KALASALINGAM
ACADEMY OF RESEARCH & EDUCATION
(DEEMED TO BE UNIVERSITY)
Under sec. 3 of UGC Act 1956. Accredited by NAAC with "A" Grade
Anand Nagar, Krishnankoil - 626126. Srivilliputtur (Via), Virudhunagar (Dt), Tamil Nadu | info@kalasalingam.ac.in | www.kalasalingam.ac.in

M.Tech.

STRUCTURAL ENGINEERING

NBA

SELF ASSESSMENT REPORT

SCHOOL OF MECHANICAL, AUTO, AERO AND CIVIL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

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 – Departmental Information

1. State the Vision and Mission of the Institute and Department

Institute Vision

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

Institute 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 a Centre of Excellence in the field of Civil Engineering through Quality Education and Research

Department Mission

1. To Produce Civil Engineers of high caliber, technical skills and ethical values to serve society and nation
2. To inculcate acumen for lifelong learning, research and capability to adapt to various challenges in the domain of civil engineering
3. To practice ethics and provide sustainbale environment conscious solutions to problems in civil engineering

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 departmentvision andit is evident from the mapping, the department aim to meet theinstitutevision andmission.

Department \ Institute			Institute Vision & Mission Key Components				
			Vision		Mission		
			Centre of Excellence	Education and Research	Teaching and learning skills	Research Development	Innovators & Administrators
Department Vision & Mission Key Components	Vision	Excellence in Quality Education	√	√	√	√	√
		Excellence in Quality Research	√	√		√	√
	Mission	Technical Skills	√	√	√		√
		Research Skills	√	√		√	
		Social Responsibility				√	√
		Ethical Values		√	√	√	√
		Sustainable environment	√	√		√	√

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.	Structural Engineering	Civil	12	5
2.	Environmental Engineering	Civil	12	2

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

Structural Engineering (SE) Program Educational Objectives (PEO) is framed based on the various stakeholders' feedback and analysis in order to meet out the mission and vision of the department.

PEO 1: Graduates will be able to provide solutions in the field of structural engineering by adapting latest techniques and practices.

PEO 2: Graduates will be able to contribute towards research and provide cost effective and environment friendly solutions to the problems in structural engineering.

PEO 3: Graduates will contribute towards societal development by adapting professional attitude and ethics.

CRITERION 1	Program Curriculum and Teaching –Learning Processes	125

1.1. Program Curriculum (35)

1.1.1. State the process for designing the program curriculum (10)

(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. Procedure for Curriculum development

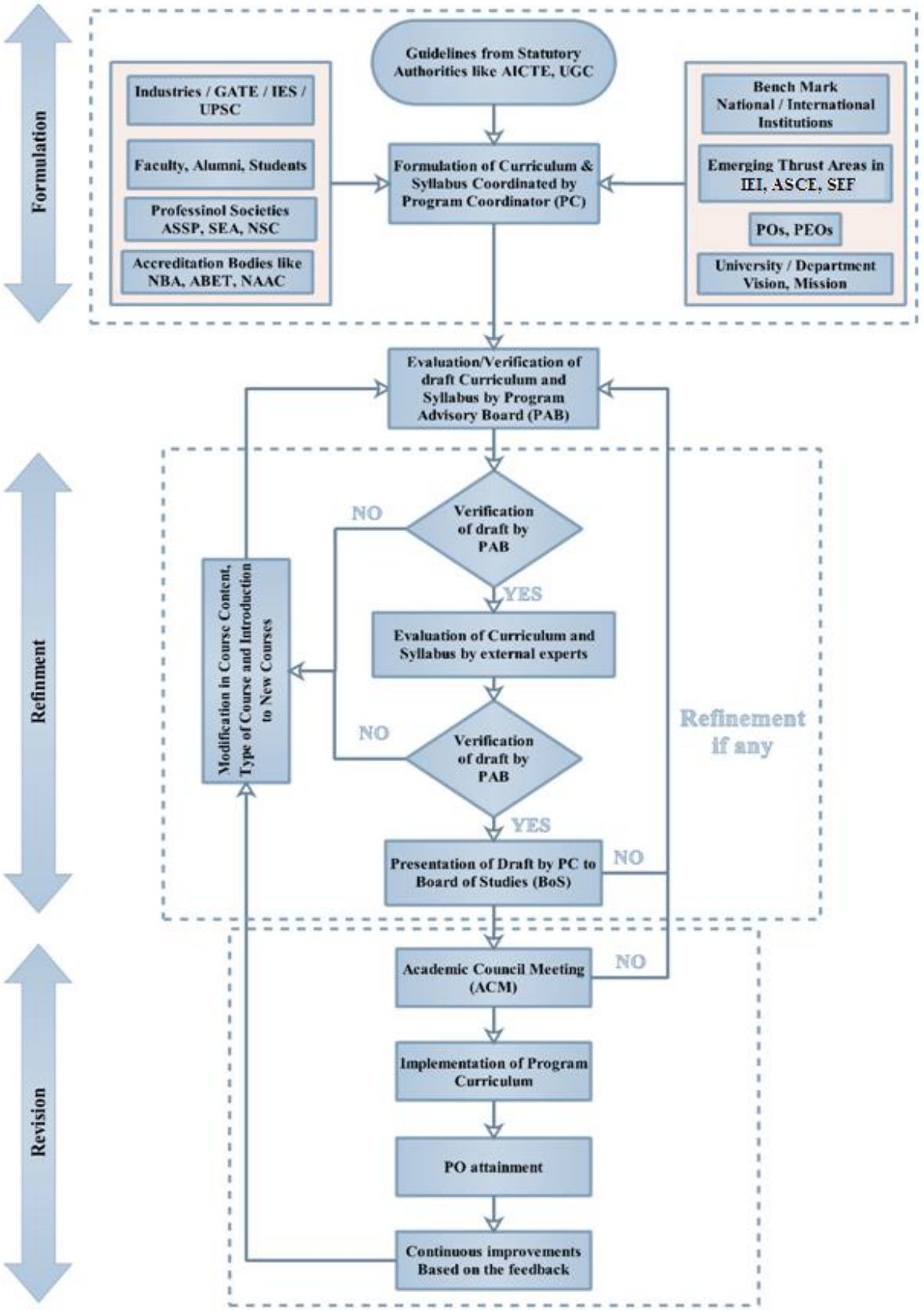
The process of curriculum development for M. Tech in Structural Engineering (SE) is carried out based on the standard procedure followed in our university. Accordingly, the draft curriculum structure is designed by referring the bench mark institutes which are well known for offering SE programs in national/international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

Step -1Draft 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 AICTE, NBA, ABET and NAAC.
- Further,thedraft curriculum was prepared in accordance with national and top ranked international institutes in the domain of Structural Engineering
- The content of the syllabus and curriculum structure were developed by considering the industries requirement by collecting the feedback from the various experts as well as the experienced academic personals.

Step -2 Evaluation and Refinement of Curriculum and Syllabus

- In step II, the draft copy of the curriculum and syllabus is submitted to Program Advisory Board (PAB) to examine the quality. This committee


Formulation
Guidelines from Statutory Authorities like AICTE, UGC
Industries / GATE / IES / UPSC
Faculty, Alumni, Students
Professinol Societies ASSP, SEA, NSC
Accreditation Bodies like NBA, ABET, NAAC
Formulation of Curriculum & Syllabus Coordinated by Program Coordinator (PC)
Bench Mark National / International Institutions
Emerging Thrust Areas in IEI, ASCE, SEF
POs, PEOs
University / Department Vision, Mission
Evaluation/Verification of draft Curriculum and Syllabus by Program Advisory Board (PAB)
Refinment
NO
Verification of draft by PAB
YES
Evaluation of Curriculum and Syllabus by external experts
Modification in Course Content, Type of Course and Introduction to New Courses
NO
Verification of draft by PAB
YES
Refinement if any
Presentation of Draft by PC to Board of Studies (BoS)
NO
Revision
Academic Council Meeting (ACM)
NO
Implementation of Program Curriculum
PO attainment
Continuous improvements Based on the feedback

consists of the following members; Head of the Department (HoD), Program Coordinator(PC) and ModuleCoordinator (MC).

- After the internal evaluation of the firstdraft copy of th ecurriculum and syllabus by the PAB Committee 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 suggestion and modification suggested by the external stakeholders are incorporated and revised version of the draft curriculum will be submitted to Board of Studies (BoS).

Step 3 –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 will be carried out and it is submitted for final approval by the Academic Council (AC).

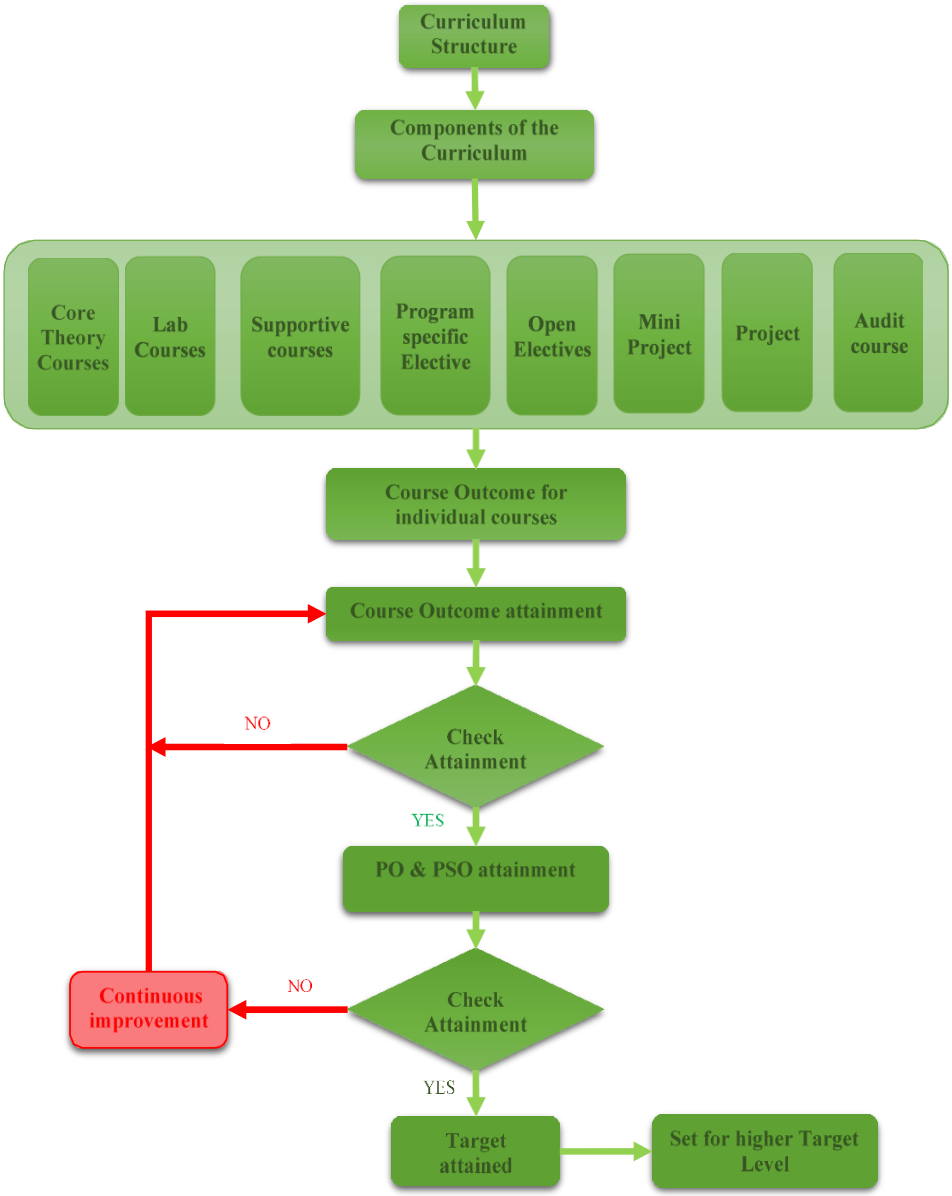
Step 4 –Academic Council

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

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 Po's 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 given below:



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 away 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. Itcould be further improved considering the continuous improvement based on the previousbatch 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 (5)

The curriculum of Structural Engineering is framed based on the guidelines suggested and recommended by AICTE. The structure of the curriculum is shown in below table.

Table: 1.1.2 Structure of the Curriculum

SEMESTER –I

Sl. No	Course Code	Course Title	Course Type	L	T	P	C
1	MAT18R5001	Applied Mathematics	T	3	0	0	3
2	CIV18R5101	Advanced Concrete Technology	TP	3	0	2	4
3	CIV18R5102	Structural Dynamics	T	3	0	0	3
5	CIV18RXXX	Programme Elective 1	T	3	0	0	3
6	CIV18RXXX	Programme Elective 2	T	3	0	0	3
8	CIV18R5182	Advanced Structural Engineering Laboratory	L	0	0	3	2
TOTAL CREDITS							**18**

SEMESTER –II

Sl. No	Course Code	Course Title	Course Type	L	T	P	C
1	CIV18R5104	Advanced Steel Structures	T	3	0	0	3
2	CIV18R5105	Advanced Concrete Design	TP	3	0	2	4
3	CIV18R5106	Matrix Method Of Structural Analysis	T	2	0	2	3
4	PGM18R5001	Research Methodology For Engineers	T	3	0	0	1
5	CIV18RXXX	Programme Elective 3	T	3	0	0	3
6	CIV18RXXX	Programme Elective 4	T	3	0	0	3
7	XXX18RXXX	Interdisciplinary Elective 1	T	3	0	0	3
8	CIV18R5183	Computer Aided Analysis And Design Laboratory	L	0	0	3	2
		Mini project		0	0	4	2
	TOTAL CREDITS						**24**

SEMESTER –III

Sl. No	Course Code	Course Title	Course Type	L	T	P	C
1	CIV18RXXX	Programme Elective 5	T	3	0	0	3
5	CIV18R6198	Project Work – Phase I	L	0	0	20	10
TOTAL CREDITS							**13**

SEMESTER –IV

Sl. No	Course Code	Course Title	Course Type	L	T	P	C
1	CIV18R6199	Project Work – Phase II	L	0	0	32	16
	TOTAL CREDITS						**16**

PROGRAM ELECTIVE COURSES

CODE NO	COURSE TITLE	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	Credits
CIV18R5107	Computer Aided Design	3	0	0	4	3
CIV18R5108	Design of Bridges	3	0	0	4	3
CIV18R5109	Design of Shell And Spatial Structures	3	0	0	4	3
CIV18R5110	Design of Steel Concrete Composite Structures	3	0	0	4	3
CIV18R5111	Design of Tall Buildings	3	0	0	4	3
CIV18R5112	Nonlinear Analysis of Structures	3	0	0	4	3
CIV18R5113	Offshore Structures	3	0	0	4	3
CIV18R5114	Industrial Structures	3	0	0	4	3
CIV18R5115	Advanced Prefabricated Structures	3	0	0	4	3
CIV18R6101	Advanced Prestressed Concrete	3	0	0	4	3
CIV18R6102	Wind and Cyclone Effects On Structures	3	0	0	4	3
CIV18R6103	Theory of Plates AndShells	3	0	0	4	3
CIV18R6104	Repair and Rehabilitation of Structures	3	0	0	4	3
CIV18R6105	Experimental Stress Analysis	3	0	0	4	3
CIV18R6106	Finite Element Methods	3	0	0	4	3
CIV18R6107	Characterization of Construction Materials	3	0	0	4	3
CIV18R6108	Sustainable Building Materials	3	0	0	4	3
CIV18R5103	Theory of Elasticity And Plasticity	3	0	0	4	3

1.1.1. State the components of the curriculum (10)

Degree is awarded in the name of Master of Technology in Structural Engineering. The graduation requirements for the program are as follows; Student should earn a minimum of

71 credits from CGPA courses and Table 1.1 shows the credit required for graduation from the each of the curriculum component

Table: 1.1.3State the components of the curriculum

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Program Core	35.21	35	25
Program Electives	25.35	24	15
Open Electives	4.22		3
Mini Projects	2.81	3	2
Internships/Seminars	-		
Major Project	36.61	20	26
Any other (Specify)	-		-
Total number of Credits			71

Table 1.2 Comparison of the curriculum structure with NIT, Trichy

S.No	Course component	KARE (Out of 71 Credits)		NIT, Trichy (Out of 64 Credits)	
	Coursework / 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	25	35.21	19	29.68
2.	Program Electives	15	25.35	18	28.12
3.	Open Electives	3	4.22	3	4.68
4.	Mini Project	2	2.81	0	0
5.	Major Project	26	36.61	24	37.5
6.	Audit courses	0	-	-	-
		71	100	64	100

1.1.2. Overall quality and level of program curriculum (10)

The framed Structural Engineering Curriculum maintains a good balance in the composition of professional courses and the distribution in offering core and elective courses which makes the graduates tailor made 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.

Structural Engineering curriculum also provides space to select open elective courses based on the interest of the students to understand the importance of other domain courses and for applying their safety domain knowledge to solve their real time problems. This also improve interdisciplinary skills. Since, students from various engineering discipline are pursuing Structural Engineering program may require specific elective course to strengthen their knowledge in their domain and to apply the learned knowledge in different perceptive.Industrial experts are invited to take specific topic on particular courses, based on the course content, the quality of the syllabus and curriculum also refined with minor changes during the Board of Studies meeting.

PEO 1: Graduates will be able to provide solutions in the field of structural engineering by adopting latest techniques

Structural Engineering curriculum mainly focuses on providing the strong fundamental concepts which highly supports the career professional growth. Following are the courses which align with this PEO 1

Course Code	Course Title
CIV18R5101	Advanced Concrete Technology
CIV18R5102	Structural Dynamics
CIV18R5182	Advanced Structural Engineering Laboratory
CIV18R5104	Advanced Steel Structures
CIV18R5105	Advanced Concrete Design
CIV18R5106	Matrix Method of Structural Analysis
CIV18R6198	Project Work – Phase I

CIV18R6199	Project Work – Phase II

PEO 2: Graduates will be able to contribute towards researching new knowledge in the field of structural engineering.

