	T Livingston, A Athijayamani, A Alavudeen	Evaluation of Mechanical Properties of Coconut Shell Particle/Vinyl Ester Composite Based on the Untreated and treated conditions	Materials Research Express	1.449	2020
31.	R Sundarakannan, V Arumugaprabu, V Manikandan, S Vigneshwaran	Mechanical property analysis of biochar derived from cashew nut shell waste reinforced polymer matrix, 2020, Vol. 6 (12),	Materials Research Express	1.449	2020
32.	G Kalusuraman, S Thirumalai Kumaran, M Aslan, K Mayandi	Mechanical properties of waste copper slag filled surface activated jute fiber reinforced composite, 2020, Vol. 6 (12)	Materials Research Express	1.449	2020
33.	Sang Tae Jung, Rendi Kurniawan, S. Thirumalai Kumaran, In Jun Yoon and Tae Jo Ko	Mechanism study of micro-electrical discharge drilling method during micro-dimpling	Journal of Mechanical Science and Technology	1.345	2020
34.	S Kavitha, P Venkumar	A vibrant crossbreed social spider optimization with genetic algorithm tactic for flexible job shop scheduling problem, 2020, Vol. 53 (1-2) https://doi.org/10.1177/0020294019889085	Measurement and Control	1.229	2020
35.	M Thirukumaran, JT Winowlin Jappes, I	On the interfacial adhesion of fiber metal laminates using surface	Journal of Adhesion	1.210	2020

	Siva, Rajajeyaganthan Ramanathan, NC Brintha	modified aluminum 7475 alloy for aviation industries–a study, 2020, Vol. 34 (6), 635-650	Science and Technology		
36.	KM John, S Thirumalai Kumaran, K Senthil Kumar, S Suresh Kumar, M Aslan, Ü Alver	Mechanical and Vibrational Behavior of Twill Woven Carbon Fiber Reinforced Composites, 2020, Vol. 35 (2), pp. 203-210 https://doi.org/10.3139/217.3918	International Polymer Processing	0.942	2020
37.	P. Sreeraj, S. Thirumalai Kumaran, S. Suresh Kumar, M. Uthayakumar, M. Pethuraj	Measurement of micro channels produced in AA6351/Rutile composite by wire-EDM. https://doi.org/10.1142/S0218625X20500341	Surface Review Letters	0.835	2020
38.	RKA Bhalaji, S Bathrinath, SG Ponnambalam, S Saravanasankar	A soft computing methodology to analyze sustainable risks in surgical cotton manufacturing companies, 2020, Vol. 45, pp. 1-22 https://doi.org/10.1007/s12046-020-1306-7	Sādhanā	0.769	2020
39.	V Balaji, P Venkumar, MS Sabitha, D Amuthaguka	DVSMS: dynamic value stream mapping solution by applying IioT, 2020, Vol. 45 (1), https://doi.org/10.1007/s12046-019-1251-5	Sādhanā	0.769	2020
40.	G Kalusuraman, S Thirumalai Kumaran, I Siva, S Anand Kumar	Cutting performance of luffa cylindrica fiber–reinforced composite by abrasive water jet, 2020, Vol. 48 (5) https://doi.org/10.1520/JTE20180330	Journal of Testing and Evaluation	0.711	2020
41.	S Vigneshwaran, M Uthayakumar, V Arumugaprabu	Prediction and Analysis of Abrasive Water Jet Machining Performance on Hybrid Composite, 2020, Vol. 48 (2), pp. 1505-1519 https://doi.org/10.1520/JTE20180593	Journal of Testing and Evaluation	0.711	2020
42.	R Deepak Joel Johnson, V Arumugaprabu, V Manikandan	Effect of Moisture on the Resistance of Sansevieria Cylindrica–Reinforced Vinyl Ester Composites, 2020, Vol. 49 (5), https://doi.org/10.1520/JTE20180827	Journal of Testing and Evaluation	0.711	2020
43.	M Uthayakumar, S Thirumalai Kumaran, M Adam Khan, Sebastian Skoczypiec, Wojciech Bizon	Microdrilling of AA (6351)-SiC-B4C Composite Using Hybrid Micro-ECDM Process, 2020, Vol. 48 (4), https://doi.org/10.1520/JTE20180216	Journal of Testing and Evaluation	0.711	2020
44.	GS Samy, S Thirumalai Kumaran,	Observations of Machining Performance during Turning	Journal of Testing and	0.711	2020

	M Uthayakumar	AA6351-B4C Composite, 2020, Vol. 49 (3), https://doi.org/10.1520/JTE20180429	Evaluation		
45.	M Adam Khan, D Chellaganesh, M Uthayakumar, JT Winowlin Jappes, Muthukannan Duraiselvam	Electrochemical Behaviour and Surface Studies on Austenitic Stainless Steel and Nickel-Based Superalloy Dissimilar Weld Joints, 2020, pp. 251-266 https://doi.org/10.1007/978-3-030-18854-2_11	Materials Forming, Machining and Post Processing. (Materials Forming, Machining and Tribology)	Scopus	2020
46.	A Ajithram, JT Winowlin Jappes, T Senthil Muthu Kumar, N Rajini, A Varada Rajulu, Sanjay Mavinkere Rangappa, Suchart Siengchin	Water Hyacinth for Biocomposites—An Overview, 2020, pp. 171-179 https://doi.org/10.1007/978-3-030-40301-0_8	Biofibers and Biopolymers for Biocomposites	Scopus	2020
47.	NC Brintha, Shajulin Benedict, JT Winowlin Jappes	Resource allocation in cloud manufacturing using bat algorithm, 2020, Vol.34 (3), pp. 296-310 https://doi.org/10.1504/IJMTM.2020.107309	International Journal of Manufacturing Technology and Management	Scopus	2020
48.	T Senthil Muthu Kumar, K Senthilkumar, M Chandrasekar, Saravanasankar S, Sanjay Mavinkere Rangappa, Suchart Siengchin, N Rajini	Influence of Fillers on the Thermal and Mechanical Properties of Biocomposites: An Overview, 2020, pp. 111-133, https://doi.org/10.1007/978-3-030-40301-0_5	Biofibers and Biopolymers for Biocomposites	Scopus	2020
49.	Yashwant S Munde, Ravindra B Ingle, Avinash S Shinde, Siva Irulappasamy	Micromechanical Modelling and Evaluation of Pineapple Leaves Fibre (PALF) Composites Through Representative Volume Element Method, 2020, pp. 249-264 https://doi.org/10.1007/978-981-15-1416-6_12	Pineapple Leaf Fibers	Scopus	2020
50.	Chithirai Pon Selvan, I Siva, Avinash Shinde, Sandro C Amico	Tribological investigation on nano-graphene and curauá filled three-phase polymer composites, 2020, https://doi.org/10.1016/j.matpr.2020.01.499	Materials Today: Proceedings	Scopus	2020
51.	T Premkumar, I Siva,	Basalt fiber hybridization effects on	Materials	Scopus	2020

	Yashwant Munde, S Rajesh, Sandro C Amico	the thermal degradation properties of curauá fiber composites, 2020, https://doi.org/10.1016/j.matpr.2020.01.604	Today: Proceedings		
52.	S Sivakumar, I Siva, R Ramalakshmi	Automotive Drive-Shaft Health Condition Monitoring and Relaying using Internet of Things (IOT), 2020, Vol. 13 (1), pp. 94-103	Science & Technology Research Institute for Defence (STRIDE)	Scopus	2020
53.	S Suresh Kumar, F Erdemir, Temel Varol, S Thirumalai Kumaran, M Uthayakumar, Aykut Canakci	Investigation of WEDM process parameters of Al–SiC–B4C composites using response surface methodology, 2020, Vol. 3 (2), pp. 127-135 https://doi.org/10.1016/j.ijlmm.2019.09.003	International Journal of Lightweight Materials and Manufacture	Scopus	2020
54.	M Saravana Mohan, PS Samuel Ratna Kumar, S Thirumalai Kumaran, G Sikkandhar Thanish	Impact of Cu-Al-Ni shape memory alloy in dynamic performance of redundant SCARA robot, 2020, https://doi.org/10.1016/j.matpr.2019.12.296	Materials Today: Proceedings	Scopus	2020
55.	M Ramaganesh, S Bathrinath	Analysing Environmental Factors for Corporate Social Responsibility in Mining Industry Using ISM Methodology, 2020, Vol. 1057, pp. 349-360 https://doi.org/10.1007/978-981-15-0184-5_31	Soft Computing for Problem Solving. (Advances in Intelligent Systems and Computing)	Scopus	2020
56.	Syed Shuibul Qarnain, S Muthuvel, S Bathrinath	Analyzing factors necessitating conservation of energy in residential buildings of Indian subcontinent: A DEMATEL approach, 2020, https://doi.org/10.1016/j.matpr.2020.02.039	Materials Today: Proceedings	Scopus	2020
57.	Syed Shuibul Qarnain, S Muthuvel, S Bathrinath	Review on government action plans to reduce energy consumption in buildings amid COVID-19 pandemic outbreak, 2020, https://doi.org/10.1016/j.matpr.2020.04.723	Materials Today: Proceedings	Scopus	2020
58.	RKA Bhalaji, S Bathrinath, Chitrasen Samantra, S Saravanasankar	Analysis of Human Error of EHS in Healthcare Industry Using TISM, 2020, Vol. 1057, pp. 55, 56	Soft Computing for Problem Solving. (Advances in	Scopus	2020

			Intelligent Systems and Computing)		
59.	RKA Bhalaji, S Bathrinath, S Saravanasankar	An F-PROMETHEE technique for analysing the risk factors in green manufacturing, 2020, Vol. 764, pp. 1-13	Materials Science and Engineering	Scopus	2020
60.	K Koppiahraj, S Bathrinath, S Saravanasankar	A fuzzy VIKOR approach for selection of ergonomic assessment method, 2020, https://doi.org/10.1016/j.matpr.2020.02.725	Materials Today: Proceedings	Scopus	2020
61.	S Bathrinath, RKA Bhalaji, S Saravanasankar	Risk analysis in textile industries using AHP-TOPSIS, 2020, https://doi.org/10.1016/j.matpr.2020.04.722	Materials Today: Proceedings	Scopus	2020
62.	J Vairamuthu B Stalin M.Adamkhan Fazil	Wear study and elaborate the parametric effect on cupronickel metal Matrix. Doi.org/10.1016/j.matpr.2020.09.282	Materials Today: Proceedings	Scopus	2020
63.	Sp Jani Sajith, Dr.M.Adam Khan Rajaganapthy	Mechanical and thermal insulation properties of surface-modified Agave Americana/carbon fibre hybrid reinforced epoxy composites. Doi.org/10.1016/j.matpr.2020.07.180	Materials Today: Proceedings	Scopus	2020
64.	Dr.M.Adam Khan, Sp Jani Senthil Kumar	Machining parameter optimization using Adam – Gene Algorithm while turning composite material with alumina cutting tool ?	International Journal of Lightweight Materials and Manufacture	Scopus	2020
65.	Mr. Anish Nair, V Ramji, R Durai Raj, R Veeramani	Laser cladding of Stellite 6 on EN8 steel – A fuzzy modelling approach. https://doi.org/10.1016/j.matpr.2020.07.431	Materials Today: Proceedings	Scopus	2020
66.	Mr. Anish Nair, Dr.M.Adam Khan, M Sivakumar, R M Selvaganesh, J Sushanth	Geometric characteristics analysis of hole making through abrasive water jet drilling. https://doi.org/10.1016/j.matpr.2020.07.430	Materials Today: Proceedings	Scopus	2020
67.	G. Poomarimuthukumar, A.G. Kavin Bhaarathi, R. Mohanaram, G.	Investigation on the effect of erodent velocity on the erosion of 3/2 BLARE laminates. https://doi.org/10.1016/j.matpr.202	Materials Today: Proceedings	Scopus	2020

	Ruban Prabhu, I. Siva	0.06.504			
68.	I. Siva , M. Bharathi, C. Krishnaveni, M. Priyanka, I. Sankar	Frictional response of functionally graded 3/2 natural rubber based 4 lead-bismuth eutectic alloy metal rubber laminates	Materials Today: Proceedings	Scopus	2020
69.	I. Siva , DK. Sangaran, P.R. Praveen Balan, R. Rajesh kanna, P. Siddharth	Modal analysis on the additive manufactured robotic segments: Effect of 4 printing densities on the vibrational properties	Materials Today: Proceedings	Scopus	2020
70.	Ashok Mache, Harshad Pingulkar, Ashok Mache, Yashwant Munde, I. Siva	A Comprehensive Review on Drop Weight Impact Characteristics of Bast Natural Fiber Reinforced Polymer Composites	Materials Today: Proceedings	Scopus	2020
71.	P. Sethu Ramalingam, K. Mayandi, T. Srinivasan, I. Jerin Leno, Rajesh Ravi, G. Suresh	A study on E-Glass fiber reinforced interpenetrating polymer network (vinylester/polyurethane) laminate's flexural analysis	Materials Today: Proceedings	Scopus	2020
72.	Arun Prasath, V. Arumugaprabu, P. Amuthakkannan, K. Naresh, M.S. Muthugopal, M. Jeganathan, R. Pragadeesh	Quasi Static And Flexural Mechanical Property Evaluation Of Basalt/Flax Reinforced Composites K.	Materials Physics and Mechanics 46 (2020) 132-138	Scopus	2020
73.	Arun Prasath, V. V. Arumugaprabu, P.Amuthakkannan, V.Manikandan	Synergistic Utilization of Flax Fiber Polymer Composites A Review	Advanced Materials Letters	Scopus	2020
74.	P. Sethu Ramalingam, K. Mayandi, V. Balasubramanian, K. Chandrasekar, V. Mago Stalany, A. Abdul Munaf	Effect of 3D printing process parameters on the impact strength of onyx – Glass fiber reinforced composites. https://doi.org/10.1016/j.matpr.2020.10.467	Materials Today: Proceedings	Scopus	2020
75.	P. Sethu Ramalingam, K. Mayandi, G.Rubesh, S.A.Rishivanth, G.Richard Martin	Resource Optimization in Delta Dual Extruder 3D Printer Design using Waste Plastic Resources	Journal of Green Engineering	Scopus	2020
76.	M.Armstrong, PrawinJebastin. A, Saicharan. R, Kamal Kumar. C, Sudharsan. P.	Comparative Study on the Computational Analysis of Heat Exchanger Us-ing Steel Pipe, Copper Pipe Before and After Silver Nano Coated	International Journal of Advanced Science and Technology	Scopus	2020
77.	M. Manoj Prabhakar, A.K. Saravanan, A.	A short review on 3D printing methods, process parameters	Materials Today:	Scopus	2020

	Haiter Lenin, I. Jerin leno, K. Mayandi, P. Sethu Ramalingam	and materials	Proceedings		
78.	P. Balamurugan, M. Pethuraj, M. Uthayakumar, Ajay Pratap Kushwaha, Kommi Ganesh Naidu, Sai Karthik Chitrada	Electrical discharge machining of Al-sillimanite composites. https://doi.org/10.1016/j.matpr.2020.07.127	Materials Today: Proceedings	Scopus	2020
79.	Marimuthu Uthayakumar, Ponnambalam Balamurugan, Kinga Korniejenko, Szymon Gądek, Dariusz Mierzwiński	Abrasive water jet machining of fly ash and metakaolin based geo-polymers. https://doi.org/10.1051/matecconf/202032201020	MATEC Web of Conferences 322, 01020 (2020)	Scopus	2020
80.	Sai Maheswaran Baskaran , B Thanga Prasanna, R. Thirumurugan, P. Balamurugan, J Sarathkumar Sebastin	Design and Fabrication of Portable Groundnut Shell Extraction Machine. https://doi.org/10.1063/5.0034376	AIP Conference Proceedings	Scopus	2020
81.	M Venkata Pavan, K. Balamurugan, P. Balamurugan	Compressive test Fractured Surface analysis on PLA-Cu composite filament printed at different FDM conditions. https://doi.org/10.1088/1757-899X/988/1/012019	IOP Conference Series: Materials Science and Engineering	Scopus	2020
82.	T Deepthi, K. Balamurugan, P. Balamurugan	Parametric Studies of Abrasive Waterjet Machining parameters on Al/LaPO4 using Response Surface Method	IOP Conference Series: Materials Science and Engineering	Scopus	2020
83.	S.Bathrinath, R.K.A.Bhalaji, S.Saravanasankar	Risk analysis in textile industries using AHP-TOPSIS. 10.1016/j.matpr.2020.04.722	Materials Today: Proceedings	Scopus	2020
84.	S.Bathrinath, R.K.A.Bhalaji, Roopa Ann Koshy, K.Koppiahraj	Identification of the critical activity in heat treatment process using TISM. 10.1016/j.matpr.2020.06.157	Materials Today: Proceedings	Scopus	2020
85.	S.Bathrinath, R.K.A.Bhalaji, S.Saravanasankar	A Fuzzy VIKOR method to analyze the risks in lean manufacturing implementation. 10.1016/j.matpr.2020.05.123	Materials Today: Proceedings	Scopus	2020
86.	R.K.A.Bhalaji, S.Bathrinath, S.G.Ponnambalam, S.Saravanasankar	Analyze the factors influencing human-robot interaction using MCDM method. 10.1016/j.matpr.2020.06.316	Materials Today: Proceedings	Scopus	2020

87.	Syed Shuibul Qarnain, S.Muthuvel, S.Bathrinath, S.Saravanasankar	Analyzing factors in emerging computer technologies favoring energy conservation of building sector. 10.1016/j.matpr.2020.05.121	Materials Today: Proceedings	Scopus	2020
88.	Syed Shuibul Qarnain, S.Muthuvel, S.Bathrinath,	Modelling of driving factors for energy efficiency in buildings using Best Worst Method. 10.1016/j.matpr.2020.06.400	Materials Today: Proceedings	Scopus	2020
89.	Syed Shuibul Qarnain, S.Muthuvel, S.Bathrinath,	Analysis of Energy Conservation Factors in Buildings Using Interpretive Structural Modeling Methodology: An Indian Perspective. 10.1007/s40030-020-00483-z	Journal of the Institution of Engineers (India)	Scopus	2020
90.	Syed Shuibul Qarnain, S.Muthuvel, S.Bathrinath,	Analysis of social inequality factors in implementation of building energy conservation policies using Fuzzy Analytical Hierarchy Process Methodology	International Journal of Sustainable Energy Planning and Management	Scopus	2020
91.	R.Sundarakannan, V.Arumugaprabu,V. Manikandan and R.Deepak Joel Johnson	Tribo Performance Studies on Redmud Filled Pineapple Fiber Composite	Materials Today: Proceedings	Scopus	2020
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184.	ayandi, ajini, WinowlinJappes, H.SuchartSiengchin	Effect of Chemical Treatment on Tensile and flexural Performance of Cyperus Pangorei Fibre Reinforced Polyester Composites, 2018, Vol. 10(3), 416-419	Advanced Science, Engineering and Medicine	Scopus Indexed	2018

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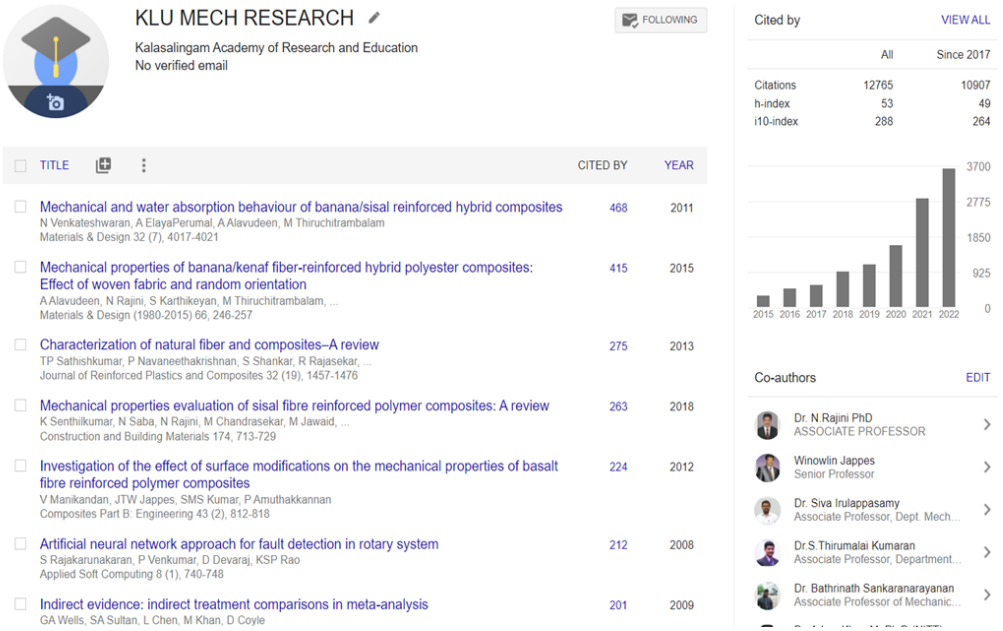
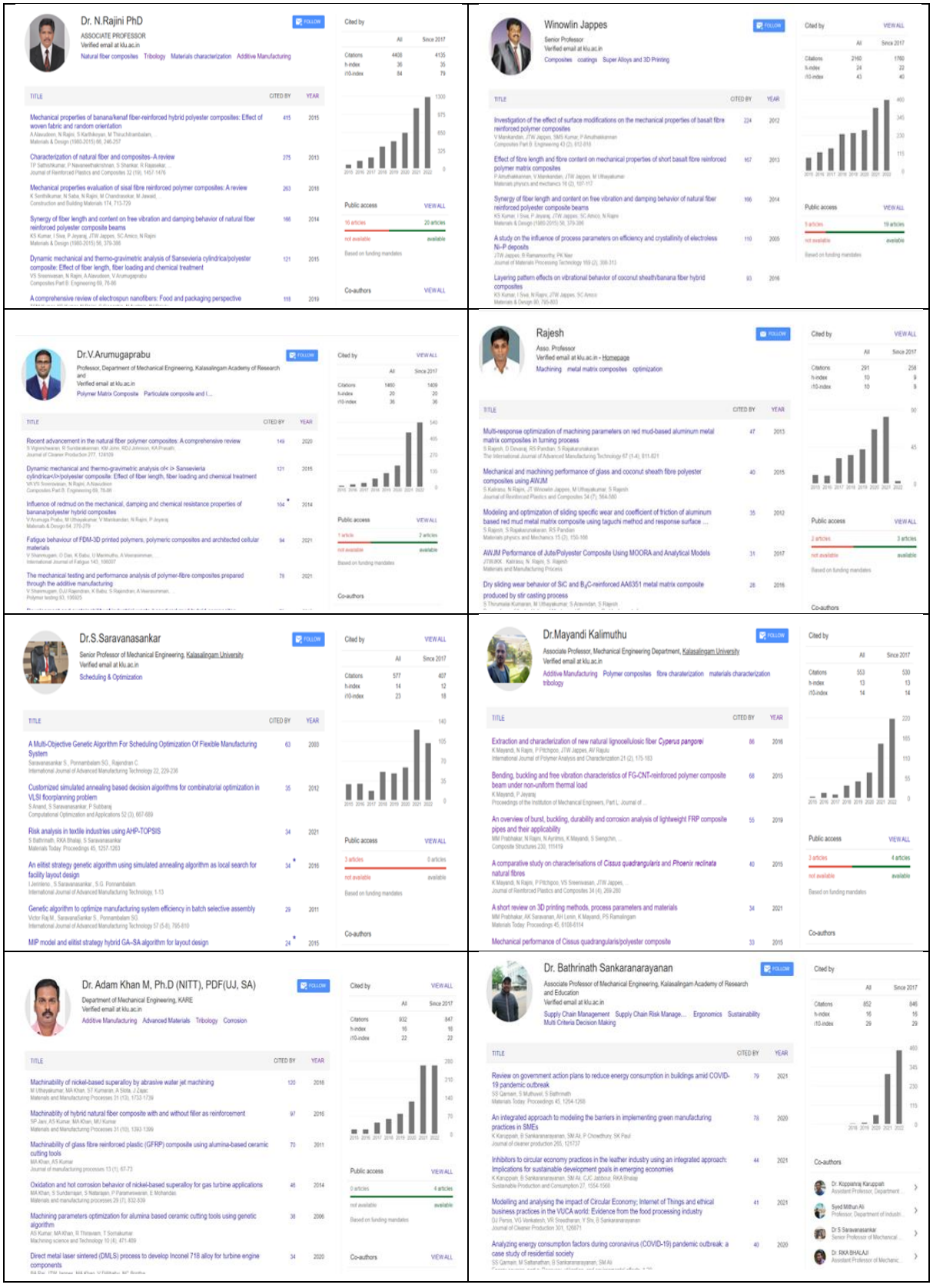
186.	R.Mahesh Kumar, N.Rajini, K.Mayandi, M.Gnanaguru, S.Haja Jasim Farid	Investigation on thermal properties of Styrene Acrylonitrile (SAN) matrix with Polytetrafluroethylene (PTFE) particle reinforced composites, 2018, Vol. 390, 1-6	Materials Science and Engineering	Scopus Indexed	2018
187.	P.Amuthakkannan, V.Manikandan	Free vibration and dynamic mechanical properties of basalt fiber reinforced polymer composite, 2018, Vol. 25, 265-270.	Indian Journal of Engineering and Materials Sciences	ISSN 0975-1017	2018
188.	S. John Leon, J.T.Winowlin Jappes, M.Edwin Sahayaraj	Corrosion Performance of Annealed Electroless Ni-B-ZrSiO4 Coatings on Mild Steel, 2018, Vol. 10(3), 1-6.	Journal of Advanced Research in Dynamical & Control Systems	ISSN: 1-349 X329	2018
189.	S.Kavitha, P.Venkumar and N.Rajini	An Efficient Social Spider Optimization for Flexible Job Shop Scheduling Problem, 2018, Vol. 17(2), 181-196.	Journal of Advanced Manufacturing Systems	ISSN : 0219-6867	2018

Department Google Scholar Citation And H-Index (as on 19-12-22)



Google Scholar for Department Faculty (Sample- Copy)



Scopus Data for Department faculty (Sample – Copy)

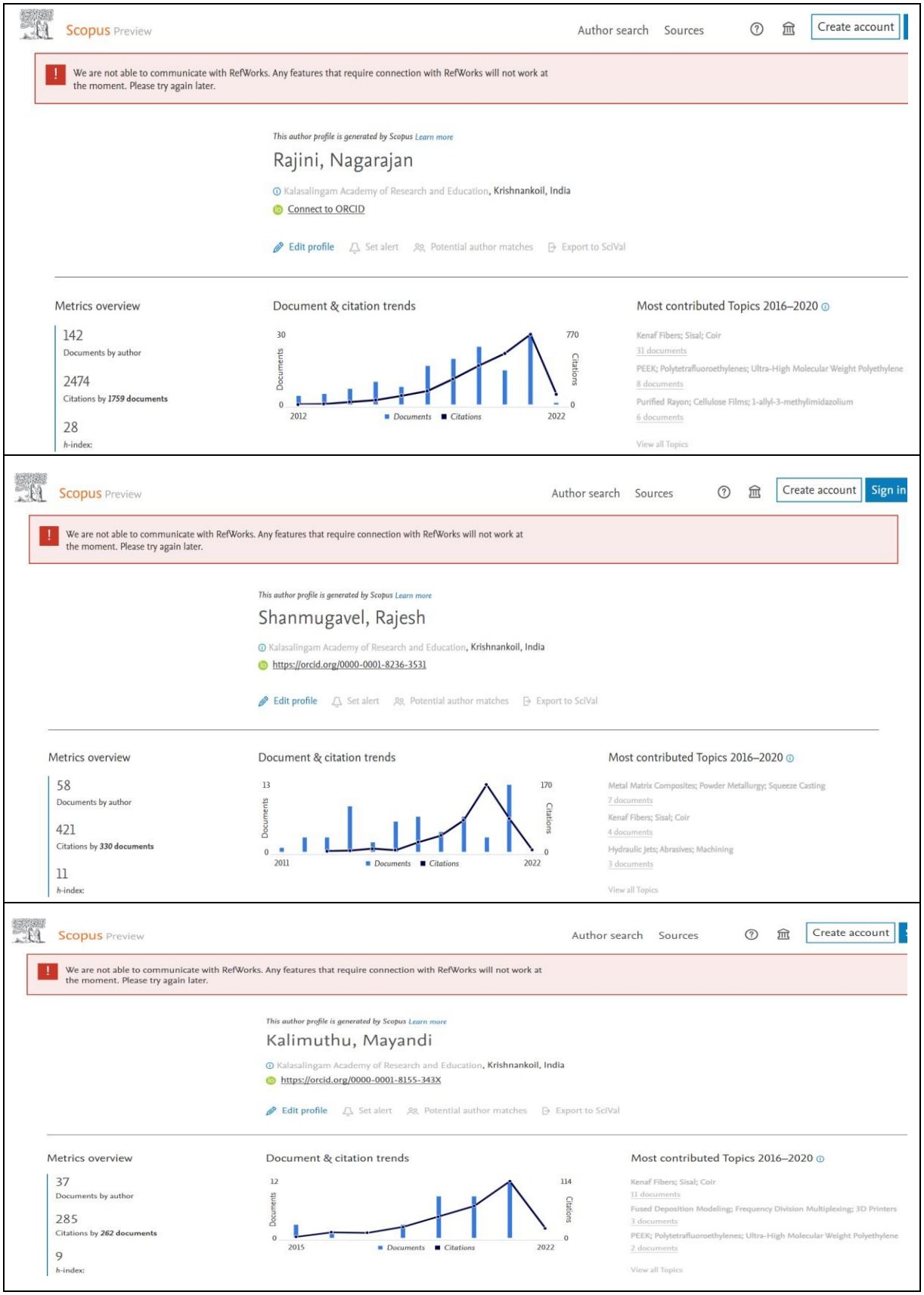


Table 4.2.2.4
International Collaboration

Sl. No	Collaborator	Collaboration	Dept Collaborating faculty
1.	Prof. Dr. Sandro C Amico Universidade Federal do Rio Grande do Sul, Brasil	Research and Academic	Dr.I.Siva Dr.J.T.winowlin Jappes
2.	Prof. Dr. Jeferson Avila Souza Universidade Federal do Rio Grande, Brasil	Research	Dr.I.Siva Dr.J.T.winowlin Jappes
3.	Prof. Dr. Sérgio Henrique Pezzin Universidade do Estado de Santa Catarina, Brasil	Research	Dr.I.Siva Dr.J.T.winowlin Jappes
4.	Prof. Dr. Veronica Maria de Araujo Calado Universidade Federal do Rio de Janeiro, Brasil	Research	Dr.I.Siva Dr.J.T.winowlin Jappes
5.	Prof. Dr. Henri Stephan Schrekker Universidade Federal do Rio Grande do Sul, Brasil	Research	Dr.I.Siva Dr.J.T.winowlin Jappes
6.	Prof. Dr. Derval dos Santos Rosa Universidade Federal do ABC, Brasil	Research	Dr.I.Siva Dr.J.T.winowlin Jappes
7.	Prof. Dr. Sandra Maria da Luz Universidade de Brasília, Brasil	Research and Academic	Dr.I.Siva Dr.J.T.winowlin Jappes
8.	Prof. Dr. Viviane Munez Universidade Federal do Rio de Norte, Brasil	Research and Academic	Dr.I.Siva Dr.J.T.winowlin Jappes
9.	Prof. Dr. Hazizan Md Akil University Saints Malaysia, Malaysia	Research and Academic	Dr.Muthuvel
10.	Dr. Jacob Sukumaran Ghent University, Belgium	Research and Academic	Dr.N.Rajini Dr.J.T.winowlin Jappes
11.	Dr. Patric Ghent University, Belgium	Research and Academic	Dr.N.Rajini
12.	Dr. Javid University Putra Malaysia, Malaysia	Research and Academic	Dr.N.Rajini
13.	Dr. Mohamed Tariqu University Putra Malaysia, Malaysia	Research and Academic	Dr.N.Rajini Dr.S.Rajesh

14.	Dr. Suchart Siengchin King Mongkut's University of Technology North Bangkok	Research	Dr.N.Rajini Dr.K.Mayandi
15.	Dr. Nadir Ayrilmis Istanbul University-Istanbul,Turkey	Research	Dr.N.Rajini Dr.K.Mayandi
16.	Dr. Faruq Mohammad King Saud University, Riyadh, Saudi Arabia	Research	Dr.N.Rajini Dr.K.Mayandi
17.	Dr. Hamad A. Al-Lohedan King Saud University, Riyadh, Saudi Arabia	Research	Dr.N.Rajini Dr.K.Mayandi
18.	Tae Jo Ko Yeungnam University, South Korea	Research & Academic	Dr.Adamkhan Dr.V.Arumugaprabu