Curriculum supports the lifelong learning practices and builds the scope for enhancing the knowledge on every specialization. Following are the courses which align with this objective PEO 2

Course Code	Course Title
CIV18R5101	Advanced Concrete Technology
CIV18R5102	Structural Dynamics
CIV18R5104	Advanced Steel Structures
CIV18R5105	Advanced Concrete Design
PGM18R5001	Research Methodology for Engineers
CIV18R6198	Project Work – Phase I
CIV18R6199	Project Work – Phase II

PEO 3: Graduates will contribute towards societal development as design consultant or university professor or entrepreneur

SE curricula mainly focus on inculcating the problem-solving issues.

Course Code	Course Title
CIV18R5101	Advanced Concrete Technology
CIV18R5102	Structural Dynamics
CIV18R5104	Advanced Steel Structures
CIV18R5105	Advanced Concrete Design

1.2. Teaching-Learning Processes(90)

1.2.1. Quality of end semester examination, internal semester question papers, assignments and evaluation (20)

To Check 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 isverified and approved by the module coordinator and program coordinator for further processing by COE office. The following items are ensured,

(A) Coverage of syllabus as per the courseplan

(B) Complexity as recommended by Blooms taxonomy

(C) Implementation of case study-based questions which includes,

a. Situation based questions and its analytical ability
b. Incident investigation kind of questions
c. Field visits are related with courses and accordingly questions are framed
d. Extension activity-based questions
e. 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 suggested to take necessary action. This is the process of ensuring 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	100% free from technical error and > 80% free from grammatical	100% free from technical error and 80% free from grammatical	Less than 100% free from technical error and <80% free from grammatical

			error	error	error	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

(D) Office of the Controller of Examination (CoE) verifies the quality of the end semester question paper in terms of CO mapping and also an external audit done inviting experts from leading institutions to ascertain the level of questionpaper. After the completion of approval process the final question paper printing done by the office of COE

Evaluation:

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

The end semester evaluation done by inviting external faculty having expertise in the same domain. The external evaluators are expected to evaluate the answer sheets based on the rubric provided by the course teacher within a stipulated period of time.

Assignments are also evaluated directly by the course teacher based on the rubrics developed and the same 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. An internal expert committee is formed by the course teacher for such evaluations

and a rubric has to be provided to the experts for assessment of the students for events such as technical seminar, case studies etc.

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

Process to ensure questions from outcomes/learning levels perspective

(A) Students learning and thinking levels are increased by asking questions from various competitive examinations.

(B) The Internal / External Questions papers are audited by External Experts from reputed institutions conducted by Controller of Examinations Office.

(C) In department level the senior level faculty member will audit the standard of the questions and post auditing is done by IQAC officers of the department level.

1.2.2. Quality of student projects (30)

The students do the main project work in a semester, either inside the campus or in the industry/research institution, according to their preference. The initial phase of the project work is to perform literature survey material /data collection on the particular specialization of study. It includes literature collection, preliminary data study and collection of materials/resources needed for the project. The second phase involves developing the design/model or conducting experiments according to the requirements/methodology. The final phase is the detailed study in which they conclude the final test results in line with the mix design /model/experiment conducted and analyzes the economic parameters. Finally, the students are supposed to write a brief project report of design/ experimental process and the test results including the experimental data and analysis/design details. The design/experiment related project work is finally converted into conference/ journal article or motivated for patent application.

Initiatives

- Students are provided with brief idea of various fields for selecting the project ideas given by project coordinator. (Referring journals, Ph.D Works, Future Scope of the existing projects).
- Each student is assigned a Mini project during Second semester and a Major project Phase I and Phase II given in the third and Fourth Semester. Also, the students are encouraged to do the mini project in laboratory (Lab with mini projects).
- The students have the freedom to select internal or external projects of their choice in consultation with teachers.
- The faculty encourage the students to carry out in- house projects and support is provided with all necessary resources.
- The students have to do the external projects in the reputed construction industries and research institution based on their interest.
- Based on their findings in the project they are encouraged publish their technical papers in National/International conferences and journals.
- The faculty members encourage students to participate in project exhibitions. The project exhibition was aimed to provide common platform to exhibit their innovations and their

work towards excellence in latest technology.

- The faculty members encourage students to avail the external funding schemes for their project work. (like TNSCST, KLU project funding scheme)

The following committee members are responsible for making the regulations for evaluation and for complete the evaluation process

- HOD/Program coordinator
- Project Coordinator
- Respective Guides and review committee members

A. Identification of projects and allocation methodology to Faculty Members.

- Projects are identified to relevant context. The need for the project and the end users of the project are verified for the current context.
- The problem definition with their requirements and constraints are verified.
- The knowledge, methodology, skill set and interest of the students to implement the project are considered to undertake the projects.
- Faculty members of various specializations are allocated as guides to guide the student's project based on their interest.
- Faculty Profile should match with the domain of the student's project.
- Students are also given choice to choose their guide that matches their project domain.

Implementation

The project coordinator is appointed by the Head of the department/Programme coordinator who is responsible for planning, scheduling and execution of all the activities related to the student project work. Schedule for conducting the project review for UG students in given the Table 1.2.2

Period	Task	Particulars

1 st Week	Zeroth review	Students registered themselves with the project coordinator of the department. Project identification and finalized title is presented in the zeroth review. With respect to the areas of interest of each guide, the Student is allocated to a guide.
4 th Week	First review	Students are instructed to submit the literature review and basic tests/basic data collected in consultation with their respective guide.
6 th Week	Second review	Students are instructed to submit Design /Experimental results document of the project and give a PowerPoint presentation for the Project. (Evaluation done by a team of faculty)
10th Week	Third review	Students are instructed to submit complete project report with university compliances and give a PPT for the project. (Evaluation done by a team of faculty)

Project Evaluation Components

Assessing Factors	Rubrics for Assessing Program Outcomes		
	Low	**Medium**	**High**
Engineering knowledge	Doesn't understand how the principles in maths, physics and chemistry are relevant for civil engineering	Understands and remembers the basic science courses and their relevance in civil engineering with some help	Has good comprehension of principles in basic sciences and its relevance in civil engineering without help
	Doesn't understand the basic principles of Engg Mech, solid mechanics and fluid mechanics clearly	Can solve problems in Engg Mech solid and fluid mechanics but cannot see its relevance to the higher related courses in civil engineering	Can relate basic principles and its connection to higher semester courses like analysis and design
Problem analysis	Ability to apply simple formulas which are discussed in the class	Can comprehend and apply one or more formulae as needed for a given problem	Can easily solve analysis and descriptive questions from GATE exam etc.
	The procedures and answers are incorrect almost always	The answers are sometimes wrong but procedures are always correct	Procedures and answers are both correct almost always
	No attempt at checking the obviously incorrect solution	Makes an attempt to check obviously incorrect solution	When possible even checks the correct answers by alternative ways
	Doesn't know related IS codes	Knows the IS codes recommendation, but sometimes may not understand its relevance in design	Has clear comprehension of IS codes and its relevance in design
Design/development of solutions	Has no understanding of how previous knowledge and new information relate	Understands the connection between previous and new information with assistance	Can relate previous knowledge and new information without any assistance
	Doesn't understand design problem and usually designs are incomplete	Understands design principles clearly	Can take into account economy, safety, environmental and other relative constraints while

			developing solution / design
	Needs significant amount of help when new design problems are given	Doesn't require the help of instructor when new design problems are given	Can design based on both working stress and limit state method and where possible alternative design methodologies
	Has no understanding of how previous knowledge and new information relate	Understands the connection between previous and new information with assistance	Can relate previous knowledge and new information without any assistance
Conduct investigations of complex problems	Doesn't understand experimental procedure. Depends only upon lab technician assistance	Understands experimental procedure given in lab manual but can't relate clearly if some change in detail are given in text books	Understands the experimental and experimental procedure clearly and can define procedure by oneself if required to carry out experiment.
	Doesn't make an attempt to relate data to theory	When directed, applies theory to data but makes mistakes in unit conversions	Analyze and interprets data carefully using appropriate theory
	Is unaware of measurement error	Is aware of measurement errors but accounts for it occasionally, particularity when directed.	Is aware of measurement error and is able to account for it appropriately
	No systematic plan of data gathering. Disorganized way to collect experimental data	Has systematic experimental plan of data gathering but can't comprehend all parameters that may be involved	Can gather data appropriately to conduct experiments beyond that recommended in syllabus
	Doesn't know how to present experimental finding through appropriate graphs / tables	Can present results through tables and graphs but not good in interpreting data without help	Can present results appropriately through graphs / tables and interpret them as well
	Doesn't know how to write good lab record	Can write a reasonable good lab record with assistance	Can write a good technical lab record

	Doesn't operate equipment / process	Operates equipment / process with necessary supervision	Is able to operate equipment / process
Modern tool usage	Is not aware of names of recent tools / techniques in the course	Knows the design tools and has taken some training in that	Has training in design tools and also applies in practical problems
The engineer and society	Is not sure why he is studying engineering	Has interest in civil engineering because of the nature of the field	He has deeper appreciation of importance of civil engineering in world
	Has no clue about issues and events in the world	Has some knowledge of current events	Has knowledge of current events in civil engineering in particular and in society, in general
	Doesn't show any interest in professional / technical societies	Occasionally participate in the activities of local professional / technical societies	Participates and takes responsibility societies available to student
	Hopes that somehow job will fall into his lap	Has narrow perspective on current job market	Has good perspective on current job market
Environment and sustainability	Doesn't understand the environmental and ecosystem around us	Understands the environment and ecosystem to a good degree	Has developed some concern for environmental issues bothering the humanity today
	Has no clue about issues and events in the world	Has some knowledge of current events	Has knowledge of current events in civil engineering in particular and in society, in general
Ethics	Not aware of any codes of ethical behavior or has been caught cheating / plagiarizing	Is aware of atleast dept / university / exam system code of ethics and tries to abide by it	Is aware of professional ethics code given by global bodies like ASCE
	Is frequently absent from	Only sometimes exhibits	Is punctual, professional and

	class and is not generally cordial to fellow students / staff	unprofessional behavior and in sometimes absent without reason	cordial
	Uses only personal value system to support actions	Uses personal value system but confuses between that professional ethics	Balances personal value system with professional ethical code
	Is unable to recognize own shortcomings	Sometimes recognize and rectifies	Learns from mistakes and practices continuous improvement
Individual and team work	Doesn't contribute to team work at all	Prepares somewhat but ideas not clear	Fully prepared for meeting and cooperate
	Doesn't value team work, doesn't consider idea of others and discourteous to others	Occasionally works as loner; tries to convince others to accept his idea, not always courteous to others	Cooperates and shares credit with others, encourages participation of others, even disagreement done gently
Communication	Little or no structure or organization through sub headings etc.	Substantial portion of presentation is well organized	Well organized materials / presentation in a logical sequence
	Key points not emphasized / repeated reading required to understand points	Articulates ideas but writing / presenting disputed	Articulates ideas clearly and concisely
	Presentation is either too short or very lengthy	Presentation is proper in time but lacking in substance / content	Presentation is complete in time and constant
	Doesn't listen carefully to question before answering or unable to give answers.	Only occasionally misunderstands question	Listen carefully and responds to question appropriately
	Mechanical aspects of presentation has major difficulty	Minor difficulties with mechanical aspect	Presents well mechanically
	Work not presented neatly	Work presented with	Work presented neatly,

		considerable neatness but appropriate for the intended audience	professionally and also appropriate to audience
	No figure / graphs used at all or when used reference not made	Figure / graphs are used but sometimes improper labeling / marking of axes etc	Figure / graphs in proper format
	Considerable grammar / spelling mistakes	Very few spelling / grammar mistakes	No grammar and spelling mistakes
Project management and finance	Has no or prior understanding of management principles	Has some understanding of management principles	Has good understanding of management principles and applies in life and situations
	Doesn't show leadership qualities	Occasionally demonstrate leadership quality, when encouraged	Shows initiative to offer leadership.
Life-long learning	Is not familiar with any technical periodicals	Knows about technical periodicals but refers occasionally	Is aware of technical periodicals refers to it regularly for understanding global and societal impact of engineering
	Requires too much spoon feeding to complete a task (detailed step-by-step wise)	Requires guidance and completes what is asked	Goes beyond what is need in completing assignment / task and bring new information
	Assumes all learning takes place within class room	Doesn't always take responsibility for own learning	Takes responsibility for creating one's own learning opportunities

B. Types and relevance of the projects and their contribution towards attainment of PO's.

- Academic projects are mapped with POs and PSOs.
- Each project is evaluated with internal marks and is graded according to their project quality and with their contribution towards attainment of PO's.

C. Process for monitoring and evaluation.

- Project students should meet their respective guide daily and explain their progress in their project on daily basis.
- They should submit project progress report during review and to get approved by the respective guide.
- The project guide/reviewers evaluates the report submitted by the students and help them to go further in project work.
- Project guide assesses each student in team and make them work in right way.

D. Quality of completed projects/working prototypes

- Final project demo for the working prototype and the report are evaluated by a team of their respective guide, a Professor Cadre faculty, an Associate professor and an Assistant professor.
- The projects are evaluated and are awarded internal assessment marks for maximum 100 and are graded according to the project contribution towards attainment of PO's and PSO's.

E. Evidences of papers published /Awards Received by project

Students are mandated to publish papers in peer reviewed conferences/ journals.

1. Anandh Babu Malayali, Ramesh Babu Chokkalingam and M. Vinay Singh., "Experimental Study on the Compressive Strength and Permeable Properties of GGBS Based Geopolymer Pervious Concrete", IOP Conference Series: Materials Science and Engineering, Volume 561, 2019 **(Scopus).**
2. Premkumar, R., Chokkalingam, R.B., Shanmugasundaram, M., Ragasree, A. "Study on mechanical properties of alkali activated binary blended binder containing steatite powder and fly ash / GGBS", IOP Conference Series: Materials Science and

Engineering, 2020, 872(1), 012153 **(Scopus).**

3. Malayali, A.B., Chokkalingam, R.B., Hari Krishnan, T., Nagaselvam, P. "Effect of molar content on GGBS based geopolymer pervious concrete", IOP Conference Series: Materials Science and Engineering, 2020, 872(1), 012146 **(Scopus).**
4. Lavanya, B., Kuriya, P.D., Suganesh, S., Indrajith, R., Chokkalingam, R.B. "Properties of geopolymer bricks made with fly ash and GGBS", IOP Conference Series: Materials Science and Engineering, 2020, 872(1), 012141 **(Scopus).**

1.2.3. Initiatives related to industry interaction including industry internship/summer training (10)

Initiatives

- ✓ Faculty members are having regular touch with Industry Experts.
- ✓ Arranging In-plant training in Summer/Winter Vacation in Construction industry through placement cell.
- ✓ Arranging project work in construction industries.
- ✓ Inviting industry personnel for delivering guest lectures, seminars and key note address in various events organized by the department.

Implementation

Many invited lectures, and workshop from industry resource persons have been arranged.

1.2.4. Participation of Industry professionals in curriculum development, as examiners, in major projects(10)

- Industry expert is a member of the Board of Studies who actively involves in the process of curriculum design.
- During the expert's visits to our campus, the feedback about the program curriculum is obtained and the same is incorporated later in the curriculum design
- In addition, the suggestions from the industry experts present in the alumni advisory board is considered for the curriculum design.

- Industry people present in the industrial advisory board is also taking part in the program and curriculum design. The following are the details of industrial advisory board.

The Board of Studies (BoS) in Civil Engineering is primarily the body which is empowered to design the curriculum with the help of industrial expert. In this regard, at least one BoS member from industry has been selected to develop/refine the curriculum in Civil Engineering. Various Industrial personnel who are involved in Board of studies for the design of curriculum were given in table 1.2.3.

Table 1.2.3: Industry Advisory Board Members

Sl. No.	Name of the Industry Advisor Member
1	Er. P. Kandavel Raja Zonal Head, Mantri Developers Pvt. Ltd., Bangalore
2	Dr. R. Manikandan, Head, Technical Support Services, ACC Cements Pvt. Ltd., Bangalore
3	Er. R. Baskaran, Executive Engineer, Public Works Department (Buildings Division), Virudhunagar.
4	Er. R. Sudheesh, Senior Project Manager Gammon India ltd

1.2.5. Quality of laboratory work given(20)

Lab manual content is prepared by the laboratory course in charge which is adequate in terms of basic principle and procedure used. Students are asked to perform the experiments individually based on laboratory manual with the guidance of course faculty.

- Before doing experiment, the students are expected to answer the viva voce question related to experiment and allowed to do the experiment.
- To easily understand the laboratory experiments virtual lab concepts are adopted before doing the experiments for all the laboratories.
- After completing the experiment, the observation, calculation and results have been verified by the laboratory course in charge.

- Constructive suggestions are given to students based on the experimental result.
- Flipped classroom concept is adopted for laboratory course.
- Students are encouraged to do Project based learning from that particular laboratory exercises (Laboratory course with Project). In concern with laboratory course, seminar, and workshops, lectures are conducted with industrial expert.
- Relevant PO assessments for practical are properly assessed by rubrics.

Continuous assessment in the laboratory

The assessments made in the laboratory course are continuous. The marks are assigned to each experiment based on the following rubrics through testing the students' knowledge by asking questions etc.