4.3 Faculty Development work (10)

FDP 2018-2019 (Resource person)

SL.NO	**Name of the Teacher Who Attended**	**Title of the Program**	**Duration from-to (DD-MM-YYY)**
1	Dr.P.Venkumar	Foundation Program on Yoga	19-11-2018 to 30-11-2018
		Introduction to IOT in Manufacturing	08-02-2018 to 08-02-2018
2	Dr.J.T.winowlin Jappes	Resource person for Guest Lecture	23-11-2018 to 23-11-2018
		Resource person for Guest Lecture	18-08-2018 to 18-08-2018
		Motivational Talk to Students	07-06-2018 to 07-06-2018
3	Dr.V.Manikandan	Key note address-Admission	29-04-2018 to 29-04-2018
4	Dr.I.Siva	Resource person for Guest Lecture	14-05-2018 to 15-12-2018
5	Dr.V.Arumuga Prabu	Invited talk at ICNP2018	12-06-2018 to 12-06-2018
		Keynote Speaker in conference	07-04-2018 to 07-04-2018
6	Dr.S.Bathrinath	Academic Audit	30-11-2018 to 30-11-2018
7	Dr. M. Adam Khan	Expert for FDP	15-11-2018 to 15-11-2018
		Resource person for Guest Lecture	26-09-2018 to 26-09-2018
		Resource person for	19-08-2018 to 19-

		Workshop	08-2018
		Resource person for Guest Lecture	07-04-2018 to 07-04-2018
		Guest for Inaugural Function	22-06-2018 to 22-06-2018
8	Dr.S.Rajesh	Academic, exam paper and question paper audit	18-08-2018 to 18-08-2018
9	Dr.P.Amuthakkannan	Resource person for FIP (CLT)	07-04-2018 to 07-04-2018
10	Dr.M.Muthukannan	Resource person for Guest Lecture	26-09-2018 to 26-09-2018
11	Dr.P.Balamurugan	Resource person for Guest Lecture	23-05-2018 to 23-05-2018
12	Mrs.S.Kavitha	Resource person for Workshop	19-08-2018 to 19-08-2018
13	Mr.R.Manikandan	Industrial Safety Engineering	31-08-2018 to 31-08-2018
14	Mr.S.P.Prasanna	Delivered Lecture on Impartus – FIP	11-07-2018 to 11-07-2018

FDP 2019-2020 (Resource person)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1.	Dr.P.Venkumar	Benefits and Challenges in Industry 4.0	28-05-2020 to 29-05-2020
		Limit in five activities	25-06-2020
2.	Dr.J.T,Winowlin Jappes	Latest Trends in Composite Materials	28-04-2020 to 28-04-2020
		Research Aspects in Mechanical and Allied Sciences	23-05-2020 to 23-05-2020
		Research Thrust Areas jn Composites	20-05-2020 to20-05-2020
		Funding Agencies and Research Proposal Writing	04-05-2020 to04-05-2020
3.	Dr.I.Siva	Inertial Measurements for Robotics – Robotic Club,KARE	18-04-2020 to 18-04-2020
		Research training for KARE Scholars	20-04-2020 to20-04-2020
		Webinar on Product Development	28-04-2020 to28-04-2020
		Webinar on Composite Mechanics	30-04-2020 to18-04-2020
		Programming with MIT APP – Robotic Club, KARE	06-05-2020 06-05-2020
		Do It Yourself Robotics for	08-05-2020 to 08-05-2020

		School Students, Robotic Club, KARE	
		Referencing and indexing using MS Office, AICTE Margdharsan	11-05-2020 to 11-05-2020
		Tribology of polymeric materials A systematic Approach, RIT-Rajapalayam	19-05-2020 to 19-05-2020
4.	Dr.S.Rajesh	Micro Machining in Biological Perspective – A Crircal Review	22-05-2020 to 22-05-2020
		Friction Stir Welding – A Critical Review	27-05-2020 to 27-05-2020
5.	Dr.V.Arumuga Prabu	FDP on Advanced Engineering Materials	21-05-2020 to 27-05-2020
6.	Mr.T.Rajpradeesh	General Safety Awareness program	20-09-2019 to 20-09-2019
		Extension Activity- Arulmigu Kalasalingam Polytechnic College	15-02-2020 to 15-02-2020
7.	Mr.R.Manikandan	Extension Activity- Arulmigu Kalasalingam Polytechnic College	15-02-2020 to 15-02-2020

FDP 2020-2021 (Resource person)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1	Dr. S. Saravanasankar	Managing Stress to Increase Productivity in the Workplace	12-06-2020 to 12-06-2020
2	Dr.J.T,WinowlinJappes	Forecasting OBE towards Institutional Accereditation - AICTE Margdharsan - KARE	15-06-2020 to 15-06-2020
		Effective Laboratory Conduction	18-06-2020 to 18-06-2020
		Creativity and Innovation A Dream	26-06-2020 to 26-06-2020
		Advances in Composite Materials	22-06-2020 to 22-06-2020
3	Dr.P.Venkumar	Yoga for Healthy Life	29-06-2020 to 01-07 -2020
		CSIR Sponsored - Importance of Traditional Agriculture	21-07-202 to 24-07-2020
		One Week AICTE (ATAL) sponsored -	19-11-2020 to 19-11-2020

		Introduction to Yoga	
4	Dr.S.Rajesh	Role of Augmentation in Condition Monitoring	24-06-2020 to 24-06-2020
5	Dr.V.Arumuga Prabu	FDP on Emerging Trends in Bio-Medical Engineering	16-07-2020 to 16-07-2020
6	Dr.S.Sureshkumar	Seminar on Advanced manufacturing technology (St. Joseph Institute of Technology)	29-06-2020 to 29-06-2020
		Webinar on advances in machining science (Hindustan Institute of Technology)	26-06-2020 to 26-06-2020
7	Dr.Anish Nair	AICTE Margadarshan webinar Phase II (2-hour lecture)	13-05-2020 to 13-05-2020
		FDP on Digital tools for learning (2-hour lecture)	16-06-2020 to 16-06-2020
		FDP on Novelty in Trending Engineering Mathematics (2-hour lecture)	11-06-2020 to 11-06-2020
8	Dr.S.Kavitha	Novelty in Trending Engineering Mathematics	12-06-2020 to 12-06-2020
9	Mr.G.Ebenezer	Innovation in Teaching and Learning Process-Dialogic Pedagogy (AICTE-Margdarshan FDP)	16-06-2020 to 16-06-2020
10	Mr.S.Vignesh	CO-PO attainment for NAAC 2020	01-06-2020 to 01-06-2020

FDP 2021-2022 (Resource person)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1	Dr.J.T,WinowlinJappes Dr.M.Adamkhan Dr.S.Kavitha Mr.S.Vignesh	Two day Faculty Orientation Program on NBA Accreditation Process AICTE Margdharsan - KARE	13-10-2021 to 14-10-2021
2	Dr.M.Adamkhan	AICTE-ISTE sponsored one week Online Refresher Program on Nanotechnology Applications in Mechanical Engineering	10.12.2021 to 16.12.2021
3	Dr. P. Balamurugan	FDP on "Fluid Mechanics and Channel Hydraulics"	17.06.2021
4	Dr.S.Bathrinath	Two weeks online FDP on "Advances in Composite Materials, Manufacturing Processes and Optimization Techniques	02-06-2021
5	Dr.S.Muthuvel Mr.G.Ebenezer Mr.M.Ramaganesh	Online FDP on Effective Preparation and Documentation of SAR	24.05.2021 to 28.05.2021

4.4 Faculty as participants in Faculty development/training activities/STTPs (5)

FDP 2018-2019 (participation)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1.	Dr. J. T. Winowlin jappes	Global Business Foundation Skills	29-05-2018 to 06-06-2018
2.	Dr. V. Manikandan	FDP – Organic Practices in Agriculture	12-07-2018 to 12-07-2018
		Mush Room Cultivation	09-07-2018 to 09-07-2018
		1 Days Faculty Development Programme(FDP) On Product Design Engineering Using Fusion360	27-08-2018 to 31-08-2018

3.	Dr.P.Venkumar	Emerging Trends in Automotive Sector	24-08-2018 to 24-08-2018
		Impactful Research Publications & Metaheuristic Algorithms	08-08-2018
		FDP on Cycle Tempo Software Used in Power Plants	15-04-2019 to 21-04-2019
4.	Dr.V.Arumuga prabu	FDP on Cycle Tempo Software Used in Power Plants	15-04-2019 to 21-04-2019
5.	Dr. M. Muthukannan	Faculty Development program on Energy Engineering	30-10-2018 to 05-11-2018
6.	Dr. C. Bennet	FPD on Thermodynamics and Fluid Mechanics	27-06-2017 to 03-07-2017
7.	Dr. K. Senthilkumar	AICTE Sponsored Faculty Development Programme on Student Induction Program	26-07-2018 to 28-07-2018
		Global Business Foundation Skills	29-05-2018 to 06-06-2018
8.	Dr. K. Mayandi	1 Days Faculty Development Programme(FDP) On Product Design Engineering Using Fusion360	27-08-2018 to 31-08-2018
9.	Dr. S. Suresh kumar	Faculty Induction Training Program-IIT Hyderabad	12-11-2018 to 06-12-2018
10	Dr. G. Kalusuraman	Global Business Foundation Skills	29-05-2018 to 06-06-2018
11	Dr. Anish Nair	One week course on Recent trends in materials and manufacturing engineering	10-12-2018 to 15-12-2018
12	Mrs. S. Kavitha	Global Business Foundation Skills	29-05-2018 to 06-06-2018
13	Mr. M. Manoj prabhakar	1 Days Faculty Development Programme (FDP) On Product Design Engineering Using Fusion360	27-08-2018 to 31-08-2018
14	Mr. R. Mahesh kumar	FDP201x on Pedagogy for Online and Blended Teaching-Learning Process	03-05-2018 to 30-05-2018
15	Mr. M. Ramaganesh	Faculty Induction Training Program-IIT Hyderabad	12-11-2018 to 06-12-2018
16	Mr. V. Dinesh kumar	Faculty Development program on Energy Engineering	30-10-2018 to 05-11-2018
17	Mr. S. Anantha krishnan	FDP on Fluid Dynamics	29-06-2018 to 05-07-2018
18	Mr. K Arun prasath	Data Acquisition and Signal Processing	18-11-2019 to 18-11-2019
		FDP on Machine Intelligence and IoT	02-07-2018 to 07-07-2018
19	Mr. M. Armstrong	Heat Exchangers: Fundamentals and Design Analysis	15-10-2018 to 27-10-2018
		Faculty Development program on Energy Engineering	30-10-2018 to 05-11-2018
20	Mr. P. Jothiraj	Faculty Induction Training Program-IIT Hyderabad	12-11-2018 to 06-12-2018
		Faculty Induction Training Program-IIT Hyderabad	12-11-2018 to 06-12-2018

21	Mr. S. Vignesh	FDP on Machine Intelligence and IoT	02-07-2018 to 07-07-2018
22	Mr.T.Rajpradeesh	FDP on Effective Utilization of Enhanced Teaching Practices	13-05-2019 to 20-05-2019
23	Mr.R.Manikandan	FDP on Effective Utilization of Enhanced Teaching Practices	13-05-2019 to 20-05-2019
		NPTEL – AICTE FDP (Funded by Ministry of Govt of India) of Industrial Safety Engineering	1-1-2019 to 3-1-2019
24	Mr. R. Jegadeesan	FDP on Machine Intelligence and IoT	02-07-2018 to 07-07-2018
25	Mr. M. Selwin	FDP on Machine Intelligence and IoT	02-07-2018 to 07-07-2018
26	Mr. G. Karthikeyan	1 Days Faculty Development Programme(FDP) On Product Design Engineering Using Fusion360	27-08-2018 to 31-08-2018
27	Mr. C. Sankar	Smart Materials and Structure	03-12-2018 to 08-12-2018
28	Mr. T. Premkumar	Smart Materials and Structure	03-12-2018 to 08-12-2018

FDP 2019-2020 (participation)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1.	Dr.S.Saravanasankar	One Week FDP on Advances on Production and Industrial Engineering	25-05-2020 to 30-05-2020
2.	Dr.P.Venkumar	FDP on Recent Pedagogy Tools and Techniques for Effective Teaching Practices	23-12-2019 to 30-12-2019
		Emerging Business Opportunities and Challenges in the Post COVID Scenario	23-05-2020 to 23-05-2020
		Advances in Production and Industrial Engineering	25-05-2020 to 30-05-2020
		IEEE Xplore Digital Library	14-05-2020 to 14-05-2020
		360 Degree Class Room Management – Teaching Methodology	16-05-2020 to 21-05-2020
		How To Write A Perfect Research Paper	22-05-2020 to 22-05-2020
		Advances in Production and Industrial Engineering,	25-05-2020 to 30-05-2020
		Life Skill Training	12 -04-2020 to 13 -04-2020
3.	Dr.J.T.Winowlin Jappes	FDP on Python	16-04-2020 to 20-04-2020
4.	Dr.I.Siva	FDP on Waste Management, NITTTR Chennai	11-05-2020 to 15-05-2020
		FDP on SEM and XRD, Indus University	25-05-2020 to 29-05-2020

5.	Dr.Vincent	FDP on Effective Research and Proposal writing	13-05- 2020 to 13-05- 2020
		Online Faculty Development Programme On Moodle Learning Management System	25-05-2020 29-05-2020
		One Week Online Faculty Development Programme on 'Innovations in Teaching Methodologies' (ITM-2020),	21-05-2020 to 27-05-2020
6.	Dr.S.Rajesh	Augmented Reality (AR) / Virtual Reality (VR)	11-05-2020 to 15-05-2020
		FDP on 3D Modeling	20-05-2020
		Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
7.	Dr.S.Bathrinath	Ethical Practices in Engineering (7 Days FDP)	28.05.2020 to 03.06.2020
		FDP on Blockchain	20-04-2020 to 24-04-2020
		One Week Sttp On Taching Learning Pedagogy	18-05-2020 to 23-05-2020
8.	Dr.V.Arumuga Prabu	FDP on Recent Pedagogy Tools and Techniques for Effective Teaching Practices	23-12-2019 to 30-12-2019
9.	Dr.K.Mayandi	Recent Developments in Surface Engineering	24-07-2020 to 05-01-2020
		FDP on Effective Research and Proposal writing	13-05- 2020 to 13-05- 2020
10.	Dr.C.Bennet	Design of food processing equipment and fabrication	23-05-2020 to 29-05-2020
11.	Dr.P.Balamurugan	Two days Faculty Training Program on "Project Proposal Writing"	25-05-2020 to 26-05-2020
12.	Dr. D. Chella Ganesh	Recent Developments in Surface Engineering	24-07-2020 to 05-01-2020
13.	Dr.S.Suresh Kumar	Recent Developments in Surface Engineering	24-07-2020 to 05-01-2020
		Composites during lockdown	25-05-2020 to 30-05-2020
		Recent Developments in Surface Engineering	27-04-2020 to 05-01-2020
14.	Dr.S.Kalirau	Fundamentals of Finite Element Analysis	25-04-2020 to 25-04-2020
		Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
		One week Faculty Development Programme on "Emerging Areas in Manufacturing"	25-04-2020 to 30-04-2020
		Two days Faculty Training Program on "Project Proposal Writing"	25-05-2020 to 26-06-2020
15.	Dr.Anishnair	FDP on AI and its applications	18-05-2020 to 24-05-2020
		FDP on advances in production and industrial engineering	25-05-2020 to 30-05-2020
		Technical writing and publishing with advanced computer tools	25-05-2019 to 29-05-2019
		NAAC Awareness Programme for Faculty	08-05-2020 to 14-05-2020

16.	Dr. D. Chellaganesh	IPR Awareness programme	13-05-2020 to 13-05-2020
		Computational Fluid Dynamics (CFD) and its applications	17-05-2020 to 23-05-2020
17.	Mrs.S.Kavitha	Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
		FDP on advances in production and industrial engineering	25-05-2020 to 30-05-2020
18.	Mr.T.Premkumar	Advances in Welding Techniques	27-04-2020 to 01-05-2020
		IPR awareness	03-05-2020 to 03-05-2020
		NAAC Awareness Programme for Faculty	08-05-2020 to 14-05-2020
		Advanced Engineering Materials	21-05-2020 to 27-05-2020
		future automotive industry and challenges	27-05-2020 to 27-05-2020
		How to Write Scientific Proposals	27-05-2020 to 27-05-2020
19.	Mr.M.Manoj Prabhakar	Recent Developments in Surface Engineering	27-04-2020 to 05-01-2020
		Future Automotive Industry and Challenges	27-05-2020 to 27-05-2020
		Online Faculty Development Programme On Moodle Learning Management System	25-05-2020 to 30-05-2020
20.	Mr.S.Sivakumar	Recent Developments in Surface Engineering	27-04-2020 to 05-01-2020
		NAAC Awareness Programme for Faculty	08-05-2020 to 14-05-2020
		Advances in Production on and Industrial Engineering	25-05-2020 to 30-05-2020
21.	Mr.G.Ebenezer	Ethical hacking	15-5-2020 to 19-05-2020
		ISO 45001:2018 – Principles of Occupational Health and Safety Management Systems	25-05-2020 29-05-2020
		One week FDP on Artificial Intelligence	22-05-2020 26-05-2020
		Computational Fluid Dynamics (CFD) and its applications	17-05-2020 to 23-05-2020
22.	Mr. I. Rajkumar	FDP on Advances in Production and Industrial Engineering	25-05-2020 to 30-05-2020
		one week Faculty Development Programme on “Emerging Areas in Manufacturing / Vimal Jyothi Engineering College, Jyothi Nagar, Chemperi	25-05-2020 to 30-05-2020
		FDP on Wheeled Mobile Robots – Research Challenges” KARE	30-05-2020 to 30-05-2020
		Faculty Development Programme on CFD simulation of thermal management of batteries and power converters/ VIT	28-05-2020 to 28-05-2020

		FDP on Advances in Production and Industrial Engineering / kare	02-05-2020 to 06-05-2020
		Online Faculty Development Programme on Moodle Learning Management System	25-5-2020 to 29-05-2020
23.	Mr.G.Poomarimuthu kumar	Step by Step for Writing Research Articles	21-05-2020 to 21-05-2020
		Advanced Engineering Materials	21-05-2020 to 27-05-2020
		FDP on " The Composites Materials"	25-05-2020 to 30-05-2020
24.	Mr.P.Jothiraj	Recent Developments in Surface Engineering	27-04-2020 to 05-01-2020
25.	Mr.I.Rajkumar	Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
26.	Mr.M.Armstrong	Recent Developments in Surface Engineering	27-04-2020 to 01-05-2020
		FDP on Advances in Production and Industrial Engineering	25-05-2020 to 30-05-2020
		FDP on Rehabilitation Robots – A Practical Approach	25-05-2020 to 25-05-2020
		FDP on Tribology of Polymeric Composite	28-05-2020 to 28-05-2020
27.	Mr.T.Rajpradeesh	National Level Five Day faculty development program	15-5-2020 to 19-05-2020
		on "Scilab"	
		Online Faculty Development Programme On Moodle Learning Management System	25-05-2020 29-05-2020
		One Week Online Faculty Development Programme on 'Innovations in Teaching Methodologies' (ITM-2020),	21-05-2020 to 27-05-2020
		FDP on How to Write and Publish a Research Article with Reputed Publishers	23-12-2019 to 30-12-2019
28.	Mr.R.Manikandan	FDP on How to Write and Publish a Research Article with Reputed Publishers	23-12-2019 to 30-12-2019
		Product Design using Value Engineering	01-07-2019 to 31-08-2019
		FDP on Product Design and Development	31-03-2019 to 31-03-2019
		FDP on Virtual Teaching	20-04-2020 to 21-04-2020
29.	Mr.K.Arunprasath	Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
		Five Days FDP on Advances in Production and Industrial Engineering	25-05-2020 to 30-05-2020
		One Week International FDP (online) on "Potential Research Areas in Mechanical Engineering"	15-05-2020 to 20-05-2020
30.	Mr.Selwin	Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
		FDP on NAAC Awarness Program, Mmit Pune	08-05-2020 to 14-05-2020
		FDP on AI nd Its Applications, KARE & Eduxlabs	18-05-2020 to 24-05-2020

		FDP On Solid Propulsion, KARE	01-05-2020 to 06-05-2020
31.	Mr.J. Manivannan	Fundamentals of Strength of Materials	29-04-2020 to 29-04-2020
32.	Mr.K.Vijayrakesh	Margadharshan FDP on how to write Research articles	21-05-2020 to 28-05-2020
		G-ChemPaint and LibreOffice Suite Writer	04-05-2020 to 10-05-2020

FDP 2020-2021 (participation)

S.No	Name of the Teacher Who Attended	Title of the Program	Duration from-to (DD-MM-YYY)
1.	Dr.S.Saravanasankar	FDP on Applied Thermal Engineering	08-06-2020 to 14-06-2020
2.	Dr.J.T. Winowlin Jappes	Fostering OBE towards Institutional Accreditation	15-06-2020 to 20-06-2020
3.	Dr.P.Venkumar	Quality Research and Its Output & Paradigam Shift in Teaching Pedagogy – Post COVID 19	19-06-2020 to 19-06-2020
		Spend One Hour Useful Forever	20-09-2020 to 20-09-2020
		Emerging Business Opportunities and Challenges In The Post Covid Scenario	23-05-2020 to 23-05-2020
		Spend One Hour Useful Forever	08-08-2020 to 08-08-2020
4.	Dr.I.Siva	FDP on Materiala	15-06-2020 to 20-06-2020
		The BodhiTree and SAFE Tools for Effective Online Teaching A Hands On Workshop, IITB	20-06-2020 to 21-06-2020
5.	Dr.Vincent	FDP On Contemporary Developments in Manufacturing Processes, Sustainable Manufacturing and Industrial Technologies	09-06-2020 to 13-06-2020
		FDP on “Optimization Techniques & Tools for Mechanical Engineers”	22-06-2020 to 27-06-2020
6.	Dr.S. Rajesh	Solid Works: Become a Certified Assocaite Today (CSWA)	01-06-2020 to 01-06-2020
7.	Dr.V.Arumuga prabu	Advances in Production and Industrial Engineering	25-05-2020 to 30-05-2020
		Virtual teaching-learning MOODLE the efficient way	29-05-2020 to 30-05-2020
		7 days online course on Embedded C Programming for C51 Microcontroller	28.05.2020 to 03.06.2020
		Digital Tools for learning/KARE	15.06.2020 to 20.06.2020
		FDP on Disruptive Technologies in Mechanical Engineering	08.06.2020 to 12.06.2020

		3D Printing & Design	30-11-2020 to 04-12-2020
8.	Dr. S. Muthuvel	One Week FDP On Purely the Fundamentals Of Mechanical Engineering	01.06.2020 to 06.06.2020
		Digital Tools for Learning (KARE)	16-06-2020 to 21-06-2020
9.	Dr.S.Bathrinath	One Week STTP on Statistical Analysis in SPSS Software	01-06-2020 to 06-06-2020
		Digital Tools for Learning (KARE)	15-06-2020 to 20-06-2020
10	Dr.C.Bennet	Applied Thermal Engineering	08-06-2020 to 14-06-2020
		Digital tools for learning	15-06-2020 to 20-06-2020
11	Dr.K.Mayandi	"FDP On Contemporary Developments in Manufacturing Processes, Sustainable Manufacturing and Industrial	09-06-2020 to 13-06-2020
		Technologies	
		FDP on Disruptive Technologies in Mechanical Engineering	08-06-2020 to 13-06-2020
		"FDP on Disruptive Technologies in Mechanical Engineering	05-06-2020 to 07-06-2020
12	Dr.P.Balamurugan	One week FDP on Purely the fundamentals of Mechanical Engineering	01-06-2020 to 05-06-2020
		One week FDP on Disruptive Technologies in Mechanical Engineering	08-06-2020 to 13-06-2020
		One Week FDP on Digital tools for learning	15-06-2020 to 20-06-2020
13	Dr. S. Kalirasu	One Week FDP on "Digital Tools for Learning"	15-06-2020 to 20-06-2020
14	Dr.S.Sureshkumar	Faculty Development Program on Advances in Composite Materials and Manufacturing Process	22-06-2020 to 26-06-2020
15	Dr.Anishnair	FDP on Digital tools for learning	15-06-2020 to 20-06-2020
		FDP on Novelty in Trending Engineering Mathematics	06-06-2020 to 12-06-2020
16	Dr. D. Chellaganesh	Recent Trends in Mechanical Engineering	13-06-2020 to 17-06-2020
		FDP on Solid propulsion	01-06-2020 to 06-06-2020
		Fundamentals of Mechanical Engineering	01-06-2020 to 05-06-2020
		FDP on Novelty in Trending Engineering Mathematics	06-06-2020 to 12-06-2020

17	Dr. S. Kavitha	FDP on Digital tools for learning	15-06-2020 to 20-06-2020
		FDP on "Optimization Techniques & Tools for Mechanical Engineers" , Conducted by Mechanical Engineering Department, SNIST, Hyderabad	22-02-2020 to 27-06-2020
18	Dr.S.Sivakumar	Recent Trends in Mechanical Engineering	13-06-2020 to 17-06-2020
19	Dr.K.Arunprasath	Faculty Development Programme on " IPRs for Professional Innovators"	15-06-2020 to 20-06-2020
		FDP on Manufacturing, Machining and Testing of Composite materials	15-06-2020 to 20-06-2020
		FDP on Digital Tools on Teaching	15-06-2020 to 20-06-2020
		FDP on Advanced Composite Manufacturing and Processing	22-06-2020 to 26-06-2020
		Five days FDP on Optimization tools and techniques in mechanical engineering	22-06-2020 to 26-06-2020
		Five days seminar on Recent trends in mechanical engineering	13-06-2020 to 17-06-2020
20	Mr.T.Premkumar	Digital Tools for Learning	15-06-2020 to 20-06-2020
		Advance engineering material for strategic and societal sectors -current perspectives	10-06-2020 to 16-06-2020
		FDP on Digital tools for learning	15-06-2020 to 20-06-2020
21	Mr.M.Manoj prabhakar	FDP On Applications of Thermal Engineering, Kings Engineering College	08-06-2020 to 12-06-2020
		Advance Engineering Material for Strategic and Societal Sectors -Current Perspectives	10-06-2020 to 16-06-2020
		One Week FDP On "Digital Tools For Learning" Organized By Office of FA & CLT, Kalasalingam Academy Of Research And Education, Krishnankoil.	15-06-2020 to 20-06-2020
22	Mr.G.Ebenezer	FDP on Solid propellent	01-06-2020 to 06-06-20202
		One-Week Online Faculty Development Programme under the Aegis of TEQIP-III	08-06-2020 to 13-06-2020
		Recent Trends in Mechanical Engineering	13-06-2020 to 17-06-2020
		FDP On Digitial Tools For Learning, KARE	15-06-2020 to 20-06-2020

23	Mr. I. Rajkumar	Faculty Development Programme on " IPRs for Professional Innovators"	15-06-2020 to 20-06-2020
		FDP on Manufacturing, Machining and Testing of Composite materials	15-06-2020 to 20-06-2020
24	Mr.T.Rajpradeesh	7 Days Online Course on Embedded C Programming for C51 Microcontroller	28-05-2020 to 03-06-2020
		A Five-Day International e-Seminar" on Recent Trends in Mechanical	13-6-2020 to 17-6-2020
		Five Days Online FDP On Recent Trends in Electrical Engineering	8-6-2020 to 12-6-2020
		Online Faculty Development Programme On Moodle Learning Management System	25-05-2020 to 29-05-2020
		FDP on "Optimization Techniques & Tools for Mechanical Engineers"	22-06-2020 to 27-06-2020
		One-week Online FDP On Digital Pedagogy Tools	15-6-2020 to 20-6-2020
		A National Level One Week Faculty Development Programme On Moodle – Learning Management System (LMS)	15-6-2020 to 20-6-2020
		FDP on "Mechatronics"	19-10-2020 to 23-10-2020
25	Mr.R.Manikandan	Disruptive Technologies In Mechanical Engineering"	8-6-2020 to 13-06-2020
		Enhancing the Quality of Academic and Sponsored Research	04-06-2020 to 06-06-2020
		Effective Learning and Teaching methods of Business Practices	19-05-2020 to 25-05-2020
		Online Faculty Development Programme On Moodle Learning Management System	25-05-2020 to 29-05-2020
		Online FDP on "Augmented Reality (AR) / Virtual Reality (VR)"	11-5-2020 to 15-05-2020
		Online FDP on MOODLE organized by VIT, Chennai	13-05-2020 to 15-05-2020
		Innovations in Teaching Methodologies' (ITM-2020),	21-05-2020 to 27-05-2020
		How to Write Scientific Proposals	27-05-2020 to 27-05-2020
		Rehabilitation Robots – A Practical Approach Organized	25-05-2020 to 25-05-2020

		Recent Communication Tools and Its Application organized by St. Martin's Engineering	19-05-2020 to 23-05-2020
		FDP on Robotics	11-01-2021 to 15-01-2021
26	Mr.G.Poomarimuthukumar	Composite Mechanics and G-Comp	03-06-2020 to 04-06-2020
		Digital Tools for Learning	15-06-2020 to 20-06-2020
27	Mr.M.Armstrong	FDP on Digital tools for learning	15-06-2020 to 20-06-2020
28	Mr.S.Vignesh	FDP on Digital tools for learning	15-06-2020 to 20-06-2020
		Recent Advancees in Nano-materials	04-06-2020 to 06-06-2020
		Novelty in Trending Engineering Mathematics-2020	06-06-2020 to 12-06-2020
		Online FDP on Spoken Tutorial in association with IIT Bombay	04-06-2020 to 10-06-2020
29	Mr.K.Vijayrakesh	Applied Thermal Engineering	08-06-2020 to 14-06-2020
		Novelty in Trending Engineering Mathematics – 2020	06-06-2020 to 12-06-2020
30	Mr.M.Selwin	FDP On Fundamentals of Mechanical Engineering, Chennai Institute of Technology	01-06-2020 to 05-06-2020
		FDP On Applications of Thermal Engineering, Kings Engineering College	08-06-2020 to 12-06-2020
		FDP On Artificial Intelligence and Data Sciences, Oriental Institute Of Science And Technology	10-06-2020 to 14-06-2020
		FDP On Digitial Tools for Learning, KARE	15-06-2020 to 20-06-2020
		Mechanical Behaviour of Advanced Materials and Its Scope For Engg Applications	10-06-2020 to 14-06-2020

FDP 2021-2022 (participation)

1	S.Saravanasankar J.T.Winowlin apes S.Balasubaramaniyan N.Rajini	Ten Days International Virtual FDP "Frontiers of Mathematics"	19-07-2021 to 28-07-2021
2	I.Siva A.Alavudeen V.Arumugaprabu M. Adam khan S.Rajesh	Six days FDP on Smart Materials & Manufacturing Systems	27-06-2022 to 02-07-2022

	S.Muthuvel S.Bathrinath K.Mayandi		
3	S.Suresh kumar P.Balamurugan	Online Elementary FDP on " Advances in Manufacturing"	26-07-2021 to 30-07-2021
4	Anish nair S.Kavitha C.Bennet T.Rajpradeesh	Ten Days International Virtual FDP "Frontiers of Mathematics"	19-07-2021 to 28-07-2021
5	M.Ramaganesh	Online elementary FDP on Biomass to fuels, Chemicals and value-added products for sustainable energy and environmental future	20-12-2021 to 24-12-2021
6	J.Manivannan G.Ebenezer P.Jayakumar p S.Vignesh S.Sivakumar D.Chellaganesh M.Manojprabhakar	FDP on Laser welding of high strength alloys	15-04-2022 to 20-04-2022

(Mention details such as program title, description, duration, resource person, type of training, training methodology, participants, etc.). Mention details separately for the programs organized and the programs participated outside the institution)

4.4 Research and Development (30)

4.4.1. Sponsored Research (15)

Funded research from outside; considering faculty members contributing to the program: (Provide a list with Project Title, Funding Agency, Amount and Duration) Funding Amount (Cumulative for CAYm1, CAYm2 and CAYm3)