1. Internal examination 50% and external examination 50% are conducted for each laboratory course and evaluated.
2. Internal and External assessment weightages are given below

   Practical Observation book - 10%

   Experiments – 15%

   Model Practical - 25%

   External Assessment - 50%
3. All the activities are under control and monitored by the laboratory course teacher

CRITERION 2	Program Outcomes and Course Outcomes	75

2.1. Establish the connect between the courses and POs(15)

POs as defined in Annexure-I

PO	Courses*
PO1	Advanced Concrete Technology, Advanced Steel Structures, Advanced Concrete Design
PO2	Research Methodology for Engineers, Project work Phase I and II
PO3	Advanced Concrete Technology, Advanced Structural Engineering Laboratory, Advanced Steel Structures, Advanced Concrete Design, Structural Dynamics

Table: 2.1.1

*Mention the courses relevant to the PO

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

Program Core Courses mapping with PO's

Year	Semester	Course Code	Course Name	PO1	PO2	PO3
I	I	MAT18R5001	Applied Mathematics	L		H
		CIV18R5101	Advanced Concrete Technology	H	M	M
		CIV18R5102	Structural Dynamics	M		M
		CIV18RXXX	Programme Elective 1			
		CIV18RXXX	Programme Elective 2			
		CIV18R5182	Advanced Structural Engineering Laboratory	H	H	H
	II	CIV18R5104	Advanced Steel Structures	M	M	M
		CIV18R5105	Advanced Concrete Design	H	M	M
		CIV18R5106	Matrix Method Of Structural Analysis	M		M
		PGM18R5001	Research Methodology For Engineers	M	M	L
		CIV18RXXX	Programme Elective 3			
		CIV18RXXX	Programme Elective 4			
		XXX18RXXX	Interdisciplinary Elective 1			
		CIV18R5183	Computer Aided Analysis And Design Laboratory	M	H	M
		CIV18R5198	Mini Project	M	H	M

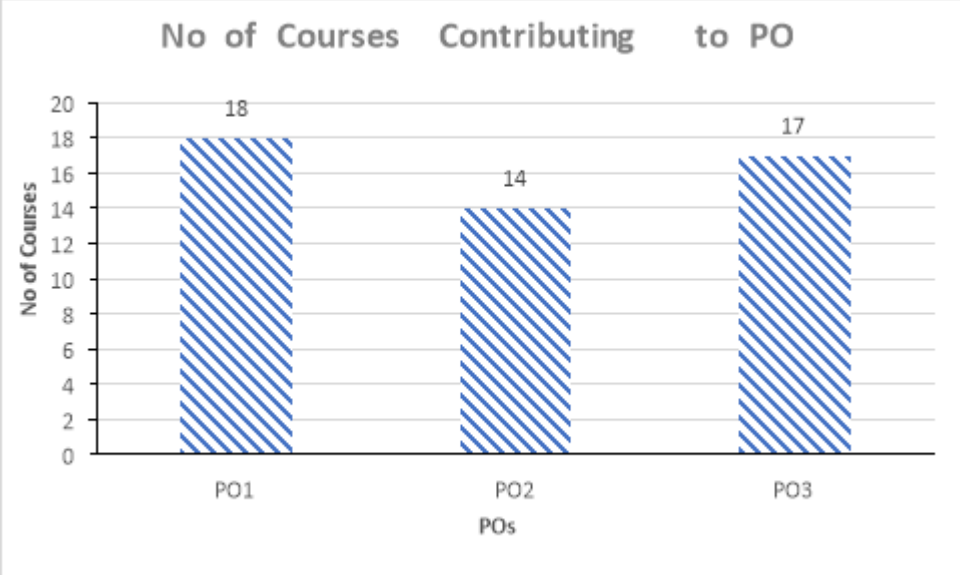
II	III	CIV18RXXX	Programme Elective 5			
		CIV18R6198	Project Work – Phase I	M	H	M
	IV	CIV18R6199	Project Work – Phase II	M	H	M

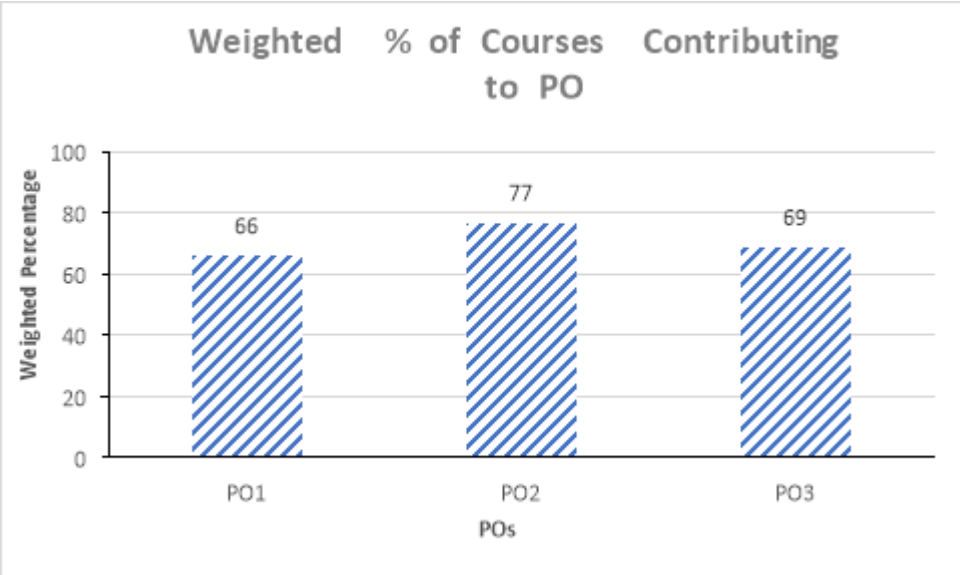
Program Electives Courses mapping with PO's

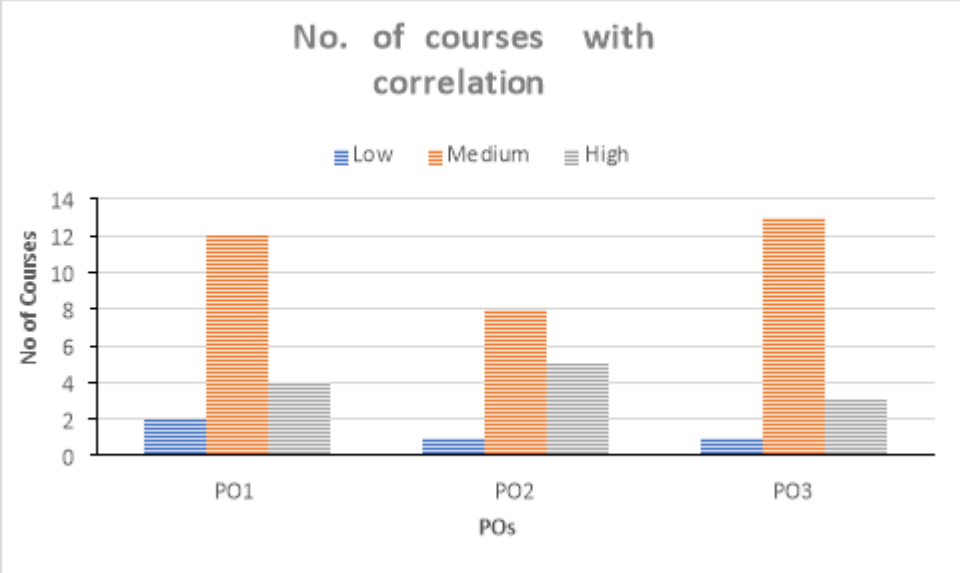
Course Code	Course Name	PO1	PO2	PO3
CIV18R5107	Computer Aided Design	H	H	M
CIV18R5108	Design of Bridges	M	L	L
CIV18R5109	Design of Shell And Spatial Structures	M	L	M
CIV18R5110	Design of Steel Concrete Composite Structures	M	L	M
CIV18R5111	Design of Tall Buildings	M	L	M
CIV18R5112	Nonlinear Analysis of Structures	L	L	L
CIV18R5113	Offshore Structures	M	L	L
CIV18R5114	Industrial Structures	H	L	M
CIV18R5115	Advanced Prefabricated Structures	M	-	M
CIV18R6101	Advanced Prestressed Concrete	H	L	M
CIV18R6102	Wind and Cyclone Effects On Structures	M	L	M
CIV18R6103	Theory of Plates And Shells	M	L	L
CIV18R6104	Repair and Rehabilitation of Structures	M	L	L
CIV18R6105	Experimental Stress Analysis	M	L	L
CIV18R6106	Finite Element Methods	M	-	L
CIV18R6107	Characterization of Construction Materials	M	H	M
CIV18R6108	Sustainable Building Materials	M	M	M
CIV18R5103	Theory of Elasticity And Plasticity	M	L	L
CIV18R5116	Health, Safety And Environmental Management (HSE) Practices	L	M	L
CIV18R5117	Design of Boiler Structures	L	-	L
CIV18R5118	Random Vibrations And Structural Reliability	L	-	L
CIV18R5119	Structures In Disaster Prone Areas	M	M	M

Course Code	PO1	PO2	PO3
MAT18R5009	1		3
CIV18R5101	3	2	2
CIV18R5102	3		2
CIV18R5108	2	2	2
CIV18R5110	2	2	2
CIV18R5181	2	3	3
CIV18R5104	3	1	2
CIV18R5105	1		2
CIV18R5106	2		2
PGM18R5001	2	3	

CIV18R5114	2	2	2
CIV18R6104	2	2	2
CIV18R5018	2	2	2
CIV18R5183	2	2	2
CIV18R5199	2	3	2
CIV18R6101	2	2	2
CIV18R6198	2	3	2
CIV18R6199	3	3	3
Weighted Average	1.98	2.30	2.06
Low	2	1	1
Medium	12	8	13
High	4	5	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)

Program outcomes are the key indicators which explore the learning experience gained by the students through dynamic teaching learning process. Program Outcomes (PO) attainment is one of the important processes to assess the effective implementation of the outcome based education in M. Tech. Structural Engineering Program. Normally, PO attainment process is carried out using two evaluation methods namely Direct and In-direct methods.

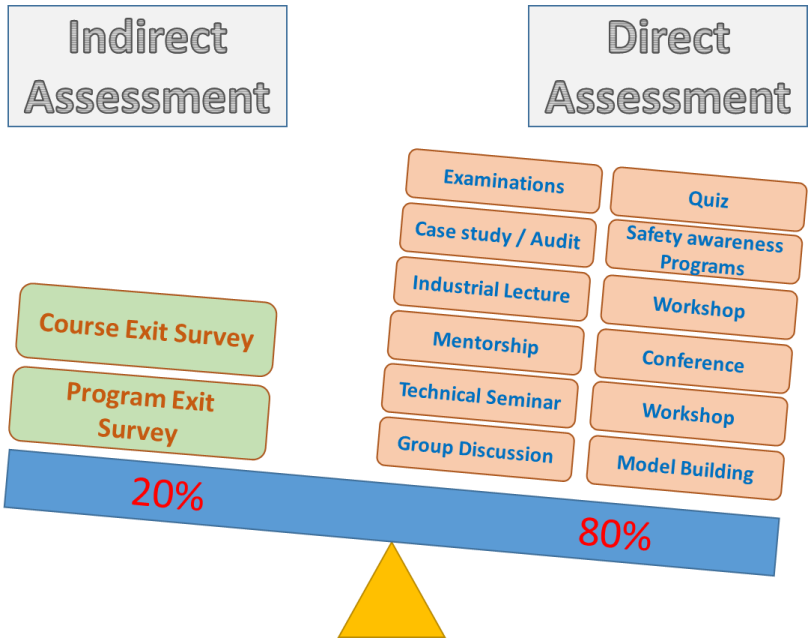


Figure 2.1 Weightage of Direct and Indirect Assessment of POs

The process of data collection from different assessment tools and the analysis of collected data to arrive at PO target levels is explained in detailed with the evidence of sample batch.

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 types 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 Structural 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 5 point 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 program exit survey is another effective indirect assessment technique which is obtained from the students at the end of program. This survey also follows a 5 point rating system, and this directly indicates the technical skill/practical knowledge of the student with respect to the attainment of the student outcomes of M.Tech Structural 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,

Direct Assessment Methodologies

	Description
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 is 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 :50marks Sessional Examination II :50marks
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:50marks
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. Internalmarks: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 : 100marks
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 an 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 or view 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 students 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 report presentation	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

In Direct Assessment Methodologies

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 be designed by the course coordinator.

Program Exit Survey	At the end of the course every student is asked to give report about the courses they have studied with assigned rubrics. The survey is assessed based on rubrics that will be designed by the course coordinator.

Assessment tools used for evaluation (2018-2020Batch)

COURSE CODE	NAME	SE-I	SE-II	ASSIGNMENT	END SEM	QUIZ	PAPER PRESENTATION	SEMINAR / WORKSHOP	FIELD REPORT
MAT18R5001	Applied Mathematics	✓	✓	✓	✓	✓			
CIV18R5101	Advanced Concrete Technology	✓	✓	✓	✓		✓	✓	✓
CIV18R5102	Structural Dynamics	✓	✓	✓	✓	✓	✓		
CIV18R5110	Design of Steel Concrete Composite Structures	✓	✓	✓	✓	✓	✓		
CIV18R5111	Design of Tall Buildings	✓	✓	✓	✓	✓	✓	✓	
CIV18R5182	Advanced Structural Engineering Laboratory				✓	✓			
CIV18R5104	Advanced Steel Structures	✓	✓	✓	✓	✓	✓	✓	
CIV18R5105	Advanced Concrete Design	✓	✓	✓	✓	✓		✓	✓
CIV18R5106	Matrix Method Of Structural Analysis	✓	✓	✓	✓		✓		
PGM18R5001	Research Methodology For Engineers	✓	✓	✓	✓		✓		✓
CIV18R5114	Industrial Structures	✓	✓	✓	✓	✓	✓		

CIV18R6104	Repair and Rehabilitation of Structures	✓	✓	✓	✓		✓		✓
CIV18R5116	Health, Safety And Environmental Management (HSE) Practices	✓	✓	✓	✓		✓	✓	
CIV18R5183	Computer Aided Analysis And Design Laboratory				✓	✓		✓	
CIV18R5198	Mini Project				✓		✓		
CIV18R6101	Advanced Prestressed Concrete	✓	✓	✓	✓		✓		
CIV18R6198	Project Work – Phase I				✓	✓	✓		
CIV18R6199	Project Work – Phase II				✓	✓	✓		

Assessment tools used for evaluation (2019-2021Batch)

COURSE CODE	NAME	SE-I	SE-II	ASSIGNMENT	END SEM	QUIZ	PAPER PRESENTATION	SEMINAR / WORKSHOP	FIELD REPORT	CASE STUDY	MODEL MAKING	RESEARCH BASED ARTICLE
MAT18R5001	Applied Mathematics	✓	✓	✓	✓	✓						
CIV18R5101	Advanced Concrete Technology	✓	✓	✓	✓		✓	✓	✓			✓
CIV18R5102	Structural Dynamics	✓	✓	✓	✓	✓	✓	✓				
CIV18R5110	Design of Steel Concrete Composite Structures	✓	✓	✓	✓	✓	✓					
CIV18R5111	Design of Tall Buildings	✓	✓	✓	✓	✓	✓	✓				✓
CIV18R5182	Advanced Structural Engineering Laboratory				✓	✓						✓
CIV18R5104	Advanced Steel Structures	✓	✓	✓	✓	✓	✓	✓		✓		
CIV18R5105	Advanced Concrete Design	✓	✓	✓	✓	✓		✓	✓		✓	
CIV18R5106	Matrix Method Of Structural Analysis	✓	✓	✓	✓		✓					
PGM18R5001	Research Methodology For Engineers	✓	✓	✓	✓		✓	✓	✓			✓
CIV18R5114	Industrial Structures	✓	✓	✓	✓	✓	✓				✓	
CIV18R6104	Repair and Rehabilitation of Structures	✓	✓	✓	✓		✓		✓	✓		

CIV18R5116	Health, Safety And Environmental Management (HSE) Practices	✓	✓	✓	✓		✓	✓	✓			
CIV18R5183	Computer Aided Analysis And Design Laboratory				✓	✓		✓				
CIV18R5198	Mini Project				✓		✓					✓
CIV18R6101	Advanced Prestressed Concrete	✓	✓	✓	✓		✓	✓		✓		
CIV18R6198	Project Work – Phase I				✓	✓	✓					✓
CIV18R6199	Project Work – Phase II				✓	✓	✓					✓

Assessment tools used for evaluation (2020-2022Batch)

COURSE CODE	NAME	SE-I	SE-II	ASSIGN MENT	END SEM	QUIZ	PROJECT TEAM WORK	PAPER PRESENT ATION	SEMINAR / WORKSHOP	FIELD REPORT	CASE STUDY	RESEARCH BASED ARTICLE
MAT18R5001	Applied Mathematics	✓	✓	✓	✓	✓						
CIV18R5101	Advanced Concrete Technology	✓	✓	✓	✓		✓	✓	✓	✓		✓
CIV18R5102	Structural Dynamics	✓	✓	✓	✓	✓		✓	✓			
CIV18R5110	Design of Steel Concrete Composite Structures	✓	✓	✓	✓	✓		✓				
CIV18R6104	Repair and Rehabilitation of Structures	✓	✓	✓	✓		✓	✓		✓	✓	
CIV18R5182	Advanced Structural Engineering Laboratory				✓	✓	✓					✓

CIV18R5104	Advanced Steel Structures	✓	✓	✓	✓	✓		✓	✓		✓	
CIV18R5105	Advanced Concrete Design	✓	✓	✓	✓	✓	✓		✓	✓		
CIV18R5106	Matrix Method Of Structural Analysis	✓	✓	✓	✓			✓				
CIV18R5111	Design of Tall Buildings	✓	✓	✓	✓	✓		✓	✓			✓
CIV18R5114	Industrial Structures	✓	✓	✓	✓	✓		✓				
CIV18R5183	Computer Aided Analysis And Design Laboratory				✓	✓	✓		✓			
CIV18R5198	Mini Project				✓			✓				✓
CIV18R6003	Water Resource Systems Engineering	✓	✓	✓	✓			✓	✓	✓		
PGM18R5001	Research Methodology For Engineers	✓	✓	✓	✓			✓	✓	✓		✓
CIV18R6101	Advanced Prestressed Concrete	✓	✓	✓	✓			✓	✓		✓	
CIV18R6198	Project Work – Phase I				✓	✓		✓				✓
CIV18R6199	Project Work – Phase II				✓	✓		✓				✓

2.2.1. PO'SATTAINMENTLEVELSWITHOBSERVATIONS(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 based on 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, Fieldwork, 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

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

STEP 1. Setting Benchmark score for the course to measure the attainment level. The benchmark score is fixed by considering the previous end semester mark average at the beginning 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.CalculatingpercentageofattainmentfortheparticularCOofthecourse