Ongoing Projects

S. No.	Project Title	Principal Investigator	Sanctioned Date	Funding Agency	Total Amount in INR
1.	Wash Basin Waste Water Reusable Filtration Gadget	DR.K.Mayandi	11.03.2022	TANSCST	**7,500**
2.	IN SITU development and investigations on the shape memory assisted bio-degradable electronic devices substrate using 3-D printing	Dr.J.T.Winowlin jappes	14 .08.2020	AICTE	20,62,745
3	3D printed flexible optical fibers using biodegradable PHBV/Graphene nanocomposites for	Dr.N.Rajini	27.02.2019	DST	21,66,000

	biophotonics applications				
4	Sustainable Manufacturing	Dr.M.Uthayakumar Dr.P.Balamurugan	01.12.2018	Poland National Science Academy	30,00,000
5	Studies on heat treatment and jet erosion on 3D printed SU718 materials	Dr.J.T.Winowlin Jappes Dr.M.Adam Khan	28.05.2018	GTRE-DRDO	9,87,900
6	Micromachining of biomedical materials shape memory alloys using acidithiobacillus ferrooxidants and thiooxidants micro organism	Dr.S.Rajesh Dr.M.Uthayakumar	15.01.2018	DST	25,85,000
7	Experimental investigations on mixing and combustion in a modified dual combustion ramjet engine	Dr.S.Jeyakumar	25.03.2017	DST - SERB	24,82,970
8	Experimental investigation on the effect of pylon based injection in a modified dual combustion ramjet engine	Dr.S.Jeyakumar	19.01.2017	ARDB	9,31,750
9	Performance investigation of green composites – A formulated microbial organism based novel bio resin	Dr.N.Rajini	12.07.2016	DST-SERB	23,14,070
10	Machining and erosion studies of redmud an induatrial waste based polymer matrix composite	Dr.M.Uthayakumar Dr.V.Arumugaprabu	10.03.2016	MOEF	27,00,000
11	Development of Floor Tiles from Land-thrown PET Bottles through Eco-friendly Processing Method	Dr.I.Siva Mr.V.B.Saravanan Mr.G.Ramkumar	19.11.2018	DST NIDHI	10,00,000

Total Amount in INR- 2,02,37,935/-

4.4.2. Consultancy (from Industry) (15)

Considering faculty members contributing to the program:

Provide a list with Project Title, Funding Agency, Amount and Duration)

Funding Amount (Cumulative for CAYm1, CAYm2 and CAYm3):

S.No	Name of the staff	Project Name	Company Name	Country Name	Sanctioned AY	Revenue
1	Dr.J.T.Winowlin Jappes Dr.M.Adam Khan	Studies on heat treatment and jet erosion on 3D printed SU718 materials	GTRE-DRDO	India	2018-19	9,87,900
2	Dr. K. Mayandi	Optimized charge scheduling of electric vehicles	TVS Sundaram Motors	India	2018-19	2,50,000
3	Dr. I. Siva	Low cost composite material tiles	Kamak Tiles	India	2017-18	2,80,000

CRITERION 5	LABORATORIES AND RESEARCH FACILITIES

5.1 Adequate and well-equipped laboratories in the area of program specialization (30)

The M. Tech Industrial Safety Engineering program is equipped with the required number of laboratories and equipment to cater to practical exposure to the students. Apart from the regular laboratory facilities, the students are permitted to use the research facilities to conduct laboratory experiments and conduct safety audits in industries/educational institutions/etc. The details of the laboratory are provided in Table 5.1.

Table 5.1 Details of the laboratory

S. No	Name of the Laboratory	Area (m^2)
1.	Industrial Safety Laboratory	132
2.	Computer-Aided Hazard Analysis	200
3.	Condition monitoring and fault diagnosis lab	67

The Industrial Safety Engineering equipped with well modernized personal protective equipment, fire safety equipment to make the students aware about the safety rules to be followed in all industrial sectors. Along with this, in CAD Laboratory, a separate Computer-Aided Hazard Analysis Laboratory is functioning with thirty advanced computers (8GB of RAM, Intel Core i5-4460 Processor 19.5" LED displays) with an internet connection installed with licensed various software. In addition, software like Ergo Fellow 2.0 and Microsoft Office is installed in the laboratory. Primarily Ergo Fellow 2.0 (Open source) is used for ergonomics modelling, and MS Office is used to prepare reports. Table 5.2 provides the equipment details in the laboratories.

Computer Aided Hazard Analysis Laboratory

Industrial Safety Laboratory

Table 5.2a Equipment details in the laboratory

S. No	Name of the Laboratory	Specialized Equipment Name	Equipment Details	Utilization details fromthe perspective of PO attainment
1	Computer-Aided Hazard Analysis Laboratory	HP computer system RAM:16GB Hard disk:1TB Processor: i5	30 No. of systems	PO1, and PO3
2	Industrial Safety Laboratory	1. Digital sound level meter 2. Digital lux meter 3. Thermo hygro clock 4. Fire alarm control panel 5. Frequency and spectrum analyzer 6. Vibration analyzer 7. Fire extinguisher 8. Safety PPE manmodel 9. Power oscillator 10. Wind shocks 11. Eyewash shower 12. First aid kit 13. Treatment of electric shock chart 14. Leather apron 15. Barrication tape 16. Fire hose reel 17. Fire hydrant valve with nozzle 18. Various smoke detectors 19. Face shields 20. Traffic barricade light 21. Safety helmet 22. Safety shoe, cumbots 23. Traffic cones 24. Hand gloves 25. Safety belt	1 No. for all the equipments	PO1, PO2, PO3

Table 5.2b. INDUSTRIAL SAFETY LAB OVERALL EQUIPMENT PURCHASE DETAILS

Sr. No	EQUIPMENT/ INSTRUMENT	MAKE & MODEL	COST
1.	Digital sound level meter	Lutron sl-4001 sound level meter	Rs. 6,000.00
2.	Digital lux meter	Lutron lx-102 lightmeter	Rs. 3,250.00
3.	Thermo hygro clock	Lutron THERMO HYGRO CLOCK M288CTH	Rs. 650.00
4.	Fire alarm control panel	Ravel re102	Rs. 7,650.00
5.	Frequency and spectrum analyzer	Instrol devices spectran hf-2025ev3	Rs. 3,75,000
6.	Vibration analyzer with Power oscillator	Instron devises vibrationexciter 2311	Rs. 1,32,600
7.	Fire extinguisher	Sun Fire Equipment's	Rs. 5,150
8.	Wind shocks	Sun Fire Equipment's	Rs. 2,050.00
9.	Eyewash shower	Udyogi Industries	Rs. 5,750.00
10.	First aid kit	Anuraag	Rs. 850.00
11.	Treatment of electric shock chart	Sun Fire Equipment's	Rs. 750.00
12.	Leather apron	Usha Fire Safety Equipment's	Rs. 2,960.00
13.	Barrication tape	Sun Fire Equipment's	Rs. 570.00
14.	Fire hose reel	Sun Fire Equipment’s	Rs. 2,475.00
15.	Fire hydrant valve with nozzle	Sun Fire Equipment’s	Rs. 5,850.00
16.	Various smoke detectors	Sun Fire Equipment’s	Rs. 1,850.00
17.	Face shields	Sun Fire Equipment's	Rs. 510.00
18.	Traffic barricade light	Sun Fire Equipment's	Rs. 375.00
19.	Safety helmet	Sun Fire Equipment's	Rs. 170.00
20.	Safety shoe, cumbots(Hooters)	Sun Fire Equipment's	Rs. 1,100.00

21.	Traffic cones	Sun Fire Equipment's	Rs. 1,000.00
22.	Heat Detector	Sun Fire Equipment's	Rs. 1,750.00
23.	Multi Sensor Detector	Sun Fire Equipment's	Rs. 1615.00
24.	Breathing Apparatus	Sun Fire Equipment's	Rs. 5652.00
25.	Safety Net	Sun Fire Equipment's	Rs. 5350.50

5.2. Research facilities/centre of excellence (30)

Table 5.3 shows the additional research facilities available to carry out the research-oriented projects for solving real-time industrial problems and carry out the fundamental and advanceddata collection from industries to audit and propose a solution from the collected and analyzed data.

Table 5.3 Additional Research facilities

Name of the Laboratory	Equipment's Available	Quantity	Cost (Rs)	Total Cost (Rs)	Utilization
Centre for composite materials (2400 Sq.Feet)	Compression Molding Machine	1	500000	1853437	96 hours/week
	Computerized Universal testing Machine	1	350000		
	Stereo Zoom Trinocular Microscope	1	262000		
	Pin-on-disc wear tester	1	405437		
	Flammability Tester	1	126000		
	Digital Impact tester	1	60000		
	Digital weighing Machine.	1	75000		
	Hot air oven	1	40000		
	Notch cutter	1	30000		
Materials processing Laboratory (2400 Sq.Feet)	Fibre cutter	1	5000	2516395	96 hours / Week
	Fatigue tester	1	424080		
	Creep tester	1	1322400		
	Corrosion analyzer	1	769915		
Condition Monitoring and Fault diagnosis laboratory (720 Sq.Feet)	Electrical units	1	337592	4801308	48 hours/week
	Sound and vibration measurement system	1	139192		
	Tri axial accelerometer	1	134310		
	Single axis accelerometer	1	36712		
	Impact force hammer	1	95535		
	Acoustic emission sensor	1	268520		
	Data accusation board and software	1	331200		
	Digital tool tip temperature recorder	1	24913		

	Digital tool tip temperature recorder	1	10615		
	Electrical units	1	337592		
	Sound and vibration measurement system	1	139192		
CO_2 Sequestration Lab (230 Sq.Feet)	Ultrasonic flow meter	1	350000	590000	48 hours/week
	Velocity anemometer	1	12500		
	Infrared thermometer	1	9500		
	Data logger	1	9300		
	Flue gas analyzer	1	100000		
	Lux meter	1	9500		
	Taco meter/Stroboscope	1	23200		
	Pressure meter	1	22500		
	Power analyzer	1	53500		
Advanced machining laboratory (720 Sq.Feet)	Electrical Discharge Machine	1	1021420	3266497	48 hours/week
	Abrasive water jet machining	1	2497701		
	Lathe tool dynamometer	1	213363		
	Drilling tool dynamometer	1	207226		
Gas dynamics Lab (960 Sq.Feet)	20 HP air compressor with 2000 Litre air tank – 20 bar capacity.	1	274655	1093627	8 hours/week
	Traversing mechanism	1	223125		
	Schileren flow visualization	1	204750		
	DSLR camera, Nikon D7000	1	102000		
	Pressure scanner-16 pressure transmitter	1	225000		
	NI DAQ-6210	1	43797		
	Air tank – 750 liter – 12 bar capacity	1	20300		

Condition monitoring and Fault diagnosis laboratory is equipped with the latest sensing devices, including high sensitivity vibration measuring sensors, sound, acoustic emission sensors, thermal images camera, and suitable data acquisition systems with required software's. Students are permitted to conduct a safety kind of audit when undergraduate students are using the machines, the data relevant to machine vibration, sound and the working temperature is measured and analyzed to measure the performance of the students in terms of occupational

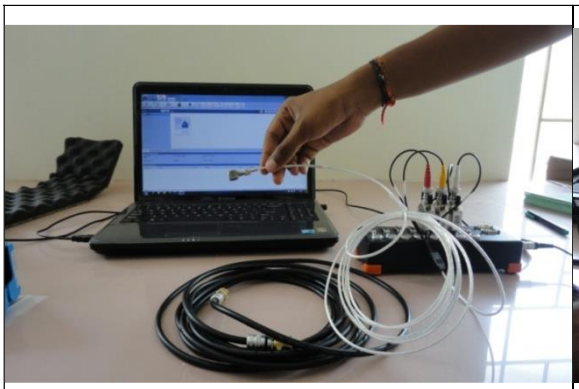
Safety aspects. After the preliminary studies and the quality of the reports, students are permitted to visit nearby industries to collect the data and encouraged to propose solutions to the identified problems.

CO_2 Sequestration laboratory equipped with power analyzer, pressure meter, anemometer, luxmeter and flue gas analyzer. With available equipment, students are permitted to conduct basicstudies of environmental pollution and its level in the different working areas of the industry. Also, energy audits and leakage in electrical systems and machines are identified, and a solution for the problem is also proposed to minimize the energy consumption. Furthermore, occupational health studies in the office's environment are studied to understand the comfort of the workplace. The students were also permitted to visit the chemical industries to understandand analyze the effect of pollutes in the atmospheric air and the working environment.

CO_2 Sequestration Laboratory

	
Energy audit	Energy audit Fenner India Pvt Ltd

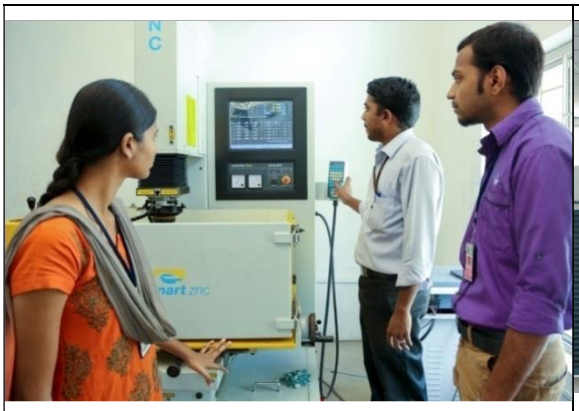
Machine dynamics and condition monitoring Laboratory

	
Triaxial accelerometer	Impulse Force Hammer and accessories

Center for Composite Materials

	
Creep Indentation Tester and UTM	Stereo Zoom Trinocular Microscope
	
Scanning Electron Microscope	Compression Molding Machine

Advanced Machining Laboratory

	
Electrical Discharge Machining	Abrasive Water Jet Machining

Biocomposites Laboratory

	
Thermal Analysis System (DMA7100 (220-240V))	Mechanical Stirrer

Centre for surface Engineering Laboratory

High Temperature Tubular furnace (Temp: up to 1200°C, Tolerance: ±1°C)

5.3. Access to laboratory facilities, training in the use of equipment (15)

Post-Graduate Students:

If they work in KARE's laboratories, all post-graduate students must complete laboratory safety training. They are permitted to work in laboratories under supervision until the next planned KARE Laboratory Safety Training by environmental health and safety. They shouldn't be given full access to the lab unless

they've undergone laboratory safety training. If their usual office space is within the laboratory, they may access their desk. However, unless another fully trained laboratory staff member is present, the student should not conduct any experimental activities.

Staff:

Technical staff, research scientists, and other staff members may work in the laboratory under supervision until they complete laboratory safety training. They must register for the laboratory safety training session after their arrival and should not be granted laboratory key access until they have undergone safety training. Access exceptions may be made if their office is located within a laboratory space. However, laboratory operations should not commence until supervised by another trained lab member.

Faculty Members (PIs) and Laboratory Supervisors:

While faculty members and laboratory supervisors may receive immediate access to their assigned laboratories, they must undergo the two-part training series as soonas possible. The first part is a high level supervisory specific briefing provided by EHS personnel. It should bescheduled immediately upon arrival on campus. Second,they must attend a general laboratory safety training session.

Visiting Researchers (faculty, staff, graduate students):

Official visitors acting in a research capacity are approved through the Director of Research. Except for short-term visitors, all visitors are subjected to the same training and key access rules outlined above.

Short Term Visitors:

Laboratory access should not be granted to short-term visitors. These visitors should only be working in laboratories while trained University faculty, staff, or students are present. Because these visitors will be accompanied at all times, laboratory safety training is not necessary. However, they should receive a copy of the Short-Term Safety Pamphlet (What You Should Know About Safety at KARE) from the departmental head or laboratory in charge.

CRITERION 6	CONTINUOUS IMPROVEMENT

To improve the quality performance of the program in a continuous manner the assessment of POs has to be determined for each batch of students. Accordingly, each PO was computed using direct and indirect assessment methods with varying weight percentages. The parameters such as CO attainment and mapping strength of each course outcomes decided the attainment of POs. Hence, the analysis was performed towards the improvement of achieving higher CO attainment and to strengthen the mapping of CO with the PO by implementing various measures like innovative pedagogy and curriculum up gradation. All these measures have been discussed at different levels, considering all the factors which are found to be important for imparting cognitive knowledge to the graduates through well-defined outcome-based education. Some of the common measures proposed at different levels to implement the action plans specifically for the courses and programme are shown in Fig 6.1.

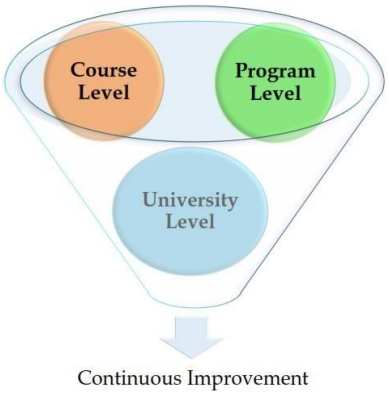


Fig 6.1. Contribution of various levels towards continuous improvement

Course Level Component in the Improvement Process

- Lecture content delivery
- Quiz based lectures.
- Practical applications oriented lectures
- Lecture with flipped class content
- Effective usage of video animations
- Lecture with industrial visits
- Online course materials
- Guest Lectures by expert from peer university and research laboratory

Improvement in Program level

- Revision of curriculum
- Revision of teaching and learning process
- Revision of assessment procedure and interpretation of result
- Revision of feedback system

Improvement in University level

- Implementation of ICT tools in teaching
- Faculty Development Program through Center for Learning Technology (CLT)
- Online examinations – NPTEL, Coursera
- International certification courses for faculty members
- Monitoring of academic process through IQAC and Academic Office.
- Visit to research lab and peer university visit.

In addition to the methodologies adopted to improve the CO and PO attainment level Fig 6.2 shows the overall action taken to improve the quality of the system, the auxiliary actions taken to improve the attainability by providing quality improvement programs to supporting staff and improving faculty qualities by advising them to join online line courses and attending seminar and peer group institution.

Fig. 6.2 Overall actions taken for continuous improvement

the next batch student analysis. If the POs attainment is greater than the target, the target value is revised for the next batch.

6.1 Actions taken based on the results of evaluation of each of the POs:

The program coordinator will continuously access the performance of the students through direct assessment methods for achieving the targeted COs and POs and the gap will be identified. Fig 6.3 shows the process of identification of gap analysis and action taken for both CO and PO attainment levels. The CO attainment is calculated for individual courses from the marks secured in the sessional examinations and end semester examinations and other assessment tools specified by the faculty.

- Based on the COs attainment level the observations were noted subsequently the action plans for the improvement are framed.
- Effective implementation of the action plan helps drastically to minimize the gap observed.
- Further the POs attainment is calculated based on the COs attainment.
- The value of PO attainment was compared with the set target value. If there is a shortfall, the same target value is retained for the next batch of students. However, various action plans will be designed and executed for the improvement of the attainment based on the gap analysis. If the target level is reached, a higher target value will be set to calculate the PO attainment for the next batch of students.

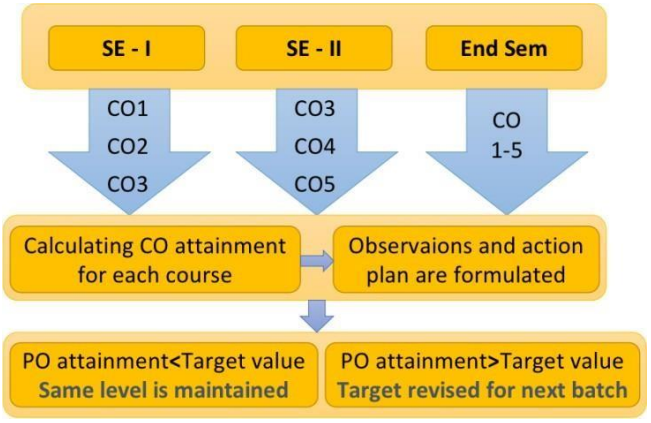


Fig 6.3 Process of Gap analysis and actions taken in PO attainment

Following the above process, the data of the previous batch of students (2018–2020) were collected and analyzed towards the PO attainment. Based on the comparison of PO

attainment with the set target various measures were taken to enhance the programme outcome for the succeeding batch (2019–2021) of students. Though several courses mapped with POs, only few courses were selected based on the attainment value and level of correlation for the further improvement

PO1: An ability to independently carry out research /investigation and developmentwork to solve practical problems

To discuss in detail, the sample courses from the program are taken as an example to suggest the action for continuous improvement. The selection of core courses connected to PO1 and their CO mapping are as follows:

S.No.	***Course Detail***	***CO1***	***CO2***	***CO3***	***CO4***	***CO5***
1	PGM18R5001 – Research Methodology	1	2	1	2	2
2	MEC18R5022 – Electrical Safety		2		1	
3	MEC18R6099 – Project Phase 2	2	3		1	2

Note: 1 – Low, 2 – Medium and 3 – High

The majority of the courses and their COs mapping with the PO1 are in the Medium level.

POs	**Target Level**	**Attainment Level**	**Observations for the Batch 2018 – 20.**
PO1	2.4	1.76	***PGM18R5001 – Research Methodology*** It is a post graduate mandatory course, covering the basic technology for core and research event in the program. It has deliberated outcome on ethics, modelling, creation and demonstration. Observations made from the Course Outcome are as follows: 1. The bench mark is fixed as 75% for each course. This is because the Post Graduate level is expected to be fixed at higher level. 2. Aspirants felt lagging on identifying he problem and data collection for analysis 3. Students are inefficient to find suitable problem-solving method for the problem taken. 4. Writing skill, documentation and data orientation for the publication is expected to be improved.
			MEC18R5022 – Electrical Safety It is a core course, which covers the major safety problems from the Industrial scenario. The attainment for the courses 1. The knowledge on selection of industrial safety measures and the hazard reduction process are less among the student's community. 2. Industrial Exposure for the availability of equipment's for installation and safety procedure has to be improved.

			MEC18R6099 – Project Dissertation It is a practical Course, students have to perform a project from the industry following all the Industrial Standards. The attainment for the courses 1. Risk assessment tools are not properly adopted in the project evaluation. 2. Aspirants should follow factory acts and recommended standard analysis tools to evaluate the problems identified. 3. Students involvement in the report development, project review, presentation and publications have to be improved.

Actions taken for continuous improvement:

Based on the observation action taken is implements in the batch 2019 - 21 for continuous improvement.

1. ***PGM18R5001 – Research Methodology***

   The bench mark score is fixed in higher order to meet the level of expectation for post graduate. Since the action taken is strong enough to meet the course outcome expectations.

Action Taken	***COs***
Data collection and Documentation from the industrial safety measures and analysis	CO1
Advanced techniques to be adopted in complex situation (safety system) for ease of problem solving	CO2, CO3
Expert lecture for how to publish paper in the conference and journals	CO4

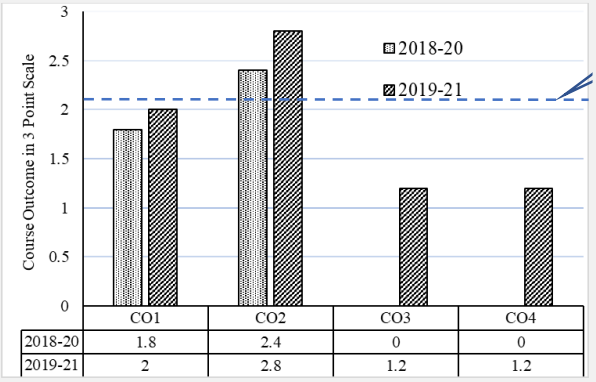


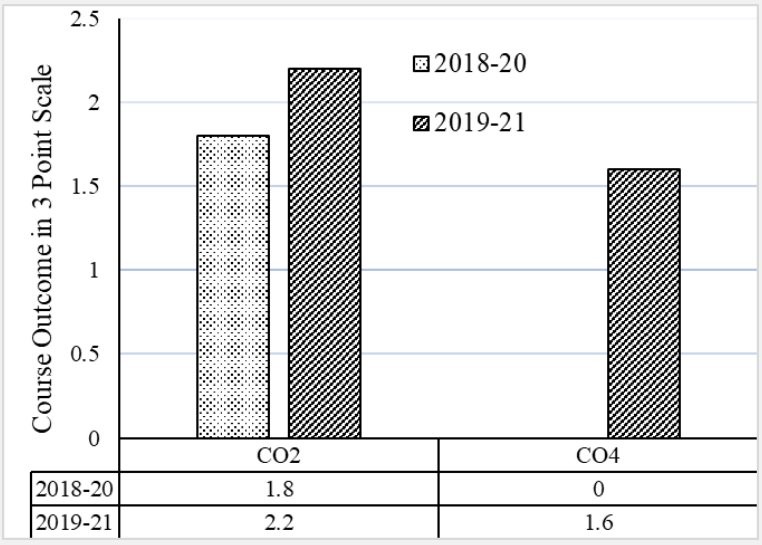
Figure: Course Attainment for the course PGM18R5001 – Research Methodology for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO1, CO3 and CO4) has been improved tremendously for the course on Research Methodology. Unexpectedly, the CO3 and CO4 requires still more concentration on data interpretation and evaluation pattern.

2. ***MEC18R5022 – Electrical Safety***

Action Taken	***COs***
Expert lecture on handling of Electrical Tool, to increase the safety measure and to reduce the hazard rate.	CO2
Industrial exposure for availability of safety equipment's and	CO4

installation has been arranged for the aspirants	



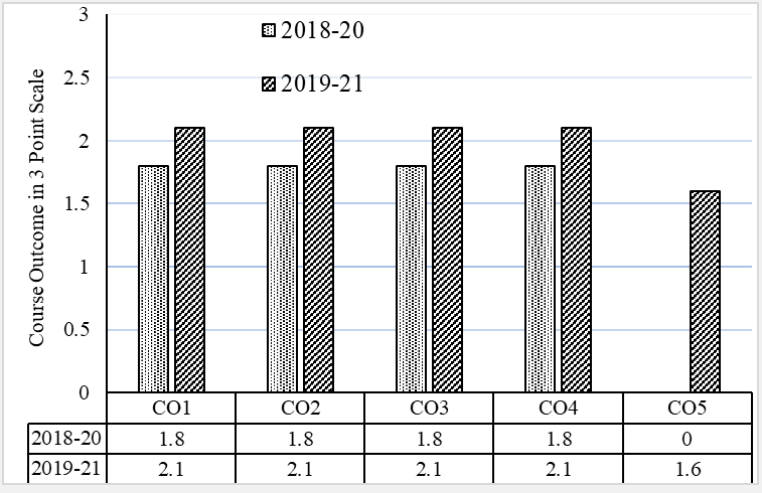
	CO2	CO4
2018-20	1.8	0
2019-21	2.2	1.6

Figure: Course Attainment for the course MEC18R5022 – Electrical Safety for the batch 2018 – 20 and 2019 – 21.

From the action plan, the CO2 has improved. However, the attainment level for CO4 is zero and found increased in the 2019 – 21 batch. It has been proposed to organise industrial visit for the specific course outcome and to give more information through videos and lectures for equipment handling.

3 MEC18R5099 – Project Dissertation (Phase 1)

Action Taken	***COs***
Earlier risk assessment has been considered; however to improve the level students has to follow hazard analysis tools such HAZOP, ETA, FTA, FMEA and others are incorporate	CO2
It is enforced to follow standards like ISO 14000, OSHAS 18000 and Regulations like factories act 1948 and other industrial standards	CO2 and CO4
Students are enforced to present and get reviewed through publishing articles in the journal's conferences.	CO5



	CO1	CO2	CO3	CO4	CO5
2018-20	1.8	1.8	1.8	1.8	0
2019-21	2.1	2.1	2.1	2.1	1.6

Figure: Course Attainment for the course MEC18R6099 – Project Dissertation for the batch 2018 – 20 and 2019 – 21.

It is clear that the action plan has yielded with good outcome throughout the course. All the COs has reached the level of attainment more than 2.1 (70%) level to maximum of scale 3. However, the CO5 found to be less than level of expectation. In future level, the projects will be available with multiple reviews for following the standards in problem analysis and evaluations.

PO2: An ability to write and present a substantial technical report/document

To discuss in detail, the sample courses from the program are taken as an example to suggest the action for continuous improvement. The selection of core courses connected to PO2 and their CO mapping are as follows:

S.No.	*Course Detail*	*CO1*	*CO2*	*CO3*	*CO4*	*CO5*
1	MEC8R5001 – Safety in Management	**3**	1	2	**3**	1
2	MEC18R5006 – Safety in Engineering Industry	-	-	**3**	3	**3**
3	MEC18R5013 – Safety in Textile Industry	3	**3**	3	**3**	3

Note: 1 – Low, 2 – Medium and 3 – High

Most of the courses and their COs mapping with the PO2 are in the higher level.

POs	Target Level	Attainment Level	Observations for the Batch 2018 – 20.
PO2	2.4	2.18	***MEC18R5001 –Safety in Management*** 1. Based on the sessional examination and technical report assessment, it is observed that the lack of understanding in the principles of safety management leads to poor documentation of students. 2. Based on the assignment report and quiz results, it is observed that the student is unable to provide a manage to improve the workers' health in a harsh environment. It is due to a lack of knowledge about the most up-to-date technologies in monitoring the harsh environment. 3. Change in teaching methodology, increasing number of relevant factories visit and preparation of model might improve the technical report documentation skills.
			MEC18R5006 – Safety in Engineering Industry 1. The students could be able to understand the different machine guarding and operation protective devices. However, they could not classify the hazardous based on the sound pollution in the industry during their preparation of assignments and the industrial visits.
			MEC18R5013 – Safety in Textile Industry 1. The students could not identify the various hazards

			occurring in the individual unit during their field visit. Consequently, they could not categorize and prioritize the hazard involved in the looming section during their seminar presentation. 2. The student can answer and fairly document the rules and regulations of the factories act but cannot handle a recent amendment.

Actions taken for continuous improvement:

Based on the observation action taken is implements in the batch 2019-21 for continuous improvement.

4. ***MEC18R5001 – Safety in Management***

Action Taken	***COs***
1. Along with the overall picture of the safety management, the risk assessment concept under the thirteen-risk assessment category is augmented with teaching methodology, enabling the understanding of the various operations performed.	CO1
1. In addition, to change teaching methodology, the students are permitted to visit different kinds of textile industries and some of the selected operations performed in the textile industries. 2. To help students to do safety management, the many devices needed to assess exposure to cotton dust levels, noise, and chemicals, organized programs with the help of internal and external specialists were organized. At the program, the students were instructed to document the observation.	CO4

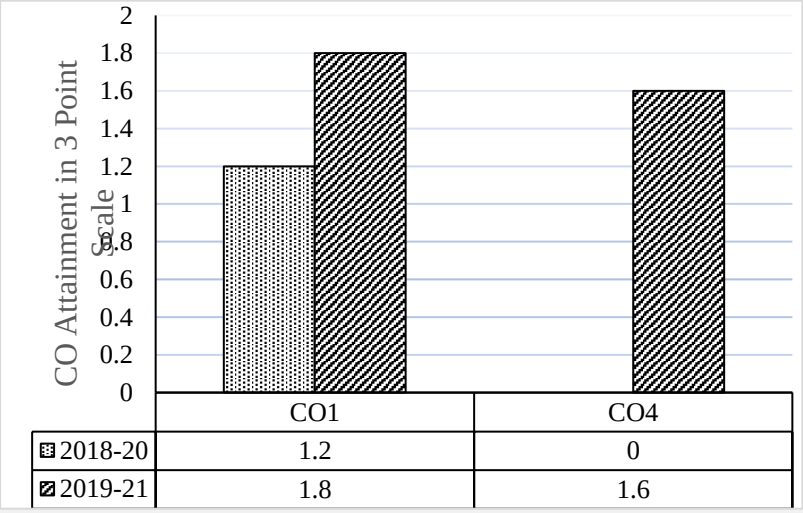


Figure: Course Attainment for the course MEC18R5001 – Safety in Management for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO1 and CO4) has been improved for the course.

3. MEC18R5006 - Safety in Engineering Industry

Action Taken	***COs***
The students were advised to take sound samples from the various units of the textile industry. Then, the collected samples were tested in the condition monitoring laboratory to understand the existence of different sound levels.	CO5

Finally, students were instructed to prepare a technical report on their observations and findings based on the results.	