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

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

Percentage of Attainment	Level
Lessthan59.9%	0
60– 69.9%	1
70– 79.9%	2
Greaterthan80%	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 STEP5

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

2.2.1. POs attainment levels with observations (40)

Course Articulation Matrix

Course Code	CO	PO1	PO2	PO3
MAT18R5009	CO1	1		2
	CO2	1		3
	CO3	1		3
	CO4	1		2
	CO5	1		3
		1		2.6
CIV18R5101	CO1		2	1
	CO2	3	2	1
	CO3	3	2	2
	CO4		3	2
	CO5			1
		3	2.25	1.4
CIV18R5102	CO1			2
	CO2	3		2
	CO3	3		2
	CO4			2
	CO5	3		2
		3		2
CIV18R5108	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2
	CO5	3	2	2
		1.7	2	2
CIV18R5110	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2
	CO5	3	2	2
		1.7	2	2
CIV18R5181	CO1	1	3	1
	CO2	2	3	3

	CO3	2	3	3
	CO4	2	3	3
	CO5	2	3	3
		1.8	3	2.6
CIV18R5104	CO1		2	1
	CO2	3		1
	CO3	3	1	1
	CO4		1	2
	CO5			3
		3	1.3	1.6
CIV18R5105	CO1			1
	CO2	1		3
	CO3	1		3
	CO4	1		2
	CO5			2
		1		2.2
CIV18R5106	CO1	2		1
	CO2	2		1
	CO3			2
	CO4			3
	CO5			3
		2		2
PGM18R5001	CO1	2	3	
	CO2	2	2	
	CO3	2	3	
	CO4	2	2	
	CO5	2	3	
		2	2.6	
CIV18R5114	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2
	CO5	3	2	2
		1.7	2	2
CIV18R6104	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2
	CO5	3	2	2
		1.7	2	2
CIV18R5018	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2

	CO5	3	2	2
		1.7	2	2
CIV18R5183	CO1		2	1
	CO2		2	1
	CO3		2	2
	CO4	2	2	3
	CO5	2	2	3
		2	2	2
CIV18R5199	CO1	2	3	2
	CO2	2	3	2
	CO3	2	3	2
	CO4	2	3	2
	CO5	2	3	2
		2	3	2
CIV18R6101	CO1	1		2
	CO2			2
	CO3	1		2
	CO4			2
	CO5	3	2	2
		1.7	2	2
CIV18R6198	CO1	2	3	2
	CO2	2	3	2
	CO3	2	3	2
	CO4	2	3	2
	CO5	2	3	2
		2	3	2
CIV18R6199	CO1	3	3	2
	CO2	3	3	2
	CO3	2	3	3
	CO4	3	3	3
	CO5	3	3	3
		2.8	3	2.6

CO PO Attainment

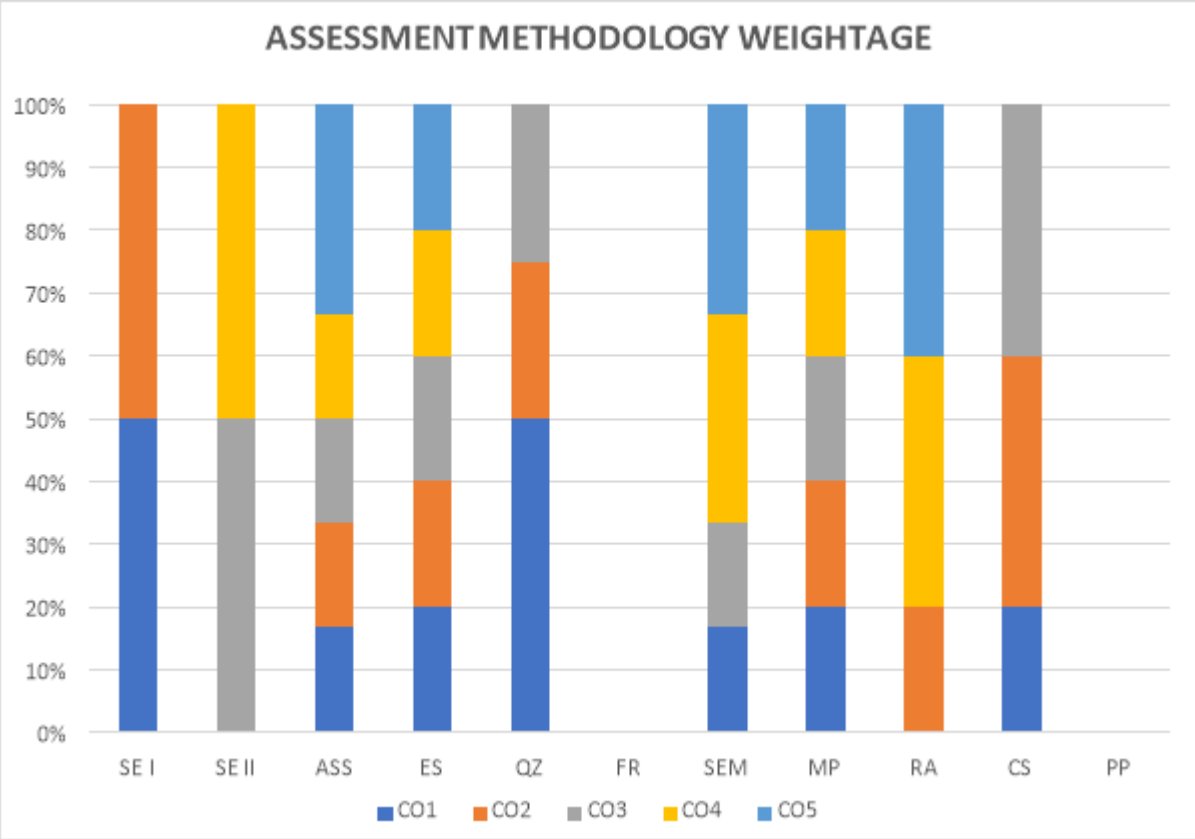
Course Title	Advanced Concrete Technology
Course Code	CIV18R5101
Month/Year of Examination	APR/MAY 2019
Batch	2018

BENCHMARK SCORE:	**70**

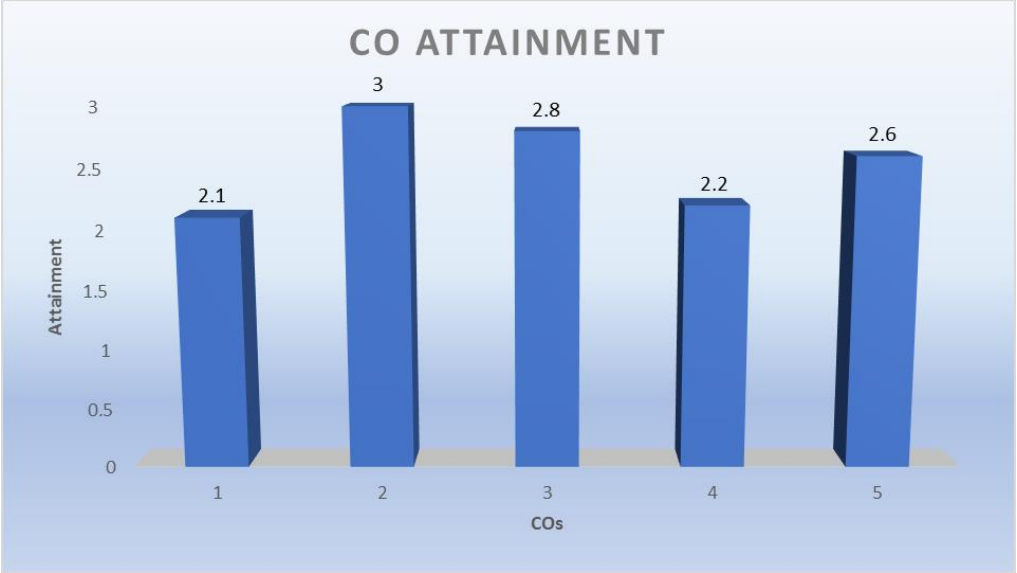
CONSOLIDATION OF THE ATTAINMENT

ASSESSMENT METHODOLOGY WEIGHTAGE

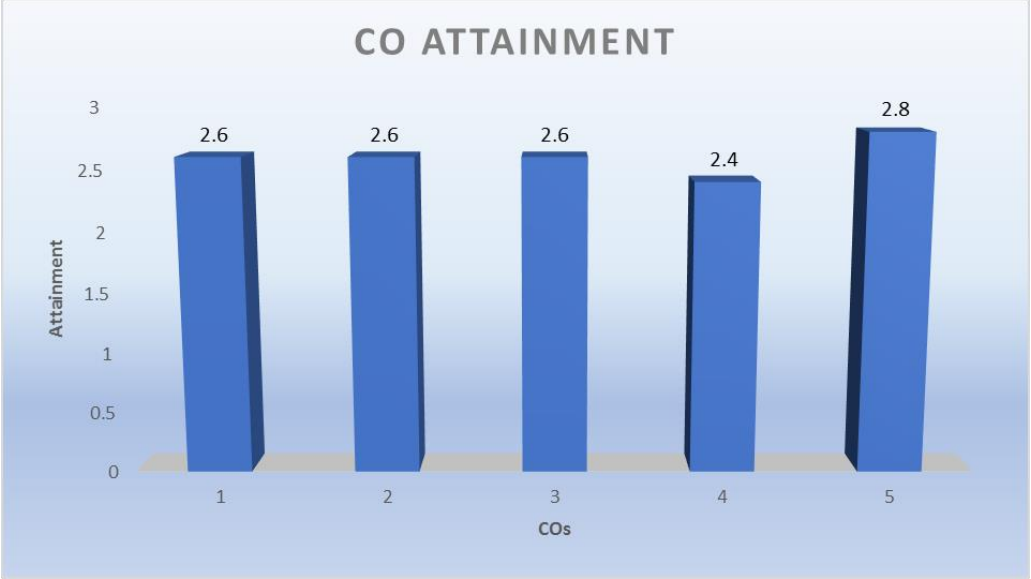
	SE I	SE II	ASS	ES	QZ	FR	SEM	MP	RA	CS	PP	TOT
CO1	10	0	10	20	20	0	10	20	0	10	0	100
CO2	10	0	10	20	10	0	0	20	10	20	0	100
CO3	0	10	10	20	10	0	10	20	0	20	0	100
CO4	0	10	10	20	0	0	20	20	20	0	0	100
CO5	0	0	20	20	0	0	20	20	20	0	0	100



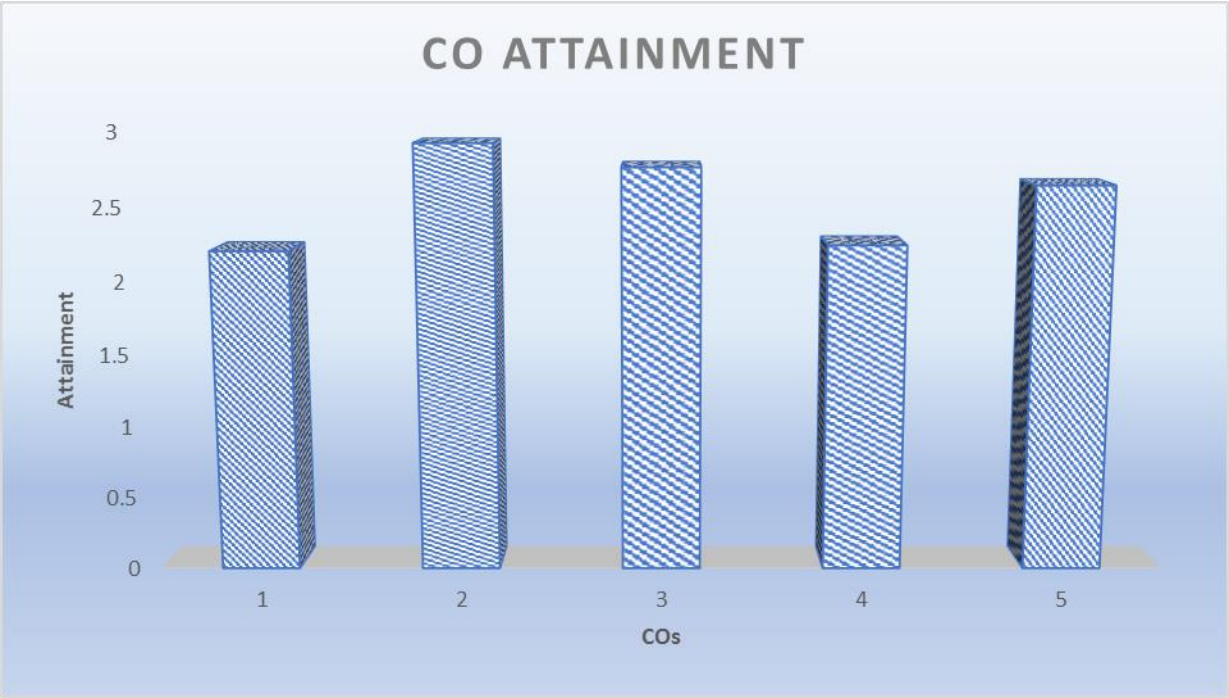
Direct Attainment



Indirect Attainment



Overall Attainment



		SE-I						SE II						ASSIGNMENT												END SEMESTER										
	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
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
1	9918138001	17	N	15.5	Y	32.5	65	21	Y	14	Y	35	70	8.5	Y	8.5	Y	8.5	Y	8.5	Y	8.5	Y	42.5	85	13	N	14	Y	15	Y	13	N	19	Y	74
2	9918138002	20	N	17.5	Y	37.5	75	23	Y	16	Y	39	78	9	Y	9	Y	9	Y	9	Y	9	Y	45	90	14	Y	15	Y	16	Y	14	Y	21	Y	80
3	9918138003	21	Y	14	Y	35	70	19	N	15	Y	34	68	8.5	Y	8.5	Y	8.5	Y	8.5	Y	8.5	Y	42.5	85	15	Y	15	Y	14	Y	15	Y	17	Y	76
4	9918138004	19	N	18	Y	37	74	22	Y	14	Y	36	72	9	Y	9	Y	9	Y	9	Y	9	Y	45	90	13	N	14	Y	15	Y	13	N	19	Y	74
5	9918138005	24	Y	16	Y	40	80	25	Y	16	Y	41	82	8.5	Y	8.5	Y	8.5	Y	8.5	Y	8.5	Y	42.5	85	16	Y	16	Y	16	Y	16	Y	18	Y	82
		Y	2	Y	5			Y	4	Y	5			Y	5	Y	5	Y	5	Y	5	Y	5			Y	3	Y	5	Y	5	Y	3	Y	5	
		N	3	N	0			N	1	N	0			N	0	N	0	N	0	N	0	N	0			N	2	N	0	N	0	N	2	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	
Appeared			5		5				5		5				5		5		5		5		5				5		5		5		5		5	
CO Attainment			0.40		1.00				0.80		1.00				1.00		1.00		1.00		1.00		1.00				0.60		1.00		1.00		0.60		1.00	
Attainment Level			0		3				3		3				3		3		3		3		3				1		3		3		1		3	

	QUIZ											FIELD REPORT													SEMINAR										
	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
	50		25		25		0		0			0		0		0		0		0			S.No	Reg.No	15		0		15		30		30		
	15	N	7.5	N	7.5	N	0	N	0	N	30	0	N	0	N	0	N	0	N	0	N	0	1	9918138001	12.8	Y	0	N	12.8	Y	25.5	Y	25.5	Y	85
	37.5	Y	18.8	Y	18.8	Y	0	N	0	N	75	0	N	0	N	0	N	0	N	0	N	0	2	9918138002	9.75	N	0	N	9.75	N	19.5	N	19.5	N	65
	38	Y	19	Y	19	Y	0	N	0	N	76	0	N	0	N	0	N	0	N	0	N	0	3	9918138003	9	N	0	N	9	N	18	N	18	N	60
	42	Y	21	Y	21	Y	0	N	0	N	84	0	N	0	N	0	N	0	N	0	N	0	4	9918138004	10.8	Y	0	N	10.8	Y	21.6	Y	21.6	Y	72
	41	Y	20.5	Y	20.5	Y	0	N	0	N	82	0	N	0	N	0	N	0	N	0	N	0	5	9918138005	11.3	Y	0	N	11.3	Y	22.5	Y	22.5	Y	75
	Y	4	Y	4	Y	4	Y	0	Y	0		Y	0	Y	0	Y	0	Y	0	Y	0					Y	3	Y	0	Y	3	Y	3	Y	3	
	N	1	N	1	N	1	N	5	N	5		N	5	N	5	N	5	N	5	N	5					N	2	N	5	N	2	N	2	N	2	
	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	
		5		5		5		5		5			5		5		5		5		5						5		5		5		5		5	
		0.80		0.80		0.80		0.00		0.00			0.00		0.00		0.00		0.00		0.00						0.60		0.00		0.60		0.60		0.60	
		3		3		3		0		0			0		0		0		0		0						1		0		1		1		1	