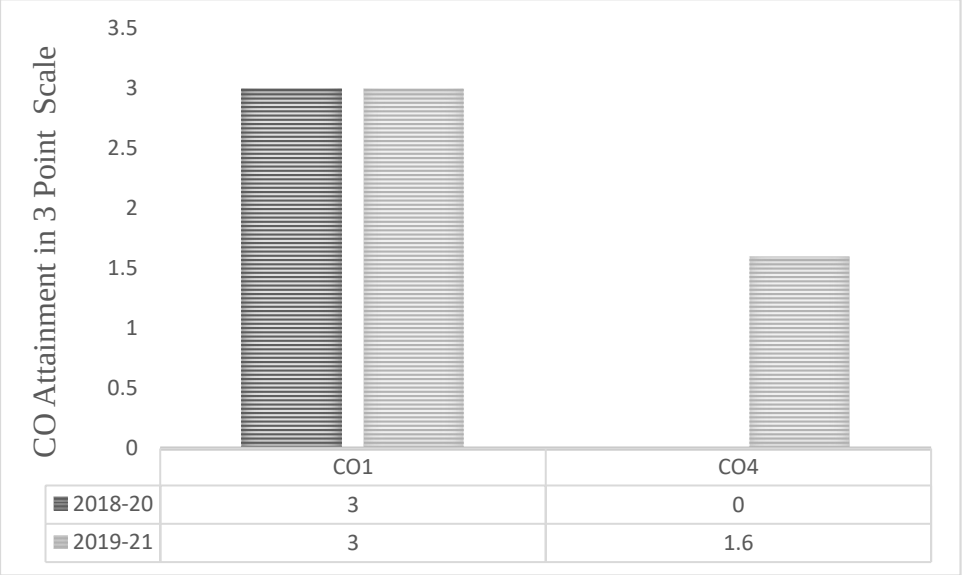


Figure: Course Attainment for the course MEC18R5006 –Safety in Engineering Industry for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO3 and CO4) has been improved for the course on Safety in Engineering Industry.

4 MEC18R5013 – Safety in Textile Industry

Action Taken	***COs***
Before the industrial visit, the students were instructed to prepare an observation sheet and expected hazards in various units of the textile industry. In addition, the students were asked to observe the working condition of the environment. After the visit, students were instructed to infer the outcome in a technical report and seminar. A similar kind of case study is also taken, compared during their presentation.	CO2
To handle the recent amendment in the factories act, the students were adopted peer-to-peer learning concepts and later subjected to group discussion for assessment.	CO4

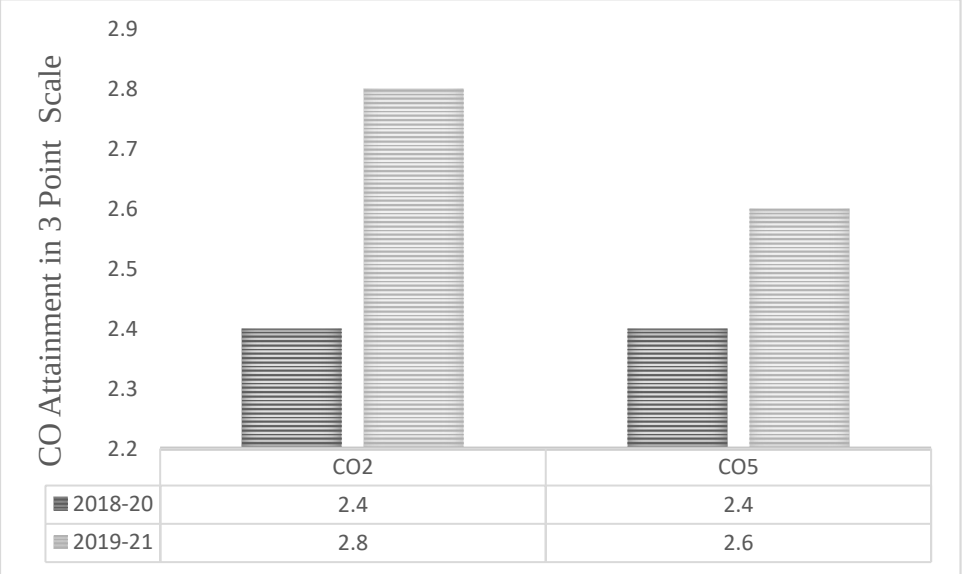


Figure: Course Attainment for the course MEC18R5013 –Safety in Textile Industry for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO2 and CO5) has been improved for the course on Safety in Textile Industry.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

To discuss in detail, the sample courses from the program are taken as an example to suggest the action for continuous improvement. The selection of core courses connected to PO1 and their CO mapping are as follows:

S.No.	***Course Detail***	***CO1***	***CO2***	***CO3***	***CO4***	***CO5***
1	MEC18R5013 – Safety in Textile Industry	2				2
2	MEC18R5022 – Electrical Safety	3	3			2
3	MEC18R5006 – Safety In Engineering Industry.	1	2	2	2	3

Note: 1 – Low, 2 – Medium and 3 – High

The majority of the courses and their COs mapping with the PO1 are in the Medium level.

POs	**Target Level**	**Attainment Level**	**Observations for the Batch 2018 – 20.**
PO3	2.4	1.71	***MEC18R5013-Safety In Textile Industry*** It is a post graduate understand the basic knowledge of textile safety process. It has reflected outcome on basic industrial process on textile spinning process operations and garment machinery process. The attainment for the courses 1. Candidates felt difficult on understanding the basics textile safety process and operations in industry. 2. Students are difficult to get practical exposure on basic textile safety process. 3. Identifications of Regulations and standards are very difficult related to textile safety.
			MEC18R5022 – Electrical Safety 1. Students felt very difficult to understand the working principle of Electrical Equipment's and its safety handling methods. 2. Candidates need to learn about the practical training on CPR and accident prevention methods. 3. Lag of difficulties faced on the categories of Electrical

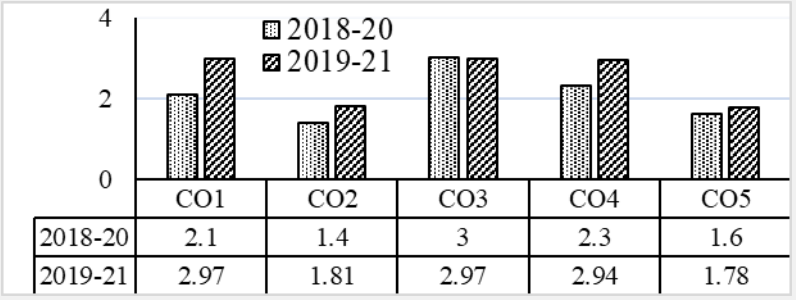
			zones as per industrial standards.
			MEC18R5006 – Safety In Engineering Industry.. 1. Lack of knowledge related to health and welfare measures in engineering industry. 2. Need to Get practical Exposure for understand the basic knowledge of Safety measures in Engineering Industry.

Actions taken for continuous improvement:

Based on the observation action taken is implements in the batch 2019 - 21 for continuous improvement.

1.MEC18R5013-Safety In Textile Industry

Action Taken	***COs***
Industrial Lectures conducted on Textile safety process.	CO2
Frequently Plant visit arranged in nearby by Textile mills.	CO2
Industrial Experts Talks arranged for the regulations for textile safety.	CO5



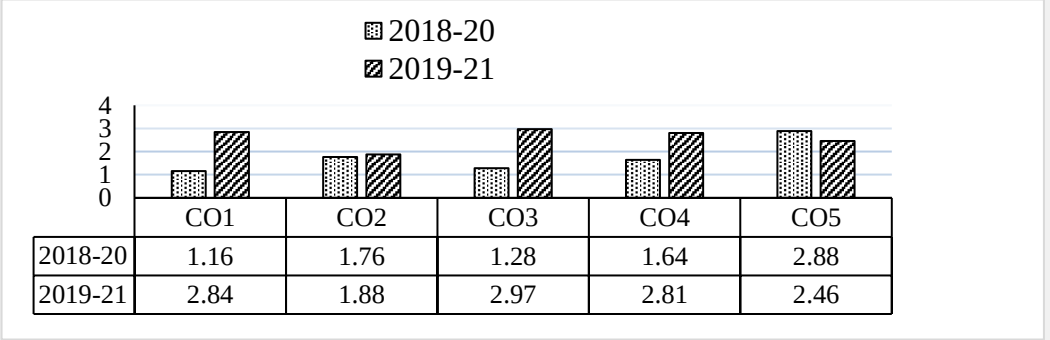
	CO1	CO2	CO3	CO4	CO5
2018-20	2.1	1.4	3	2.3	1.6
2019-21	2.97	1.81	2.97	2.94	1.78

Figure: Course Attainment for the course MEC18R5013-Safety In Textile Industry for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO2 and CO5) has been improved tremendously for the course on Safety In Textile Industry. Unexpectedly, the CO5 requires still seminars workshops are arranged to gather knowledge of regulations.

2.MEC18R5022 – Electrical Safety

Action Taken	***COs***
Hands on Training are needed to know the basic working principle of Electrical Equipments.	CO1
Hands on Training are needed for Emergency Life Savings Skills.	CO2
Seminars Need to planned with the Electrical Inspectorate officer to know the Categories of electrical zones.	CO5



	CO1	CO2	CO3	CO4	CO5
2018-20	1.16	1.76	1.28	1.64	2.88
2019-21	2.84	1.88	2.97	2.81	2.46

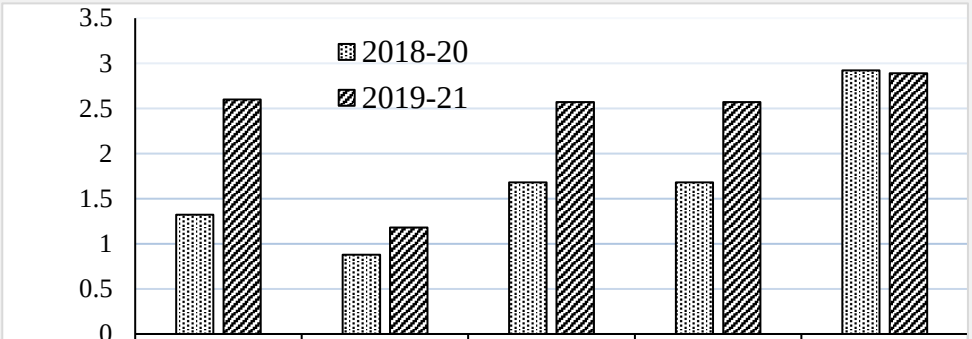
Figure: Course Attainment for the course MEC18R5022 – Electrical Safety for the batch 2018 –

20 and 2019 – 21.

From the action taken, the CO attainments (CO1 and CO2) has been improved tremendously for the course on ***Electrical*** Safety. Unexpectedly, the CO5 requires more importance to reach the higher-level target.

3.MEC18R5006 – Safety In Engineering Industry

Action Taken	***COs***
Regular Field visit and Plant Visit must be planned on every week related to the Health and safety practices in the engineering industry.	CO5



	CO1	CO2	CO3	CO4	CO5
2018-20	1.32	0.88	1.68	1.68	2.92
2019-21	2.6	1.18	2.57	2.57	2.89

Figure: Course Attainment for the course MEC18R5006 – Safety In Engineering Industry for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO5) has been improved for the course on Safety In Engineering Industry. Still some more take Initiates like Internships are needed to improve further.

6.2 Improvement in Quality of Projects:

Taking the one-year time span of the postgraduate project into mind, the project's quality assurance was guaranteed via a continual monitoring and evaluation procedure. Through collaborative activities, students are encouraged to take on real-world challenges encountered in the industry. Students are often encouraged to attend workshops and seminars on academic and industry research, research methodology, research publishing ethics, and intellectual property rights. Our postgraduate students used to visit industries to undertake energy audits using the CO2 sequestration research lab's available resources. Furthermore, the project coordinator will create rubrics to evaluate the progress of project work at regular intervals, which will be considered as continuous assessment prior to the end-of-semester exams. Students will be provided recommendations to follow in order to meet the necessary quality requirements for project reports and presentations. As a result, all projects have been published in past years' International Conferences. The increasing quantity of high-quality papers in Scopus and Science Citation Indexed Journals has resulted in a transformational shift. Students' project work has been published in international journals such as International Journal of Engineering Research & Technology, Journal of Safety Research, Safety and Health at Work, International Journal of Occupational Safety and Health, and others. Table 6.1 displays a

list of students who have published their project work in peer-reviewed journals. The % conversion rate of project efforts into publications is shown in Table 6.2.

Table 6.1 Selected Projects Published in Quality Journals

Year	Student Name	Title	Company
2017-19 (Phase II)	R.Vinoth	Development modification for handling, storage and transportation of chemicals in textile plants located in southern India	Madura Coats, Pabanasam
2018-20 (Phase I)	Roopa Ann Koshy	Analysis of risk in an ammonia plant using FMEA method	Mangalore Chemicals and Fertilizers Ltd., Karnataka
	M.Saravana Mani	Risk assessment of machining and assembly line in automotive industry	Wabco India Ltd., Chennai
	P.Pradeep Kannan	Risk assessment using Bow Tie tool in cement industry	Tamilnadu Cements Corporation Ltd. Alangulam
	G.Rampranav	Job safety analysis for various operations in cement industry using risk assessment matrix	Tamilnadu Cements Corporation Ltd. Alangulam
	A.Ramapandian	Quantitative risk analysis using HIRA in an automotive manufacturing sector	Wabco India Ltd., Chennai
2018-20 (Phase II)	Roopa Ann Koshy	Risk analysis in heat treatment process of gear manufacturing company	Shanthi Gears, Coimbatore
	M.Saravana Mani	Analysis of risks in gear manufacturing industry	Shanthi Gears, Coimbatore
	P.Pradeep Kannan	Manual hazard identification on fireworks industry located in southern part on Tamilnadu	Internal
	G.Rampranav	Ergonomics survey in thread manufacturing industry by using Workplace Ergonomic Risk Assessment (WERA) method	Madura Coats, Pabanasam
	A.Ramapandian	Updation of EHS assessments by applying safety and environmental tools and techniques.	Shanthi Gears, Coimbatore

Table 6.2 Conversion Rate Percentage of Project Works into publications

Academic year	2017-18	2018-19	2019-20
% of project converted into conference paper	100	100	100
% of project converted into Journal paper	0	100	100

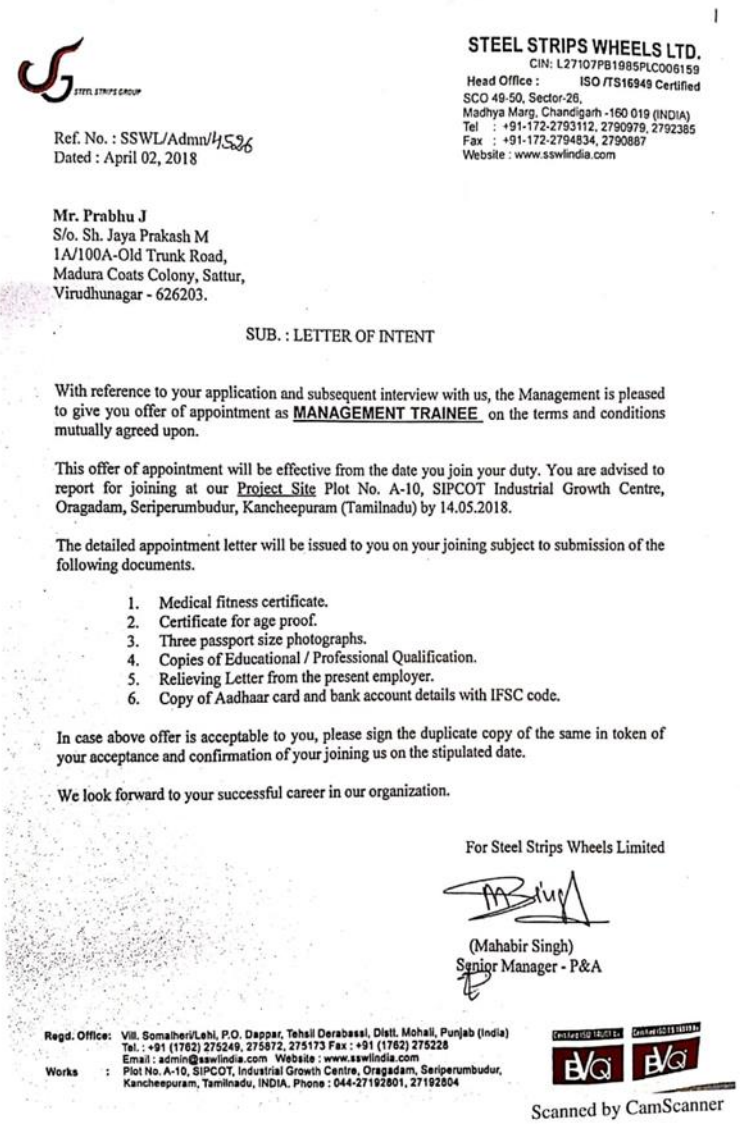
6.1 Improvement in Placement, Higher studies and Entrepreneurship:

Item	LYG (2018-20)	LYGm1 (2017-19)	LYGm2 (2016-18)	LYGm2 (2015-17)
Number of admitted students corresponding to LYG (N)	5	1	10	12
Number of Students who obtained jobs as per the record in the industry/ academia	4	1	9	11
Number of Students who opted for higherstudies with valid qualifying scores/ranks (y)	0	0	0	0
Entrepreneurs	1	0	1	1

A. Improvement in placement

The department of Mechanical Engineering in KARE take necessary corrective measures to improve the placement of students doing the ISE Program. Industrial Safety Engineering Program is commanding toward 100% percentage result in quality and quantitative aspects. All the students placed in various sectors as safety officer but necessary measures suggested to ensure them all get placed in quality companies

- The primary moto of the program relies on equipping the potent of the student to face the competency of the global scenario necessary steps taken already to bring abroad companies experts to deliver expert lectures as well as collaborate with them for internship arranged followed by placement .
- To assimilate the moto of ISE orientation program arranged to the students for placement by well renowned industrial experts.
- Special training given to the students in niche areas so as to make them tailor made for the changing industry scenario



STEEL STRIPS WHEELS LTD.
CIN: L27107PB1985PLC006159
Head Office : ISO /TS16949 Certified
SCO 49-50, Sector-26,
Madhya Marg, Chandigarh -160 019 (INDIA)
Tel : +91-172-2793112, 2790979, 2792385
Fax : +91-172-2794834, 2790887
Website : www.sswlindia.com

Ref. No. : SSWL/Admn/4536
Dated : April 02, 2018

Mr. Prabhu J
S/o. Sh. Jaya Prakash M
1A/100A-Old Trunk Road,
Madura Coats Colony, Sattur,
Virudhunagar - 626203.