MINI PROJECT											RESEARCH ARTICLE WRITING											CASE STUDIES											POSTER PRESENTATIONS										
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
20		**20**		**20**		**20**		**20**			**0**		**20**		**0**		**40**		**40**			**20**		**40**		**40**		**0**		**0**			**0**		**0**		**0**		**0**		**0**		
16	Y	16	Y	16	Y	16	Y	16	Y	80	0	N	14	Y	0	N	28	Y	28	Y	70	13.6	N	27.2	N	27.2	N	0	N	0	N	68	0	N	0	N	0	N	0	N	0	N	0
14.8	Y	14.8	Y	14.8	Y	14.8	Y	14.8	Y	74	0	N	15	Y	0	N	30	Y	30	Y	75	15	Y	30	Y	30	Y	0	N	0	N	75	0	N	0	N	0	N	0	N	0	N	0
13.4	N	13.4	N	13.4	N	13.4	N	13.4	N	67	0	N	14	Y	0	N	28	Y	28	Y	70	15	Y	30	Y	30	Y	0	N	0	N	75	0	N	0	N	0	N	0	N	0	N	0
17	Y	17	Y	17	Y	17	Y	17	Y	85	0	N	13	N	0	N	26	N	26	N	65	14	Y	28	Y	28	Y	0	N	0	N	70	0	N	0	N	0	N	0	N	0	N	0
17	Y	17	Y	17	Y	17	Y	17	Y	85	0	N	15	Y	0	N	30	Y	30	Y	75	15	Y	30	Y	30	Y	0	N	0	N	75	0	N	0	N	0	N	0	N	0	N	0
Y	4	**Y**	4	**Y**	4	**Y**	4	**Y**	4		**Y**	0	**Y**	4	**Y**	0	**Y**	4	**Y**	4		**Y**	4	**Y**	4	**Y**	4	**Y**	0	**Y**	0		**Y**	0	**Y**	0	**Y**	0	**Y**	0	**Y**	0	**5**
N	1	**N**	1	**N**	1	**N**	1	**N**	1		**N**	5	**N**	1	**N**	5	**N**	1	**N**	1		**N**	1	**N**	1	**N**	1	**N**	5	**N**	5		**N**	5	**N**	5	**N**	5	**N**	5	**N**	5	**4**
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	**NA**	0	**3**
	5		5		5		5		5			5		5		5		5		5			5		5		5		5		5			5		5		5		5		5	**2**
	0.80		0.80		0.80		0.80		0.80			0.00		0.80		0.00		0.80		0.80			0.80		0.80		0.80		0.00		0.00			0.00		0.00		0.00		0.00		0.00	**1**
	3		3		3		3		3			0		3		0		3		3			3		3		3		0		0			0		0		0		0		0	

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION					
Department of Civil Engineering					
CO ATTAINMENT					
Programe : M.Tech			**Batch : 2018 - 2020**		
Course Code	CO	Attainment Weight	PO1	PO2	PO3
MAT18R5009	CO1	2.63	1		2
	CO2	2.68	1		3
	CO3	2.58	1		3
	CO4	2.60	1		2
	CO5	2.20	1		3
			2.536957		2.525084
CIV18R5101	CO1	2.35		2	1
	CO2	2.43	3	2	1
	CO3	2.42	3	2	2
	CO4	2.51		3	2
	CO5	2.42			1
			2.423077	2.434676	2.434851
CIV18R5102	CO1	2.80			2
	CO2	2.85	3		2
	CO3	2.91	3		2
	CO4	2.96			2
	CO5	2.25	3		2
			2.67033		2.753846
CIV18R5108	CO1	2.52	1		2
	CO2	2.66			2
	CO3	2.88	1		2
	CO4	2.92			2
	CO5	2.48	3	2	2
			2.566667	2.477778	2.691111
CIV18R5110	CO1	2.72	1		2
	CO2	2.77			2
	CO3	2.71	1		2
	CO4	2.76			2
	CO5	2.60	3	2	2

			2.646667	2.6	2.711111
CIV18R5181	CO1	2.73	1	3	1
	CO2	2.80	2	3	3
	CO3	2.68	2	3	3
	CO4	2.80	2	3	3
	CO5	2.73	2	3	3
			2.747354	2.745238	2.748168
CIV18R5104	CO1	2.05		2	1
	CO2	2.18	3		1
	CO3	1.95	3	1	1
	CO4	2.04		1	2
	CO5	1.86			3
			2.064706	2.020588	1.977941
CIV18R5105	CO1	2.49			1
	CO2	2.64	1		3
	CO3	2.72	1		3
	CO4	2.78	1		2
	CO5	2.52			2
			2.709804		2.649198
CIV18R5106	CO1	2.75	2		1
	CO2	2.82	2		1
	CO3	2.65			2
	CO4	2.73			3
	CO5	2.37			3
			2.785714		2.616667
PGM18R5001	CO1	2.75	2	3	
	CO2	2.81	2	2	
	CO3	2.72	2	3	
	CO4	2.82	2	2	
	CO5	2.66	2	3	
			2.752941	2.742986	
CIV18R5114	CO1	2.49	1		2
	CO2	2.56			2
	CO3	2.43	1		2
	CO4	2.54			2
	CO5	2.46	3	2	2

			2.461905	2.464286	2.495238
CIV18R6104	CO1	2.10	1		2
	CO2	2.17			2
	CO3	2.10	1		2
	CO4	2.16			2
	CO5	2.49	3	2	2
			2.337079	2.494382	2.204494
CIV18R5018	CO1	2.01	1		2
	CO2	2.15			2
	CO3	2.27	1		2
	CO4	2.34			2
	CO5	2.47	3	2	2
			2.339326	2.47191	2.247191
CIV18R5183	CO1	2.27		2	1
	CO2	2.20		2	1
	CO3	2.20		2	2
	CO4	2.17	2	2	3
	CO5	2.02	2	2	3
			2.095506	2.173034	2.144944
CIV18R5199	CO1	1.80	2	3	2
	CO2	1.88	2	3	2
	CO3	2.16	2	3	2
	CO4	2.20	2	3	2
	CO5	2.38	2	3	2
			2.083146	2.083146	2.083146
CIV18R6101	CO1	2.64	1		2
	CO2	2.78			2
	CO3	2.73	1		2
	CO4	2.81			2
	CO5	2.90	3	2	2
			2.813483	2.898876	2.770787
CIV18R6198	CO1	2.47	2	3	2
	CO2	2.62	2	3	2
	CO3	2.57	2	3	2
	CO4	2.72	2	3	2
	CO5	2.54	2	3	2

			2.58427	2.58427	2.58427
CIV18R6199	CO1	2.50	3	3	2
	CO2	2.54	3	3	2
	CO3	2.56	2	3	3
	CO4	2.61	3	3	3
	CO5	2.64	3	3	3
			2.569728	2.569048	2.576923

Program Articulation Matrix (Summary)

Course Code	PO1	PO2	PO3
MAT18R5009	1		3
CIV18R5101	3	2	1
CIV18R5102	3		2
CIV18R5108	2	2	2
CIV18R5110	2	2	2
CIV18R5181	2	3	3
CIV18R5104	3	1	2
CIV18R5105	1		2
CIV18R5106	2		2
PGM18R5001	2	3	
CIV18R5114	2	2	2
CIV18R6104	2	2	2
CIV18R5018	2	2	2
CIV18R5183	2	2	2
CIV18R5199	2	3	2
CIV18R6101	2	2	2
CIV18R6198	2	3	2
CIV18R6199	3	3	3
Weighted Average	1.98	2.30	2.06
Low	2	1	1

Medium	12	8	13
High	4	5	3

2018-20 Batch - PO Attainment

Course Code	PO1	PO2	PO3
MAT18R5009	1		3
CIV18R5101	3	2	1
CIV18R5102	3		2
CIV18R5108	2	2	2
CIV18R5110	2	2	2
CIV18R5181	2	3	3
CIV18R5104	3	1	2
CIV18R5105	1		2
CIV18R5106	2		2
PGM18R5001	2	3	
CIV18R5114	2	2	2
CIV18R6104	2	2	2
CIV18R5018	2	2	2
CIV18R5183	2	2	2
CIV18R5199	2	3	2
CIV18R6101	2	2	2
CIV18R6198	2	3	2
CIV18R6199	3	3	3
Total	36	32	35
Count	18	14	17
Attainment Level	2	2	2

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

Department of Civil Engineering

PO ATTAINMENT

Programe : M.Tech Batch : 2018 - 2020

S.No	Course Code	Course Name	PO 1	PO 2	PO 3
1	MAT18R5009	Applied Mathematics	2.54		2.53
2	CIV18R5101	Advanced Concrete Technology	2.42	2.43	2.43
3	CIV18R5102	Structural Dynamics	2.67		2.75
4	CIV18R5108	Design of Bridges	2.57	2.48	2.69
5	CIV18R5110	Design of Steel Concrete Composite Structures	2.65	2.60	2.71
6	CIV18R5181	Advanced Structural Engineering Laboratory	2.75	2.75	2.75
7	CIV18R5104	Advanced Steel Structures	2.06	2.02	1.98
8	CIV18R5105	Advanced Concrete Design	2.71		2.65
9	CIV18R5106	Matrix Method of Structural Analysis	2.79		2.62
10	PGM18R5001	Research Methodology for Engineers	2.75	2.74	
11	CIV18R5114	Industrial Structures	2.46	2.46	2.50
12	CIV18R6104	Repair and Rehabilitation of Structures	2.34	2.49	2.20
13	CIV18R5018	Engineering Optimization	2.34	2.47	2.25
14	CIV18R5183	Computer Aided Analysis and Design Laboratory	2.10	2.17	2.14
15	CIV18R5199	Mini Project	2.08	2.08	2.08
16	CIV18R6101	Advanced Prestressed Concrete	2.81	2.90	2.77
17	CIV18R6198	Project Work Phase - I	2.58	2.58	2.58
18	CIV18R6199	Project Work - Phase II	2.57	2.57	2.58
		Average PO Attainment	2.51	2.48	2.48

Table 2.2.2 Observations on attainment levels for each of the POs.

Over ALL PO ATTAINMENT			
Programe : M.Tech		Batch : 2018 - 2020	
Modes of evaluation	PO1	PO2	PO3

Written Examination	2.51	2.48	2.48
Seminars	2.34	2.28	2.15
Mini-project	2.14	2.26	2.48
Quiz	2.45	2.58	2.48
Industrial Training	2.64	2.62	2.58
In Direct Assesment	2.56	2.64	2.57
Average PO Attainment	2.47	2.50	2.48

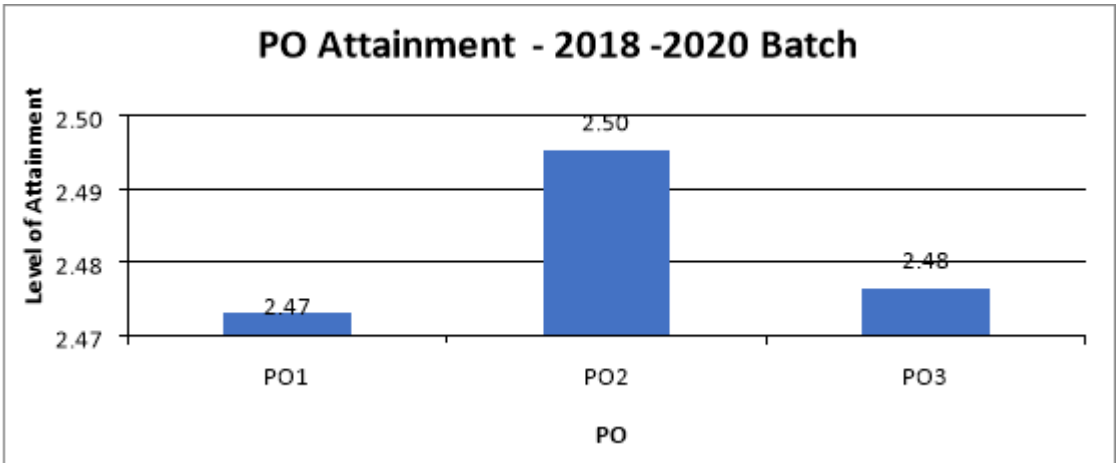


Figure PO attainment Overall Summary (2018-2020)

CRITERION 3	Students' Performance	75

Table: 3.1

Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	CAY 21-22	CAY *m*1 20-21	CAY*m*2 19-20 (LYG)	CAY*m*3 18-19 (LYGm1)	CAYm4 17-18 (LYGm2)
Sanctioned intake of the program (*N*)	12	12	12	12	12
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)*	6	5	9	5	2
Total number of students admitted in the Program (*N*1 + *N*2)	6	5	9	5	2

CAY – Current Academic Year

CAYm1- Current Academic Year minus1= Current Assessment Year

CAYm2 - Current Academic Year minus2=Current Assessment Year minus 1

LYG – Last Year Graduate

LYGm1 – Last Year Graduate minus 1

LYGm2 – Last Year Graduate minus 2

Table: 3.2

Year of entry	*N*1 + *N*2 (As defined above)	Number of students who have successfully graduated	
		I Year	II Year
CAY **21-22**	6	6	
CAY*m*1 **20-21**	5	5	5
CAY*m*2 (LYG) **19-20**	9	9	9
CAY*m3* (LYG*m*1) **18-19**	5	5	5
CAYm4 (LYG*m2*) **17-18**	2	2	2

3.1. Enrolment Ratio through GATE (20)

Table: 3.1.1

	N (From Table 3.1)	N1 (From Table 3.1)	Enrollment Ratio [(N1/N)*100]
2021-22 (CAY)	6	0	0
2020-21 (CAYm1)	5	0	0
2019-20 (CAYm2)	9	0	0

Enrolment Ratio= N1 /N; N is sanctioned intake; N1 is number of students admitted through GATE.

Students enrolled through GATE= Zero

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

	LYG (2018-19)	LYGm1 (2017-18)	LYGm2 (2016-17)
X Number of students admitted in first year of same batch	9	5	2
Y Number of students completing program in stipulated duration	9	5	2
Success Index(SI = Y/X)	1	1	1

S.I. = Number of students completing program in stipulated duration/ Number of students admitted in first year of same batch.

S.I. = 1+1+1 = 3

Average S.I.= Mean of SI for past 3 Batches = 3/3 = 1

Assessment points = 20 X Average S.I. = 20 x 1 = 20

3.3. Placement, Higher Studies and Entrepreneurship (20)

Assessment Points = 20 × average placement; N is the total no. of students admitted in first year

Table:3.3.1

Item	CAY*m*1 20-21	CAY*m*2 19-20	CAYm3 18-19
Total no. of students admitted in first year (N)	5	9	5
No. of students placed in companies or Government Sector (x)	5	5	3
No. of students pursuing Ph.D. / JRF/ SRF(y)	-	-	-
No. of students turned entrepreneur in engineering/technology (z)	-	2	-
x + y + z =	5	7	3
Placement Index: (x + y + z)/N	1	0.77	0.6
Average placement= (P1 + P2 + P3)/3	0.792		
Assessment Points = 20 × average placement	15.84		

3.3.1a. Provide the placement data in the below mentioned format with the name of the program and the assessment year:

Table 3.3.1a

M.Tech Structural Engineering 2019-21					
S.no.	Name of the student placed	Enrollment no.	Name of the Employer	Appointment letter reference no. with date	Remarks
1	PREAM KUMAR S	9920138001	Sri Ranganathar Institute of Engineering and technology	SRIET/HR/APPT/177/2022-23	Placed in private company
2	KATHIRVEL KUMAR K	9920138002	Bharathi Constructions	BC/ST/2022	Placed in private company
3	HARIHARAN P	9920138003	METIS Structures	MS / HAR / 2022	Placed in private company
4	M SHIEK MOHAMED	9920138004	KEYEM infra project private limited, Chennai	KEYEM / SHI / 2022	Placed in private company
5	ABDUL SALAM S	9920138005	AAW & Partners Consulting Engineers	2049945	Placed in private company

Table 3.3.1 b

M.Tech Structural Engineering 2019-21					
S.no.	Name of the student placed	Enrollment no.	Name of the Employer	Appointment letter reference no. with date	Remarks
1	MUTHUPRAKASH P	9919138002	VPM CONSTRUCTION	VPMC / MUT / 2021	Entrepreneur
2	ARAVINDKUMAR	9919138009	AK CONSTRUCTION	AKC / ARA / 2021	Entrepreneur
3	SESHAMAHALINGAM M S	9919138003	ASST.PROF IN VIKRAM ENGINEERING COLLEGE, MADURAI	VEC / Teaching / Civil / 2021	Placed in private company
4	MILLAR J	9919138001	VPM CONSTRUCTION	VPMC / MIL / 2021	Placed in private company
5	IRENE A D K B	9919138004	AK CONSTRUCTION	AKC / IRE / 2021	Placed in private company
6	RAJAABINAYA R	9919138005	VA Associates	VAA / RAJ / 2021	Placed in private company
7	PADMALAKSHMI M	9919138006	Kavi Interiors Designers & Construction	KIDC / PAD / 2021	Placed in private company

Table 3.3.1c

M.Tech Structural Engineering 2018-20					
S.no.	Name of the student placed	Enrollment no.	Name of the Employer	Appointment letter reference no. with date	Remarks
1	THUMMALAPALLE LAKSHMIKANTHA REDDY	9918138003	KETAN CONSTRUCTION LIMITED	KCT/PKC-7/Site Enrollment/23	Placed in private company
2	SRI KRISHNA I	9918138004	PRW CONTRACTOR	PRW / KRI / 2020	Placed in private company
3	LAVANYA B	9918138001	LAMEK INTERIOR DESIGNERS, CHENNAI	LID / CIVIL / 2020 /2	Placed in private company

3.4. Professional Activities(15)

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

Table 3.4a Student's participation in Professional societies/chapters

S.no.	Name of the student	Enrollment no.	Program	Name of the program	Institution	Date
1	LAVANYA B	9918138001	Conference	Kalasalingam Global Conference 2019	Kare	18-20 Dec 2019
2	THUMMALAPALLELAKSHMIKANTHA REDDY	9918138003	Conference	International Conference On Advances In Physical Sciences And Materials 2020	Coimbatore	13-14 Aug 2020
3	SOWMIYA K	9918138005	Conference	International Conference On Materials Science And Manufacturing Technology2020	Hotel Aloft, Coimbatore	9-10 April 2020
4	MILLAR J	9919138001	Conference	International Conference On Materials Science And Manufacturing Technology 2020	Hotel Aloft, Coimbatore	9-10 April 2020
5	MILLAR J	9919138001	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
6	MUTHUPRAKASH P	9919138002	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
7	MUTHUPRAKASH P	9919138002	Conference	International Conference On Materials Science And Manufacturing Technology2020	Hotel Aloft, Coimbatore	9-10 April 2020
8	SESHAMAHALINGAM M S	9919138003	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
9	IRENE A D K B	9919138004	Conference	International Conference On	Hotel Aloft,	9-10

				Materials Science And Manufacturing Technology 2020	Coimbatore	April 2020
10	IRENE A D K B	9919138004	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
11	RAJAABINAYA R	9919138005	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
12	PADMALAKSHMI M	9919138006	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
13	VEMULA JAYANTH KUMAR	9919138007	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
14	SENBAGAVALLI	9919138008	Conference	International Conference On Materials Science And Manufacturing Technology 2020	Hotel Aloft, Coimbatore	9-10 April 2020
15	SHENBAGAVALLI S	9919138008	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
16	ARAVINDHKUMAR G	9919138009	Webinar	Concrete Technology For Digital Era - Research And Industrial Perspective	KARE	4-Jun-20
17	A. RAGASREE	9918138002	Conference	International Conference On Materials Science And Manufacturing Technology 2020	Hotel Aloft, Coimbatore	9-10 April 2020
18	PREAM KUMAR S	9920138001	Webinar	Career Opportunities for Civil Engineers	PSR Engg College, Sivakasi	19-June-2021
19	KATHIRVEL KUMAR K	9920138002	Webinar	Career Opportunities for Civil Engineers	PSR Engg College, Sivakasi	19-June-2021
20	HARIHARAN P	9920138003	Webinar	Career Opportunities for Civil Engineers	PSR Engg College, Sivakasi	19-June-2021

21	M SHIEK MOHAMED	9920138004	Webinar	Career Opportunities for Civil Engineers	PSR Engg College, Sivakasi	19-June-2021
22	ABDUL SALAM S	9920138005	Webinar	Career Opportunities for Civil Engineers	PSR Engg College, Sivakasi	19-June-2021
23	PREAM KUMAR S	9920138001	Webinar	The Next Normal in Construction Industry:Startup Perspective	Civil Engineering Department, KARE	15 Sep 2021
24	KATHIRVEL KUMAR K	9920138002	Webinar	The Next Normal in Construction Industry:Startup Perspective	Civil Engineering Department, KARE	15 Sep 2021
25	HARIHARAN P	9920138003	Webinar	The Next Normal in Construction Industry:Startup Perspective	Civil Engineering Department, KARE	15 Sep 2021
26	M SHIEK MOHAMED	9920138004	Webinar	The Next Normal in Construction Industry:Startup Perspective	Civil Engineering Department, KARE	15 Sep 2021
27	ABDUL SALAM S	9920138005	Webinar	The Next Normal in Construction Industry:Startup Perspective	Civil Engineering Department, KARE	15 Sep 2021
28	PREAM KUMAR S	9920138001	Webinar	Nano Technology in Civil Engineering	Civil Engineering Department, KARE	30 Oct 2021
29	KATHIRVEL KUMAR K	9920138002	Webinar	Nano Technology in Civil Engineering	Civil Engineering Department, KARE	30 Oct 2021
30	HARIHARAN P	9920138003	Webinar	Nano Technology in Civil Engineering	Civil Engineering Department, KARE	30 Oct 2021
31	M SHIEK MOHAMED	9920138004	Webinar	Nano Technology in Civil Engineering	Civil Engineering Department, KARE	30 Oct 2021
32	ABDUL SALAM S	9920138005	Webinar	Nano Technology in Civil Engineering	Civil Engineering Department, KARE	30 Oct 2021

Table 3.4b. List of organized Engineering events

Name of the capability enhancement program	Date of implementation	Number of students enrolled	Name of the agencies/consultants involved with contact details (if any)
2021-22			
National level technical symposium "ASTHIVAAR-2K22	29.04.2022	116	Department of Civil Engineering, KARE
Webinar "Construction Management in Infrastructure Aspects of Urban Transport"	31.01.2022	48	Department of Civil Engineering, KARE
Project Expo	30.11.2022	42	Department of Civil Engineering, KARE
Webinar on the topic "Pollution Prevention Measures in Industrial Sectors	16.11.2022	76	Department of Civil Engineering, KARE
Webinar on the topic "Nano-Technology in Civil Engineering	30.10.2022	47	Department of Civil Engineering, KARE
Webinar on The Next Normal in Construction Industry: Startup Perspective	15.09.2021	42	Department of Civil Engineering, KARE
2020-21			
Guest Lecture on "Civil Engineer Profession-After Lock down"	09.04.2021	60	Department of Civil Engineering, KARE
Training Program on Total Station	24.03.2021 to 26.03.2021	42	Department of Civil Engineering, KARE
Guest Lecture on Water Management	22.03.2021	135	Department of Civil Engineering, KARE
One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete Technology (Phase III)	07.12.2020 to 12.12.2020	100	Department of Civil Engineering, KARE
One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete Technology (Phase II)	23.11.2020 to 28.11.2020	100	Department of Civil Engineering, KARE
One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete	02.11.2020 to	100	Department of Civil Engineering, KARE

Technology (Phase I)	07.11.2020		
VIRTUAL INTERNATIONAL CONFERENCE ON "INNOVATIONS INTERDISCIPLINARY RESEARCH"	23-6-2020	42	Department of Civil Engineering ,KARE
Cloud Internship Program Civil – STAAD Pro	10.08.2020 to 20.08.2020	52	Department of Civil Engineering ,KARE
2019-20			
EXPERT LECTURE ON "CREATING STAIRS IN REVIT ARCHITECTURE"	22-5-2020	176	Department of Civil Engineering, KARE
WEBINAR ON "CONCRETE TECHNOLOGY FOR DIGITAL ERA - RESEARCH AND INDUSTRIAL PERSPECTIVE"	4-6-2020	83	Department of Civil Engineering ,KARE
NATIONAL SEMINAR ON "SUSTAINABLE CONCRETE –A CONCRETE FOR THE FUTURE GENERATION"	4-6-2020	50	Department of Civil Engineering ,KARE
WEBINAR ON "NATURAL RESOURCE CONSERVATION"- A NEED OF THE HOUR	7-6-2020	25	Department of Civil Engineering ,KARE
WEBINAR ON " SUSTAINABLE DEVELOPMENTS IN FLEX IBLE PAVE STRUCTURES"	7-6-2020	18	Department of Civil Engineering ,KARE
2018-19			
WORKSHOP ON "UNDERGROUND CONSTRUCTION TECHNIQUES IN CMRL"	10-9-2018	59	Department of Civil Engineering ,KARE
WORKSHOP ON "SOFTWARE APPLICATIONS IN CIVIL & INFRASTRUCTURE INDUSTRY"	15-09-2018	40	Department of Civil Engineering ,KARE
WORKSHOP ON "CHALLENGES FACED BY CIVIL ENGINEERS ON SITE EXECUTION"	15-09-2018	48	Department of Civil Engineering ,KARE

3.4.2. Student's publications (10)

2018	2019	2020	2021	2022
12	3	3	4	1

1. Suresh Kumar N, Gurupandi M., "Strength Characteristics of High-Performance Lime Calcined Clay Cement (LC3) Concrete", International Journal of Civil Engineering and Technology, Volume 9, Issue 13, 1883-1889, 2018.
2. Karuppasamy. M& S.N. Ramaswamy, "Studies on feasibility of Utilization of Prosopis Juliflora in Concrete", 3rd International Conference on Civil Engineering and Infrastructural Issues in Emerging Economies (ICCIEE 2018), 16th-17th March 2018, Sastra Deemed University, 2018.
3. Subashini. R & S.N. Ramaswamy, "Strength characteristics of concrete using Recycled concrete and Bottom ash – State of Art Review", 3rd International Conference on Civil Engineering and Infrastructural Issues in Emerging Economies (ICCIEE 2018), 16th-17th March 2018, Sastra Deemed University, 2018.
4. Maritta Rodrigo, Subramanian Thiru&S.N. Ramaswamy, "Comparative studies on performance of overhead tank structures with different support and edge conditions", 3rd International Conference on Civil Engineering and Infrastructural Issues in Emerging Economies (ICCIEE 2018), 16th-17th March 2018, Sastra Deemed University, 2018.
5. Sahaya Pavithra, R. Premkumar, C. Ramesh Babu and M. Shanmugasundaran.,"An Investigation on Alkali Activated Geo Polymer Structural Element", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
6. S. Surendrakumar, C. Ramesh Babu, M. Ahamed Azik Ali, P. SharathRajeshwar., "Behaviour of Interlock Block Masonry under Compressive Lateral Loading", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
7. P. Ramalakshmi, M Ahamed Azik Ali, C. Ramesh Babu, "Behaviour of Glass Fiber Reinforced Gypsum Panel under Compressive Loading", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
8. K. Yogalakshmi, C. Ramesh Babu and T.R. Neelakantan, "Experimental study on Mechanical and Durability Properties of Geopolymer Concrete", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
9. C. Karthikeyan, S. Jagan, S. R. Ramprasanna and P. Lakshmanan, "Influence of Loaded Nano Particles on Strength Property of Cement Mortar", International

conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.

10. J. Manimaran, A. Chithambar Ganesh and M. Muthukannan, "Effect of Utilization of Ground Granulated Blast Furnace Slag in the Behavior of Fly ash Based Geopolymer Concrete Under Different Curing Conditions", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
11. P.Rajesh,S.Jagan, SR.Ramprasanna, KS Naresh, Study on strength and self-healing properties of bacterial concrete, Global Journal of Engineering Science and Researches, SCRICE-2018.
12. G. M. Mahalakshmi, M. Muthukannan and A. Chithambar Ganesh, "Effect of Molarity of Activator Solution in the Behavior of Fly ash Based Geopolymer Concrete Under Different Curing Conditions", International conference on Civil Engineering and Infrastructural Issues in Emerging Economics (ICCIEE 2018), SASTRA Deemed to be University, March 16th and 17th, 2018.
13. Suresh Kumar N, Gurupandi M.,M.Selvaganesh, R.Sriram, S.Sathish raj and P.Muthu Prakash "CRITICAL REVIEW ON FLEXURAL AND SHEAR BEHAVIOUR OFHYBRID FIBER REINFORCED CONCRETE", International Journal of Civil Engineering and Technology, Volume 10, Issue 3, 1080–1090, 2019.
14. Suresh Kumar N, Gurupandi M.,P.Senthil Kumar, K.A. Ragul, M. Muni Selvam, "PAST INVESTIGATIONS ON MECHANICAL AND DURABILITYPROPERTIES OF HYBRID FIBER REINFORCED CONCRETE", International Journal of Civil Engineering and Technology, Volume 10, Issue 3, 1–10, 2019.
15. Premkumar R, Ramesh Babu Chokkalingam, PL.Meyyappan, M Shanmugasundaram, Ragasree A, Effect of Hybrid Binder on Properties of Geopolymer Concrete – State of Art, International Journal of Engineering and Advanced Technology, Vol 9, Issue 1S4, 2019
16. S Jagan, Neelakantan T R, Lakshmikantha Reddy, Gokul Kannan R1, Characterization Study on Recycled Coarse Aggregate for its Utilization in Concrete – A Review, Journal of Physics: Conference Series, Volume 1706, 13-14 August 2020.
17. MukilanK, Irene A D K B, Shenbagavalli S, Muthuprakash P., (2020), Experimental study on steel fibre reinforced concrete with a partial replacement of cement by rice husk ash,IOP Conf. Series: Materials Science and Engineering 872 (2020) 012140, IOP Publishing doi:10.1088/1757-899X/872/1/012140)
18. Chithambar Ganesh A, Sowmiya K, Muthukannan M, Investigation on the effect of steel fibers in geopolymer concrete, IOP Conf. Series: Materials Secience and Engineering, 872 (2020) 012156

19. SKM. Pothinathan, J Miller, and S. Christopher Gnanaraj, "Effect of sulfonated-melamine formaldehyde as superplasticizer in cementitious system", Materials Research Proceedings, 2021 Vol. 19, pp 51-59. DOI: https://doi.org/10.21741/9781644901618-7.
20. SKM. Pothinathan, S. Pream Kumar, N Arunachelam, S. Christopher Gnanaraj, "Effect of PCB as partial replacement of fine aggregate and coarse aggregate in concrete", Material Proceedings Today. https://doi.org/10.1016/j.matpr.2021.09.363
21. Mukilan K, Kathirvel kumar K, RavinashreeAyingaran Abdul Salam S Preamkumar, S Shiek Mohamed M, "A Claim Model for Brown-Field Regeneration To Eco-Friendly System" Advances in Mechanics, Volume 9, Issue 3, 2021, Page 1074-1088
22. PL. Meyyappan, S. Abdul salam, Studies on The Partial Replacement Of Kaolinite In The Conventional Concrete, Multidisciplinary Subjects for Research-vii, Vol-1, ISBN: 978-3-16-148385-225

CRITERION 4	Faculty Contributions	75

Note: *Please provide details for the faculty of the department, cumulative information for all the shifts for all academic years starting from current year in above format in Annexure - II.*

Academic Year 2021-2022

S. No.	Name	Qualification			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Nature of Association (Regular/Contract/ Adjunct)	If contractual mention Full time or Part time	Date of Leaving (In case Currently Associated is "No")
		Degree (Highest)	University	Year									
1.	Dr. T. R. NEELAKANTAN	Ph.D	AU	1998	Yes	PROFESSOR	-	12.06.2017	Civil	Hydrology & Water Resources Engineering	Regular	-	No
2	Dr.C.SIVAPRAGASAM	Ph.D	NUS	2003	Yes	PROFESSOR	01.08.2012	16.10.2006	Civil	Hydrology & Water Resources Engineering	Regular	-	No
3	Dr.M.MUTHU KANNAN	Ph.D	AU	2009	Yes	PROFESSOR	01.08.2012	06.06.2000	Civil	Transportation Engineering	Regular	-	No

4	Dr. C. RAMESH BABU	Ph.D	IITM	2008	Yes	ASSOCIATE PROFESSOR	03.07.2017	11.09.2015	Civil	Structural Engineering	Regular	-	No
5	Dr. D. SIVAKUMAR	Ph.D	AU	2008	Yes	ASSOCIATE PROFESSOR	-	03.06.2020	Civil	Hydrology & Water Resources Engineering	Regular	-	No
6	Dr.PL.MEYYAPPAN	Ph.D	KLU	2016	Yes	ASSOCIATE PROFESSOR	01.09.2014	03.07.2006	Civil	Structural Engineering	Regular	-	No
7	Dr.S.VANITHA	Ph.D	KLU	2018	Yes	ASSOCIATE PROFESSOR	01.07.2018	11.06.2007	Civil	Environmental Engineering	Regular	-	No
8	Dr. APARNA R PILLAI	Ph.D	IIT	2019	Yes	ASSISTANT PROFESSOR	-	28.01.2022	Civil	Geotechnical Engineering	Regular	-	No
9	Dr.S.K.M.POTHINATHAN	Ph.D	KARE	2022	Yes	ASSISTANT PROFESSOR	-	01.06.2012	Civil	Structural Engineering	Regular	-	No
10	Mr.R. PREM KUMAR	M.E	AU	2012	Yes	ASSISTANT PROFESSOR	-	15.07.2012	Civil	Structural Engineering	Regular	-	No

11	Dr. P.VELUMANI	Ph.D	KARE	2022	Yes	ASSISTANT PROFESSOR	-	30.06.2014	Civil	Construction Engineering & Management	Regular	-	No
12	Dr. K.MUKILAN	Ph.D	KARE	2021	Yes	ASSISTANT PROFESSOR	-	26.06.2015	Civil	Construction Engineering & Management	Regular	-	No
13	Dr. S. JAGAN	Ph.D	KARE	2021	Yes	ASSISTANT PROFESSOR	-	03.08.2015	Civil	Structural Engineering	Regular	-	No
14	Mr. THIRU. SUBRAMANIAN	M.E	AU	2016	Yes	ASSISTANT PROFESSOR	-	09.06.2016	Civil	Structural Engineering	Regular	-	No
15	Ms. M. KARTHIGA	M.E	AU	2017	Yes	ASSISTANT PROFESSOR	-	03.06.2020	Civil	Structural Engineering	Regular	-	No
16	Mr. J. NITTIN JOHNSON	M.E	AU	2018	Yes	ASSISTANT PROFESSOR	-	11.06.2021	Civil	Environmental Engineering	Regular	-	No

Academic Year 2020-2021

S. No.	Name	Qualification			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Nature of Association (Regular/Contract/ Adjunct)	If contractual mention Full time or Part time	Date of Leaving (In case Currently Associated is "No")
		Degree (Highest)	University	Year									
1.	Dr. T. R. NEELAKANTAN	Ph.D	AU	1998	Yes	PROFESSOR	-	12.06.2017	Civil	Hydrology & Water Resources Engineering	Regular	-	No
2	Dr.C.SIVAPRAGASAM	Ph.D	NUS	2003	Yes	PROFESSOR	01.08.2012	16.10.2006	Civil	Hydrology & Water Resources Engineering	Regular	-	No
3	Dr.M.MUTHU KANNAN	Ph.D	AU	2009	Yes	PROFESSOR	01.08.2012	06.06.2000	Civil	Transportation Engineering	Regular	-	No
4	Dr. C. RAMESH BABU	Ph.D	IITM	2008	Yes	ASSOCIATE PROFESSOR	03.07.2017	11.09.2015	Civil	Structural Engineering	Regular	-	No
5	Dr. D. SIVAKUMAR	Ph.D	AU	2008	Yes	ASSOCIATE PROFESSOR	-	03.06.2020	Civil	Hydrology & Water Resources Engineering	Regular	-	No

6	Dr.PL.MEYYAPPAN	Ph.D	KLU	2016	Yes	ASSOCIATE PROFESSOR	01.09.2014	03.07.2006	Civil	Structural Engineering	Regular	-	No
7	Dr.S.VANITHA	Ph.D	KLU	2018	Yes	ASSOCIATE PROFESSOR	01.07.2018	11.06.2007	Civil	Environmental Engineering	Regular	-	No
8	Mr.S.K.M.POTHINATHAN	M.E	AU	2011	Yes	ASSISTANT PROFESSOR	-	01.06.2012	Civil	Structural Engineering	Regular	-	No
9	Mr.R. PREM KUMAR	M.E	AU	2012	Yes	ASSISTANT PROFESSOR	-	15.07.2012	Civil	Structural Engineering	Regular	-	No
10	Mr.S.CHRISTOPHER GNANARAJ	M.E	AU	2012	NO	ASSISTANT PROFESSOR	-	10.06.2013	Civil	Structural Engineering	Regular	-	**Yes 31.05.2021**
11	Mr. P.VELUMANI	M.Tech	KLU	2012	Yes	ASSISTANT PROFESSOR	-	30.06.2014	Civil	Construction Engineering & Management	Regular	-	No
12	Dr. A. CHITHAMBAR GANESH	Ph.D	KARE	2021	NO	ASSISTANT PROFESSOR	-	15.06.2015	Civil	Structural Engineering	Regular	-	**Yes 31.05.2021**