SUB. : LETTER OF INTENT

With reference to your application and subsequent interview with us, the Management is pleased to give you offer of appointment as MANAGEMENT TRAINEE on the terms and conditions mutually agreed upon.

This offer of appointment will be effective from the date you join your duty. You are advised to report for joining at our Project Site Plot No. A-10, SIPCOT Industrial Growth Centre, Oragadam, Seriperumbudur, Kancheepuram (Tamilnadu) by 14.05.2018.

The detailed appointment letter will be issued to you on your joining subject to submission of the following documents.

1. Medical fitness certificate.
2. Certificate for age proof.
3. Three passport size photographs.
4. Copies of Educational / Professional Qualification.
5. Relieving Letter from the present employer.
6. Copy of Aadhaar card and bank account details with IFSC code.

In case above offer is acceptable to you, please sign the duplicate copy of the same in token of your acceptance and confirmation of your joining us on the stipulated date.

We look forward to your successful career in our organization.

For Steel Strips Wheels Limited

(Mahabir Singh)
Senior Manager - P&A

Regd. Office: Vill. Somalheri/Lehi, P.O. Dappar, Tehsil Derabassi, Distt. Mohali, Punjab (India)
Tel. : +91 (1762) 275249, 275872, 275173 Fax : +91 (1762) 275228
Email : admin@sswlindia.com Website : www.sswlindia.com
Works : Plot No. A-10, SIPCOT, Industrial Growth Centre, Oragadam, Seriperumbudur, Kancheepuram, Tamilnadu, INDIA. Phone : 044-27192801, 27192804

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Fig. A sample offer letter copy

B. Improvement in higher studies

- Industrial Safety Engineering of KARE has a valid forecasting towards the future arena and emphasizes greater importance towards higher studies.
- The department itself holds a very good research potential with high number of PhD holders to guide for PhD degree.
- Students were motivated to join for premier institution like IITs, NITs, via GATE for their research.
- The students were also motivated through various awareness programs by indurty expert to join for PhD program even though at the moment no student undergone the same.

C. Entrepreneurship

- Industrial Safety Engineering strives towards training the students to become an entrepreneur. At present in every batch passed out students 10% percentage turnout to be an entrepreneur
- The students of ISE KARE get motivated to become an entrepreneur by means of creating critical thinking skills among them in terms of engaging technical seminars, workshops,

awareness camps and engage them in exploring their ideas by making the students to participate in the programs organized by our IEDC-KARE. Also students are encouraged to submit proposals about their ideas which is the seed for their entrepreneurship skill.

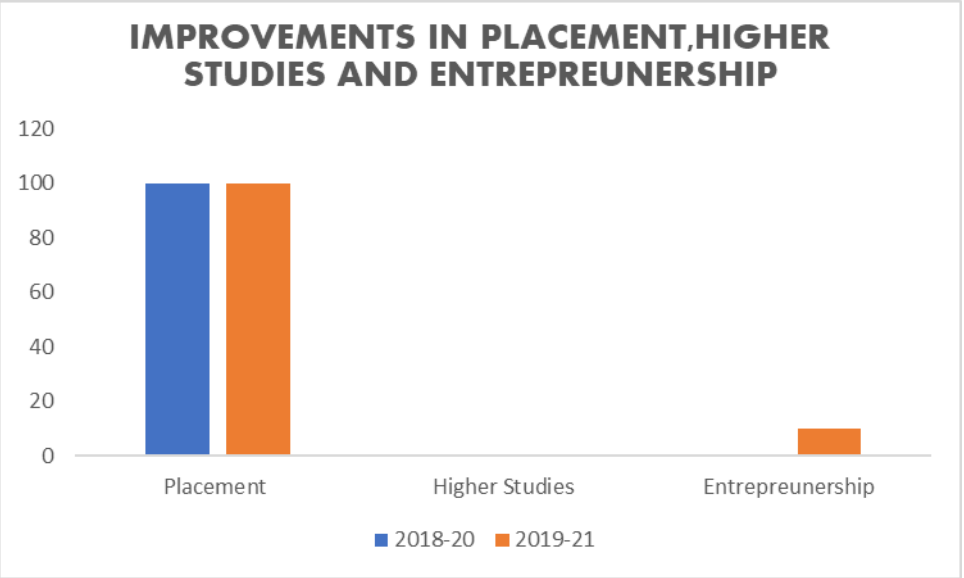


Fig. Improvement in Placement, Higher Studies and Entrepreneurship

6.4 Improvement in the quality of students admitted to the program:

Table represents the intake and the admitted strength of the M. Tech Industrial Safety Engineering program. The admission to the program is done by two ways,

1. The students having the eligible GATE score to apply for the program
2. The students not having GATE

Students having eligible GATE score

Step 1. The Students having the eligible GATE score may apply for the M. Tech Industrial Safety Engineering program through both online/offline mode.

Step 2. After the receipt of application scrutiny of the details of application done by the admission office.

Step 3. After verifying the eligibility criteria, if it met the students call for the further admission process.

Students NOT having eligible GATE score

Step 1. The Students not having the eligible GATE score may apply for the M. Tech Industrial Safety Engineering program by applying for the KEEE examination (entrance examination conducted by Kalasalingam Academy of Research and Education) through both online/offline mode.

Step 2. After the receipt of application, the date and time of examination will be

intimated to the students through e-mail and the admit card for appearing for the examination also been sent through online.

Step 3. After the examination, mark report of the students taken the examination will be sent through the e-mail.

Step 4. Based on the eligibility, the students are called for counselling.

Step 5. If students select the seat, he/she called up for the further process

Based on the merit score the students can avail scholarship as the University norms.

Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	CAY (2020-2021)	CAY*m*1 (2019-2020)	CAY*m*2 (LYG) (2018-2019)	CAYm3 (LYGm1) (2017-2018)	CAYm4 (LYGm2) (2016-2017)
Sanctioned intake of the program (*N*)	12	12	12	12	18
Total number of students admitted through GATE (*N*1)	0	0	0	0	0
Total number of students admitted through PG Entrance and others *(N2)*	12	07	05	01	10
Total number of students admitted in the Program (*N*1 + *N*2)	12	07	05	01	10

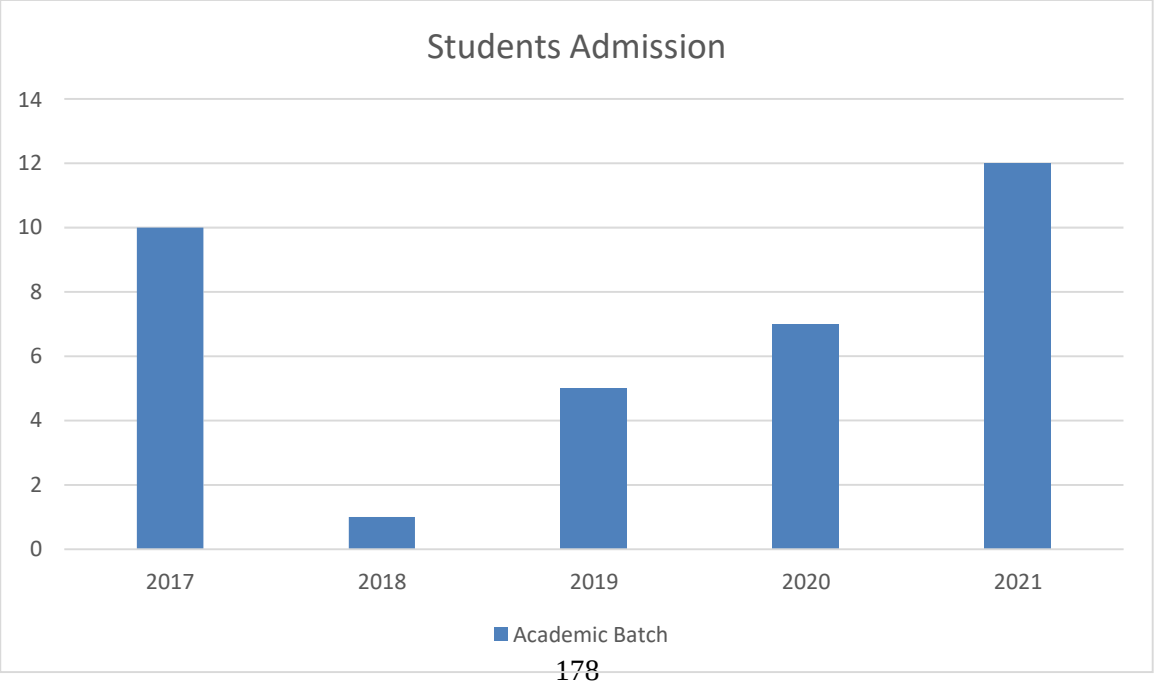


Fig 6.5. Number of students admitted in last five batches

6.2 Improvement in quality of paper publication:

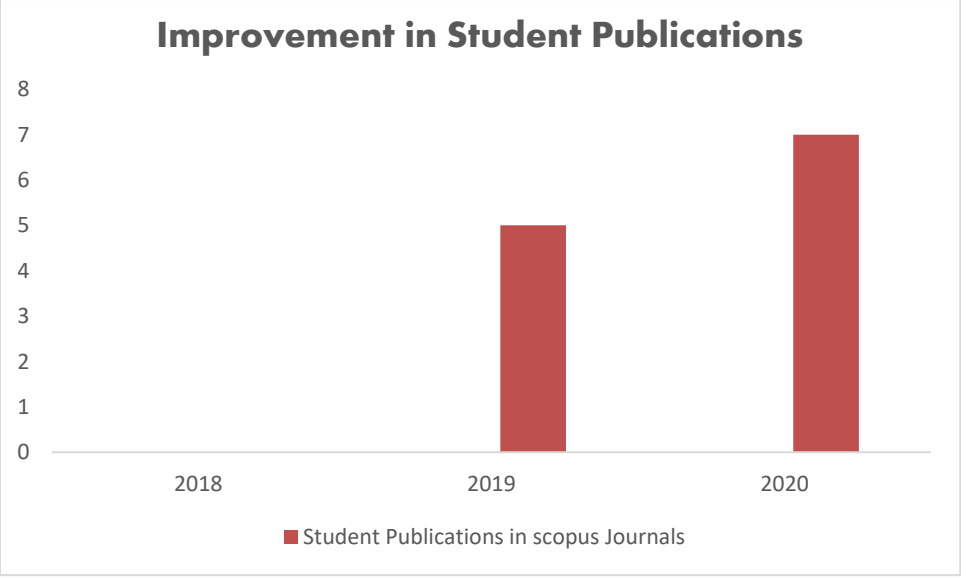
The department emphasis always quality students publications and the students along with the faculty members are engaged in quality research in focused areas such as Industrial safety/Industrial engineering, Materials Science, Machining and Thermal studies. This same thing was more helpful for the attainment of POs. The progress in increase of student publications over each assessment year leads to the attainment of POs related to major project . Apart from this a total of 68 papers during the assessment period had been published by the faculty members of the program are under consideration.

The improvement in quality of paper publication happened by taking the following measure:

Ø All the students project work are converted into paper publication in quality Scopu indexed/SCI journals

Ø All the program specialized faculty members are encouraged to publish in journals with Impact factor higher than 4. Ø Even though identification of very specialized journals in the area of ISE is scarce the faculty members are insisted to identify, share with students and publish in reputed journals.

Ø Students and Faculty members are motivated for research collaboration with abroad universities as well as reputed institutions in India where through collaboration using their advanced facilities with good outcomes the paper published in reputed journals.



The below table shows the consolidated number of research papers published during the assessment also the PhD Completed under the faculty members also listed.

Name of the faculty	Academic Research					
	Number of quality publications in refereed/SCI Journals, citations, Books/Book Chapters etc.			Ph.D. guided /Ph.D. awarded during the assessment period while working in the institute		
	CAYm 1 (2022)	CAYm 2 (2021)	CAYm 3 (2020)	CAYm 1 (2022)	CAYm 2 (2021)	CAYm 3 (2020)
Dr. S. Saravanasankar	9	8	6	4	1	--
Dr.Vincent	--	--	01	--	--	--
Dr. V. Arumugaprabu	22	15	19	4	5	5
Mr. R. Manikandan	1	2	5	--	--	--
Mr. T. Raj pradeesh	2	-	4	--	--	--
Mr.M.Ramaganesh	2	-	-	--	--	--

6.3 Improvement in laboratories:

- In the case of work places where relatively small amounts of dangerous chemicals are used on a non-production basis, the industrial safety laboratory was set up to address safety requirements based on OSHA.

- Laboratories involve a wide variety of safety risks, from chemicals to electrical equipment, which is why it is so important to consider the value of laboratory safety. Later, to avoid the potentially catastrophic impacts of climate change, it is important to restrict and even minimize the amount of CO in the atmosphere, but it appears that fossil fuels are required, at least for the next few decades, to deliver the economic growth needed for global stability and a healthy population.

- By taken into consideration those issues CO sequestration laboratory was established. One of the most reliable ways to detect and avoid device malfunction or downtime is vibration screening.

- Most defects, such as imbalance, misalignment, looseness and late-stage bearing wear, can be screened, providing precipitous warning of imminent failure. Keeping focus on these issues Condition monitoring laboratory was established.

- In considering future prospects some value addition was done in CO2 sequestration laboratory. In the follow up, keeping focus on modern trends additional equipment were added in Condition monitoring laboratory dress workplaces where relatively small amounts of dangerous

chemicals are used on a non-production basis, the industrial safety laboratory was set up to address safetyrequirements based on OSHA.

Name of the Laboratory	Equipment's Newly Added	Quantity
Condition Monitoring and Fault Diagnosis Laboratory	Acoustic emission sensor	1
	Data accusation board and software	1
	Digital tool tip temperature recorder	1
	Digital tool tip temperature recorder	1
CO_2 Sequestration Lab	Ultrasonic flow meter	1
	DSLR camera, Nikon D7000	1
	Pressure scanner-16 pressure transmitter	1
	NI DAQ-6210	1
	Air tank – 750 liter – 12 bar capacity	1