13	Mr.P.SARAVANAN	M.E	AU	2014	NO	ASSISTANT PROFESSOR	-	13.11.2014	Civil	Hydrology & Water Resources Engineering	Regular	-	Yes 31.05.2021
14	Mr. K.MUKILAN	M.E	AU	2015	Yes	ASSISTANT PROFESSOR	-	26.06.2015	Civil	Construction Engineering & Management	Regular	-	No
15	Mr. S. JAGAN	M.Tech	VIT	2015	Yes	ASSISTANT PROFESSOR	-	03.08.2015	Civil	Structural Engineering	Regular	-	No
16	Mr. THIRU. SUBRAMANIAN	M.E	AU	2016	Yes	ASSISTANT PROFESSOR	-	09.06.2016	Civil	Structural Engineering	Regular	-	No
17	Ms. M. KARTHIGA	M.E	AU	2017	Yes	ASSISTANT PROFESSOR	-	03.06.2020	Civil	Structural Engineering	Regular	-	No

Academic Year 2019-2020

S. No.	Name	Qualification			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Nature of Association (Regular/Contract/ Adjunct)	If contractual mention Full time or Part time	Date of Leaving (In case Currently Associated is "No")
		Degree (Highest)	University	Year									
1.	Dr. T. R. NEELAKANTAN	Ph.D	AU	1998	Yes	PROFESSOR	-	12.06.2017	Civil	Hydrology & Water Resources Engineering	Regular	-	No
2	Dr.C.SIVAPRAGASAM	Ph.D	NUS	2003	Yes	PROFESSOR	01.08.2012	16.10.2006	Civil	Hydrology & Water Resources Engineering	Regular	-	No
3	Dr.M.MUTHU KANNAN	Ph.D	AU	2009	Yes	PROFESSOR	01.08.2012	06.06.2000	Civil	Transportation Engineering	Regular	-	No
4	Dr. C. RAMESH BABU	Ph.D	IITM	2008	Yes	ASSOCIATE PROFESSOR	03.07.2017	11.09.2015	Civil	Structural Engineering	Regular	-	No
5	Mr.N.GANESAN	Ph.D	MKU	1999	Yes	ASSOCIATE PROFESSOR	01.09.2009	04.10.2000	Civil	Structural Engineering	Regular	-	**YES** **30.05.2020**

6	Dr.PL.MEYYAPPAN	Ph.D	KLU	2016	Yes	ASSOCIATE PROFESSOR	01.09.2014	03.07.2006	Civil	Structural Engineering	Regular	-	No
7	Dr.S.VANITHA	Ph.D	KLU	2018	Yes	ASSOCIATE PROFESSOR	01.07.2018	11.06.2007	Civil	Environmental Engineering	Regular	-	No
8	Mr.S.K.M.POTHINATHAN	M.E	AU	2011	Yes	ASSISTANT PROFESSOR	-	01.06.2012	Civil	Structural Engineering	Regular	-	No
9	Mr.R. PREM KUMAR	M.E	AU	2012	Yes	ASSISTANT PROFESSOR	-	15.07.2012	Civil	Structural Engineering	Regular	-	No
10	Mr.S.CHRISTOPHER GNANARAJ	M.E	AU	2012	Yes	ASSISTANT PROFESSOR	-	10.06.2013	Civil	Structural Engineering	Regular	-	No
11	Mr. P.VELUMANI	M.Tech	KARE	2012	Yes	ASSISTANT PROFESSOR	-	30.06.2014	Civil	Construction Engineering & Management	Regular	-	No
12	Mr. A. CHITHAMBAR GANESH	M.Tech	VIT	2015	Yes	ASSISTANT PROFESSOR	-	15.06.2015	Civil	Structural Engineering	Regular	-	No

13	Mr.P.SARAVANAN	M.E	AU	2014	Yes	ASSISTANT PROFESSOR	-	13.11.2014	Civil	Hydrology & Water Resources Engineering	Regular	-	No
14	Mr. K.MUKILAN	M.E	AU	2015	Yes	ASSISTANT PROFESSOR	-	26.06.2015	Civil	Construction Engineering & Management	Regular	-	No
15	Mr. S. JAGAN	M.Tech	VIT	2015	Yes	ASSISTANT PROFESSOR	-	03.08.2015	Civil	Structural Engineering	Regular	-	No
16	Mr. R. SUTHARSAN	M.E	AU	2016	NO	ASSISTANT PROFESSOR	-	16.06.2016	Civil	Structural Engineering	Regular	-	**YES** **27.05.2020**
17	Mr. THIRU. SUBRAMANIAN	M.E	AU	2016	Yes	ASSISTANT PROFESSOR	-	09.06.2016	Civil	Structural Engineering	Regular	-	No

4.1. Student-Faculty Ratio (SFR)(10)

(To be calculated at Department Level)

No. of UG Programs in theDepartment(n): _____

No. of PG Programs in theDepartment(m):_____

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)

Student Teacher Ratio (STR) = S/F

Table 4.1

Year	CAY	CAYm1	CAYm2
UG II YEAR	60+7 = 67	60+4 = 64	60+8=68
UG III YEAR	60+4 = 64	60+8 = 68	60+7 = 67
UG IV YEAR	60+8 = 68	60+7 = 67	90+6 = 96
UG1	**199**	**199**	**231**
Structural Engg. I YEAR	12	12	12
Structural Engg. II YEAR	12	12	12
PG1	**24**	**24**	**24**
Environmental Engg. I YEAR	-	12	12
Environmental Engg. II YEAR	12	12	12
PG2	**12**	**24**	**24**
Construction Engg. &Mgmt. I YEAR	-	-	-
Construction Engg. &Mgmt. II YEAR	-	-	-
PG3	-	-	-
Total No. of Students in the Department**(S)**	**235**	**247**	**279**
No. of Faculty in the Department**(F)**	**16**	**17**	**17**
Student Faculty Ratio (SFR)	**14.68**	**14.53**	**16.41**
Average SFR	**15.21**		

Markstobegivenproportionallyfromamaximumof10toaminimumof05foraverage SFR between 15:1 to 25:1, and zero for average SFR higher than 25:1. Marks distribution is given asbelow:

<=15 - 10Marks
<=17 - 09Marks
<=19 - 08Marks
<=21 - 07Marks
<=23 - 06Marks
<=25 - 05Marks
>25.0 - 0Marks

Note: Consideration of Contractual Faculty means:

- *All the faculty whether regular or contractual (except Part-Time), will be considered. The contractual faculty (doing away with the terminology of visiting/adjunct faculty, whatsoever) who have taught for 2 consecutive semesters in the corresponding academic year on full time basis shall be considered for the purpose of calculation in the Faculty Student Ratio. However, following will be ensured in case of contractualfaculty:*
  1. *Shall have the AICTE prescribed qualifications and experience.*
  2. *Shallbeappointedonfulltimebasisandworkedforconsecutivetwosemesters during the particular academic year under consideration.*
  3. *Should have gone through an appropriate process of selection and the records ofthe same shall be made available to the visiting team during NBA visit*
- *Faculty to be calculated Department wise as per the format given in SAR; Faculty appointment letters, time table, subject allocation file, salary statements and random interaction in person.*
- *No. of student's calculation as mentioned in the SAR (please refer table under criterion3.1)*
- *Faculty Qualification as per AICTE guidelines shall only becounted*

4.1.1. Provide the information about the regular and contractual faculty as per the format mentioned below:

Table 4.1.1

	Total number of regular faculty in the department	**Total number of contractual faculty in the department**
CAY	16	-
CAYm1	17	-
CAYm2	17	-

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

(*Relevant faculty information, in the area of Program specialization)*

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

Table 4.2.1.1

Name of the faculty	Relevant Area of Specialization
Dr. C. RAMESH BABU	Structural Engineering
Dr. PL. MEYYAPPAN	Structural Engineering
Dr. S. JAGAN	Structural Engineering
Dr.SKM. POTHINATHAN	Structural Engineering
Mr. R. PREMKUMAR	Structural Engineering
Mr. THIRU. SUBRAMANIAN	Structural Engineering

4.2.2. Faculty Research Publication(10)

Table 4.2.2.1

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		
	CAYm1	CAYm2	CAYm3	CAYm1	CAYm2	CAYm3
Dr. C. RAMESH BABU	28	3	2	4	4	4
Dr. PL. MEYYAPPAN	18	5	0	6	6	6
Mr. S. JAGAN	6	2	3	0	0	0
Mr.SKM. POTHINATHAN	2	2	0	0	0	0
Mr. R. PREMKUMAR	2	1	0	0	0	0
Mr. THIRU. SUBRAMANIAN	1	1	0	0	0	0

Publications (Relevant to Structural Engineering)

Academic Year 2021-22

1. **Meyyappan PL**, K. Ravi Tejaswar, K. Omkarnath, Venkata Naveen Kumar, P. Venkatakrishna (2022), Arriving Factors in the Conceptual Design Framework of 3D Printing Techniques for Building Construction, Proceedings of International Conference on Innovative Technologies for Clean and Sustainable Development (ICITCSD – 2021). Springer, Cham. https://doi.org/10.1007/978-3-030-93936-6_25
2. **Meyyappan PL**, Krishnan Kumar R, Framaing Conceptual Design of Adopting Interlocking Bricks Technology in Construction (2022), Proceedings of International Conference on Innovative Technologies for Clean and Sustainable Development (ICITCSD – 2021). Springer, Cham. https://doi.org/10.1007/978-3-030-93936-6_24
3. **Meyyappan Palaniappan**(2022),An Optimal Utilization of Waste Materials in Concrete to Enhance the Strength Property: An Experimental Approach and Possibility of 3D Printing Technology, Springer Tracts in Additive Manufacturing Book Series, Volume 1, 315-321.
4. **Meyyappan**, Rajha Poorna (2022), A Prototypical Design Strategy for Soil-Cement Construction, for Indian Condition, Springer Lecture Notes in Mechanical Engineering, 349-357.
5. **Meyyappan**, Ravi Tejaswar Reddy (2022), Effect of GGBS and Burnt Paper Based Solid Wastes Ash in Making Sustainable Paver Blocks: An Experimental and Model Study, Springer Lecture Notes in Mechanical Engineering, 341-348.
6. Karthigai Priya Pandiaraj, Vanitha Sankarajan, **Meyyappan Palaniappan**(2022),Utilization of compost and GGBS in the manufacturing of light-weight concrete — characteristics and mechanical properties, Environmental and Pollution Research, Volume 29, 38026-38037.
7. Jagan, S., **Neelakantan, T.R.**, Saravanakumar, P. Performance enhancement of recycled aggregate concrete - An experimental study Applied Science and Engineering Progress 2022, 15(1), 5212.
8. **Premkumar, R**., Chokkalingam, R.B., Rajesh, S. Performance of fly ash based geopolymer concrete with partial replacement of fine aggregate by steel mill slag Materials Today: Proceedings, 2022, 59, pp. 496–500.
9. **Premkumar, R**., Hariharan, P., Rajesh, S. Effect of silica fume and recycled concrete aggregate on the mechanical properties of GGBS based geopolymer concrete Materials Today: Proceedings, 2022, 60, pp. 211–215

Academic Year 2020-21

1 S. Christopher Gnanaraj, **Ramesh Babu Chokkalingam**, G. LiziaThankam and S. K. M. Pothinathan. “Influence of Steatite and Fly Ash on the Fresh-Hardened

Properties and Micromorphology of Self-Compacting Concrete", Advances in materials science and Engineering, Volume 2021, Article ID 6627450, https://doi.org/10.1155/2021/6627450

2 S. Christopher Gnanaraj, **Ramesh Babu Chokkalingam**, G. LiziaThankam, S. K. M. Pothinathan. "Durability properties of self-compacting concrete developed with fly ash and ultra-fine natural steatite powder", Journal of Materials Research and Technology, August 2021, Vol. 13, pp. 431-439.

3 Anandh Babu Malayali, **Ramesh Babu Chokkalingam** and M. Muthukannan. "Strength Properties of Geopolymer Concrete Modified with Recycled Aggregates", Iranian Journal of Science and Technology, Transactions of Civil Engineering, 2021, https://doi.org/10.1007/s40996-021-00662-3

4 S Shenbagavalli and **Ramesh Babu Chokkalingam**. "Flexural Strength of Fly ash Brick Masonry Wall with four different bond", Journal of Physics: Conference Series, Vol. 2070, 2021, Article no. 012190.

5 S. Christopher Gnanaraj and **Ramesh Babu Chokkalingam**. "Effect of ultrafine natural steatite powder, super plasticizer and VMA on the fresh and hardened properties of self-compacting cement paste and mortar", International Review of Applied Sciences and Engineering, Vol. 12, 2021, pp. 285-292.

6 **Meyyappan, P.,** Carmichael, M.J. "An Effective Replacement of Granite and Marble Powder on Cement Mortar Subjected to Chloride Ion Penetration Test", Lecture Notes in Civil Engineering, 2021, 97, pp. 533–541

7 **Meyyappan, P**., Carmichael, M.J. "A Comparative Investigation on the Utilization of Marble Dust and Granite Dust in the Cement Mortar against the Sulphate Resistance", Lecture Notes in Civil Engineering, 2021, 97, pp. 523–532

8 **Meyyappan, P**., Rajasekaran, M.P., Soroopan, R.S. "An Experimental and Analytical Investigation on the Characteristics of Light Weight Concrete Using Waste Burnt Ash and Pumice Stones", Lecture Notes in Civil Engineering, 2021, 97, pp. 543–551

9 **Palaniappan, M.,** Milton, J.C., Ramasubramaniam, S.S., Palvannan, H., Sundararaj, H. "Influence of Steel Fibers on Enhancing the Toughness

Property on Concrete: A Simplified Approach", Lecture Notes in Civil Engineering, 2021, 78, pp. 269–275

10 **Palaniappan, M**., Chandrasekar, S. "Creating learning interest in the course earthquake resistant design of structures using innovative assessment methods", Journal of Engineering Education Transformations, 2021, 34 (special Issue), pp. 757–762.

11 **Meyyappan P L**, Sivapragasam C, Neelamani S, Al-Zaqah Z K and Al-Khalidi M. "Modeling studies on the behavior of single and double rubble mound breakwaters using genetic programming tool", Indian Journal of Geo Marine Sciences, 2021, Vol. 50, pp. 437-444

12 **Meyyappan PL**, Keerthana S and Jemimah Carmichael M. "Arriving the suitability of polyethylene wastes in flexible pavements: An experimental approach", Materials Today Proceedings, 2021, Online Published, https://doi.org/10.1016/j.matpr.2021.07.457

13 **Meyyappan PL**, Sutharsan R and Jemimah Carmichael M. "Utilization of Paper Sludge Ash in Lime Based Geopolymer Concrete: An Experimental Study", Lecture Notes in Civil Engineering, 2021, Vol. 171, https://doi.org/10.1007/978-3-030-80312-4_1

14 **Jagan, S**., Neelakantan, T.R., Saravana Kumar, P., Vignesh Harish, H., Akash, M.R. "Efficient Utilization of Recycled Concrete Aggregates for Structural Applications—An Experimental Study", Lecture Notes in Civil Engineering, 2021, 97, pp. 567–579

15 **Jagan, S.,** Mohammed Sulaiman. "Behaviour of zero cement mortar – An experimental study", Lecture notes in Civil Engineering, Online first, 2021.

16 **Jagan, S.**, Neelakantan, T.R. "Effect of silica fume on the hardened and durability properties of concrete", International Review of Applied Sciences and Engineering, 2021, 12(1), pp. 44–49.

17 **S. Jagan**, T. R. Neelakantan and P. Saravana Kumar. "Mechanical properties of recycled aggregate concrete surface treated by variation in mixing approaches", Revista de la construccion, 2021, Vol. 20, pp. 236-248.

18 **S. Jagan**, T. R. Neelakantan and R. Gokul Kannan. "Mechanical and durability properties of the concrete with copper slag", Revista de la construction, 2021, Vol. 20, pp. 359-370.

19 P. Sivakumar, Nikolai B. Gorev, Tiku T. Tanyimboh, Inna F. Kodzhespirova, C. R. Suribabu and T. R. Neelakantan.

20 **S. Jagan** and T. R. Neelakantan. "Mechanical properties of the concrete with recycled coarse aggregate surface treated by microbes", World Journal of Engineering, Online Published, 2021, https://doi.org/10.1108/WJE-02-2021-0089

21 **Jagan Sivamani,** Neelakantan ThurvasRenganathan&SaravanakumarPalaniraj. "Enhancing the quality of recycled coarse aggregates by different treatment techniques—a review", Environmental Science and Pollution Research, 2021, Vol. 28, pp. 60346-60365

22 **S. Jagan**, T. R. Neelakantan and M. Padma Lakshmi. "Enhancement on the properties of recycled coarse aggregate through bio-deposition – An experimental study", Materials Today Proceedings, 2021, Online Published, 10.1016/j.matpr.2021.06.009

23 **S. Jagan**, T. R. Neelakantan and P. Saravana Kumar. "Performance Enhancement of Recycled Aggregate Concrete – An Experimental Study", Applied Science and Engineering Progress, 2022, Vol. 15, Article no. 5212

24 **S. Jagan** and T. R. Neelakantan. "Effect of fine recycled aggregate on the strength and durability properties of concrete modified through two-stage mixing approach", Environmental Science and Pollution Research, 2021, Online Published, https://doi.org/10.1007/s11356-021-14420-5

25 P. Saravana Kumar, D. Manoj and **S. Jagan**. "Properties of concrete having treated recycled coarse aggregate and slag", Revista de la construccion, Vol. 20, pp. 249-258

Academic Year 2019-20

1. Chithambar Ganesh, A., Muthukannan, M., Malathy, R and Ramesh Babu, C. "An Experimental Study on Effects of Bacterial Strain Combination in Fibre Concrete and Self-Healing Efficiency", *KSCE Journal of Civil Engineering*, Vol. 23, pp. 4368-

4377, 2019**(SCI indexed)**

2. Anandh Babu, M., Ramesh Babu, C and Vinay Singh, M. "Experimental Study on the Compressive Strength and Permeable Properties of GGBS Based Geopolymer Pervious Concrete", *IOP Conference Series: Materials Science and Engineering*, Vol. 561, Article no. 012004,2019 **(Scopus).**
3. Premkumar, R., Ramesh Babu, C.,Shanmugasundaram, M. "Durability performance of Fly Ash and Steatite Powder Based Geopolymer Concrete", *IOP Conference Series: Materials Science and Engineering*, Vol. 561, Article no. 012055, 2019**(Scopus).**
4. Ganesan, N., Ramesh Babu, C., Meyyappan, PL. "Influence of Alkaline Activator Ratio on Compressive strength of GGBS based Geopolymer concrete", *IOP Conference Series: Materials Science and Engineering*, Vol. 561, Article no. 012083, 2019**(Scopus).**
5. Subburaj, V., Ramesh Babu, C., Shanmugasundaram,M."Impact of Construction Project Execution with and without Project Management Software", *International Journal of Engineering and Advanced Technology*, Vol. 9, pp. 157-164, 2019**(UGC approved).**
6. Shaji, M. J, Neelakantan, T. R., Ramesh Babu, C. "Regression Analysis by Taguchi Method on Strength of Weathered Crystalline Rock Sand Concrete", *International Journal of Engineering and Advanced Technology*, Vol. 9, pp. 157-164, 2019**(UGC approved).**
7. Ranjhan, A., Neelakantan, T. R., Ramesh Babu, C. "Self-compacting Concrete with Alccofine and Glass Fiber", *International Journal of Engineering and Advanced Technology*, Vol. 9, pp. 188-191, 2019**(UGC approved).**
8. Ranjhan, A., Neelakantan, T. R., Ramesh Babu, C. "Waste Material Ashes Used in Concrete", *International Journal of Engineering and Advanced Technology*, Vol. 9, pp. 192-195, 2019**(UGC approved).**
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10. Ganesan, N., Ramesh Babu, C., Meyyappan, PL. "Strength behaviour of cement mortar with marble powder as partial replacement of cement", *International Journal of Engineering and Advanced Technology*, Vol. 9, pp. 405-410, 2019**(UGC approved).**
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4.2.3 Faculty Development work(10)

(a) Professional Development

Kalasalingam Academy of Research and Education (KARE) have the Mentor-Mentee system, in which for young faculty member can have a chance to develop his professional carrier based on the suggestion and corrective measures of a senior faculty member. Generally, a senior faculty member, leveraging his/her recognition as a scholar and instructor, acts as a mentor to the newly recruited faculty member. Guidance is provided by the senior faculty member on a regular basis to suggest possible ways for the junior faculty member to evolve as an effective teacher-scholar. All tenured faculty members collectively dispense advice and encouragement to new faculty member for professional development. Some examples of advice are: encouragement to deliver effective teaching, conducting live sessions and tutorials, weak students monitoring, research inputs etc.

The Office of Faculty affairs and Learning Technology (FALT) conducts three to five days workshops centrally for the newly recruited faculty members regarding effective class room management, assessment of outcome-based education, writing research papers and project proposals, leadership skills etc every year. Apart from that, the office of FALT conducts periodical workshops on management skills, and language skills for all the interested faculty members.

The Management of KARE has the policy to facilitate the growth of a faculty member's professional carrier in terms of providing on-duty leave, sabbatical leave, seed money and research incentive scheme. There is no limit in granting on-duty leave for attending seminar, workshops and conferences for all the faculty members. The sabbatical leave is provided for the faculty members who are willing to pursue higher studies. In order to promote the research growth for a faculty member, seed money is provided. Apart from that, in the research incentive scheme, financial support for attending conferences (travel grant and registration fees) in India and abroad are provided to facilitate the professional development of the interested faculty member.

The university as well as Department of Civil Engineering also organizes various workshops, seminar and conferences including, but not limited to, grant writing, instructional improvement (e.g., Learning About Learning), and research seminars throughout the year. Faculty member can freely avail these activities on campus to keep current in engineering education and scholarly research.

Table 4.2.3.1 Faculty Participation

No	Name of the Faculty	Attended			
		2021-22	2020-21	2019-20	2018-19
1	Dr. T. R. Neelakantan	1	1	2	1
2	Dr. C. Sivapragasam	2	1	1	2
3	Dr. M. Muthukannan	2	1	1	1
4	Dr. C. Ramesh Babu	2	2	2	1
5	Dr. D. Sivakumar	1	2	2	1
6	Dr. PL Meyyappan	2	1	3	3
7	Dr. S. Vanitha	3	1	4	1
8	Dr. Aparna R Pillai	2	0	0	0
9	Dr. SKM Pothinathan	2	1	3	1
10	Mr. R. Prem Kumar	3	2	3	2
11	Mr.S. Christopher Gnanaraj	0	2	2	3
12	Mr. P. Velumani	2	1	3	2
13	Dr. A. Chithambar Ganesh	0	2	3	1
14	Mr. P. Saravanan	0	2	2	3
15	Mr. K. Mukilan	2	1	2	2
16	Mr. S. Jagan	2	2	3	3
17	Mr. Thiru Subramanian	2	2	3	2
18	Ms. M. Karthiga	2	2	1	2
19	Mr. Nittin Johnson	2	0	0	0
20	Mr. N. Ganesan	0	0	3	2
21	Mr. R. Sutharsan	0	0	3	2

(b) Authority and Responsibility of faculty member

The faculty members play an important role in the guidance, development and implementation of the processes for evaluation, assessment and continuous improvement.

(i) Curriculum Development Cell (CDC)

The Constitution of Curriculum/Syllabus Development Cell consists of Department faculty members with experience and expertise in the specialized topics in Civil Engineering

along with other stake holders like academicians from the reputed institutions, industrial experts, professional body members and distinguished alumni. The faculty members proposethe draft curriculum and syllabus based on National needs/Regional needs and based on the curriculum followed in reputed National /International Institutes/Universities, existing curriculum structure, competencies syllabus (GATE, UPSC,TANCET, TNPSC) and identification of thrust area (UGC, SERC, CECRI and DRDO) based on the curriculum structure given by the office of Director academic. In the formulation of the draft curriculum, the faculty members will consider all the aspects of department vision, mission, PO, PSO and PEO. Then the faculty members in that cell prepare a modified draft curriculum and syllabus based on feedback from other stake holders and also accounting the AICTE and ASCE regulations and guidelines. The same is forwarded to department advisory board.

(ii) Department Advisory Board (DAB)

The department advisory board is headed by the program coordinator and the senior faculty members who are expertise in the various field of civil engineering. The program coordinator will present the modified draft curriculum and detailed discussion will be made on that in the Department Advisory Board meeting and necessary corrections are made if required. As in the outcome of the meeting, the final draft curriculum and syllabus are prepared and forwarded to the board of studies meeting.

(iii) Board of Studies (BoS)

The Board of Studies Members includes the following:

a. Faculty members with experience and expertise in the specialization concerned in the cadre of Assistant Professor to Professor.
b. Members representing Academia/ R&D/Industry/Alumni.
c. Board of Studies Chairman.

In the BoS meeting, the verification of percentage of credits to match with AICTE recommendations and UGC guidelines will be done to prepare the curriculum and syllabus for any particular program. The BoS finalize the corrected/suggested curriculum and syllabus recommends for the approval by Academic Council.

(iv) Academic Council (AC)

The University Academic Council comprises of External Academic members, Vice-Chancellor, Registrar, Directors, Deans, HoD's and senior faculty members. The meeting is conducted as per the direction of Dean (Academic) and Vice Chancellor to approve the corrected/suggested curriculum for further implementation on that particular program.

(v) Initiatives from course in-charges:

(a) LearningManagement System (LMS)

The concern faculty members of each course are preparing the course materials and uploaded in the website for the student's reference. Students can retrieve the course material using their username and password provided to them. (http://kalasalingam.ac.in/elearn)

(b) NPTEL online courses

Students as well as faculty members are encouraged to use online materials of their courses and also to attend additional online courses to gain knowledge and experience in the domain. Moreover, for faculty members are acting as course mentor to facilitate the NPTEL course.

(c) Collaborative learning

The slow learners are grouped with fast learners and they are individually accountable for their work, and the work of the group as a whole is also assessed.

(d) ICT Supported learning - SMART Seminar Hall

The department has ICT supported smart board facilities in the seminar hall which facilitates the students' comfort learning.

(e) Virtual lab

The faculties explain the experiments in the laboratory through Virtual lab developed by various IIT's/NIT's

(f) Computer-assisted learning:

The Department has adequate number of computers, printers, LCD projectors, application Software and system software with internet connections which are effectively used for teaching. Many final year projects are completed through the use of above said resources.

(g) Flipped Class and Video Animation

Short video lectures given by Civil Engineering faculty members are viewed by students at home before the class session while in class time is devoted to exercises and discussions. Flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom. In a flipped classroom, students watch online lectures, collaborate in online discussions, or carry out research at home and engage inconcepts in the classroom with the guidance of a mentor.

(h) Theory with practical component

For the theory subjects which are not having the allied laboratory course, practical component will be added to the course and it will be explained and demonstrated by the concern faculty incharge.

(i) Laboratory Course with mini project

For one of the laboratory courses in each semester, the students are facilitated by the course handling faculty to do a mini project, as a part of the laboratory course.

(j) Industry expert lectures

The faculty members of each course are identifying the external expert from both academia and industry and frequently arranging their expert lectures for the help of student societies and also to enrich the industry expecting practical exposure.

(k) Industrial Visit:

To enrich the students with practical knowledge, every semester the faculty members are arranging the industrial visit to develop the technical related things through real life examples.

(vi) Course Evaluation

Assessment is done through one or more than one processes, carried out by the institution, that identify, collect, and prepare data to evaluate the achievement of Course Outcomes of each course of the program by the course in-charge/course coordinators. Direct methods display the student's knowledge and skills from their performance in the continuous internal assessment tests, semester examinations, seminars, and class room and laboratory assignments etc. Indirect methods include course exit survey, program exit survey, Non-

CGPA and employer survey. At the end of every semester, the assessment results of all courses are compiled and analyzed by program coordinator. In case, a CO and corresponding PO are not attained to the expected level for a particular course, program coordinator, module coordinator, course coordinator and corresponding faculties will discuss about the reasons for not attaining the COs and PO's.

If it is found that POs and COs are not attaining because of deficiency in the following aspects,

(i) Curriculum aspects: The suggestion and refinement plan for improving curriculum will be forwarded to Department Advisory Board. Department Advisory Board will discuss about the results, suggested refinements. If needed, curriculum refinement process will be initiated by Department Advisory Board.

(ii) Teaching Methodology: Back up lectures will be organized to support the junior faculty in case if a faculty handling a particular course is not familiar with that one.

(iii) Resources: Additional web resources and videos will be provided so as to improve the level of understanding.

(iv) Learning ability: Weak students will be identified from the 3rd semester onwards and additional coaching classes, assignments and tutorials will be arranged.

(v) Assessment Methodology: Practical oriented training / Industrial visits will be organized by the concerned faculty to enhance the level of understanding.

(vi) Impartus Video Capturing: The class room teaching by the faculty is recorded and it is uploaded in the cloud which can be viewed by any number of times by the students to improve their learning.

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

(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)

(a) List of participated events (Given below)
(b) List of organized events (Given below)

(a) List of Participated Events

S. No	Name of the faculty	Title of the Program participated	Date	Organized Institute
1	Mr. R. Premkumar	Online Course on Examination Reforms	15.04.2020 - 18.04.2020	IDC, AICTE
2	Mr. K. Mukilan	Webinar on Element Modification and Handrails in Prostructures Connect	16.04.2020	Bently Institute
3	Mr. S. Jagan	Two days FDP on Virtual Learning	20.04.2020 - 21.04.2020	CIT, Coimbatore
4	Mr. S. Jagan	Webinar on Relevance of Blended Cement	22.04.2020	IIT Bhuvaneswar
5	Mr. K. Mukilan	Webinar on Improving Efficiency of Highway Projects with BIM	28.04.2020	Bently Institute
6	Mr. K. Mukilan	Webinar on Digitally Enabled Project Management	28.04.2020	Bently Institute
7	Dr. PL. Meyyappan	Webinar on Earthquake Hazard, Risk and Mitigation	29.04.2020	ISET, Roorkee
8	Mr. K. Mukilan	Webinar on Art of Research Papers	29.04.2020	CIT, Chennai
9	Dr. PL. Meyyappan	Webinar on Improving Efficiency of Highway Projects with BIM	30.04.2020	Bently Institute
10	Mr. K. Mukilan	Webinar on Conceptualizing a Highway Project	30.04.2020	Bently Institute
11	Dr. PL. Meyyappan	Webinar on Conceptualizing a Highway Project	30.04.2020	Bently Institute
12	Dr. PL. Meyyappan	SIG Workshop on Geotechnical Analysis	01.05.2020	Bently Institute
13	Mr. K. Mukilan	Webinar on Levers on Digital Industry	01.05.2020	CIT, Chennai
14	Dr. PL. Meyyappan	Webinar on Tall, Super Tall and Mega Tall Buildings - Structural Configuration	02.05.2020	ACC Concrete
15	Mr. K. Mukilan	Online Workshop on Recent Advances in Science and Technology of Concrete	02.05.2020	IITM, Chennai
16	Dr. PL. Meyyappan	Webinar on Piles in Soft Clay Field Experience	03.05.2020	IGS, Guntur
17	Dr. PL. Meyyappan	Webinar on Forensic Structural Engineering	03.05.2020	KDKCE, Nagpur
18	Mr. K. Mukilan	Webinar on Forensic Structural Engineering	03.05.2020	KDKCE, Nagpur
19	Dr. PL. Meyyappan	Webinar on Highway Engineering - Design to Deliver	05.05.2020	Bently Institute
20	Dr. PL. Meyyappan	Webinar on Detailing of Reinforcement - Do's and Don't's	06.05.2020	AIT, Coimbatore
21	Dr. PL. Meyyappan	Webinar on PreEngineered Steel and its Connection Design Details	06.05.2020	AIT, Coimbatore
22	Dr. PL. Meyyappan	Webinar on Bridge Engineering - Comprehensive Bridge Design	07.05.2020	Bently Institute
23	Dr. PL. Meyyappan	Webinar on Fundamentals of Concrete Technology	07.05.2020	AVIT, Payanoor

24	Dr. PL. Meyyappan	Webinar on Special Concrete for Special Structures	08.05.2020	ICI, Bangalore Centre
25	Mr. R. Premkumar	Online Webinar on Achieving Sustainable Concrete through Use of Mineral Admixtures	08.05.2020	ICI, Bangalore Centre
26	Mr. K. Mukilan	Online Webinar on Achieving Sustainable Concrete through Use of Mineral Admixtures	08.05.2020	ICI, Bangalore Centre
27	Dr. PL. Meyyappan	Online Webinar on Achieving Sustainable Concrete through Use of Mineral Admixtures	08.05.2020	ICI, Bangalore Centre
28	Dr. PL. Meyyappan	Webinar on Earthquake Engineering and Technology	09.05.2020	ISET, Roorkee
29	Mr. K. Mukilan	Webinar on Digital Learning	09.05.2020	CIT, Chennai
30	Mr. S. Jagan	Online Workshop on Academic Book Writing and Related Topics	13.05.2020	Springer Nature
31	Mr. K. Mukilan	Online Course on Advanced Concrete Technology	16.05.2020 - 14.06.2020	ICI, Kochi Centre
32	Mr. R. Premkumar	Online Course on Advanced Concrete Technology	16.05.2020 - 14.06.2020	ICI, Kochi Centre
33	Mr. S. Jagan	Online Course on Advanced Concrete Technology	16.05.2020 - 14.06.2020	ICI, Kochi Centre
34	Mr. K. Mukilan	Webinar on FE Simulation of Laser Welding Process	16.05.2020	KIT, Coimbatore
35	Dr. PL. Meyyappan	Workshop on Indian Seismc Codes - IS1893 - 2016	18.05.2020 - 22.05.2020	RMKCE, Chennai
36	Dr. PL. Meyyappan	Webinar on Understanding BIM Opportunities for Students and Teachers	19.05.2020	GITAM, Viszag
37	Mr. K. Mukilan	Webinar on Enduring Trends in Mobile Robotics: Present and Future	19.05.2020	CIT, Chennai
38	Dr. PL. Meyyappan	Webinar on Faecal Sludge Management ; Indian Scenario & Way Forward	19.05.2020	KDKCE, Nagpur
39	Mr. R. Premkumar	One Week National Level FDP on Matering the Art of Handling COVID Challenges	19.05.2020 - 23.05.2020	Dr.MGRU, Chennai
40	Dr. PL. Meyyappan	Webinar Series on Institution Innovation in Civil Engineering	20.05.2020 - 23.05.2020	NGP, Coimbatore
41	Dr. S. Vanitha	FDP on Environmental Engineering	20.05.2020 - 23.05.2020	GMR, Srikakulam
42	Dr. PL. Meyyappan	Webinar on Biochar and its Application	20.05.2020	MSEC, Ramnad
43	Mr. R. Premkumar	Webinar on Use of Online Resources in Teaching and Learning Process	20.05.2020	HNBG University,

				Srinagar
44	Mr. K. Mukilan	Webinar on Use of Online Resources in Teaching and Learning Process	20.05.2020	HNBG University, Srinagar
45	Dr. PL. Meyyappan	Webinar on Alternative Materials for Sustainable Concrete - A Research Perspective	20.05.2020	Civil, KARE
46	Mr. K. Mukilan	Webinar on Alternative Materials for Sustainable Concrete - A Research Perspective	20.05.2020	Civil, KARE
47	Dr. PL. Meyyappan	Webinar on Green Building Technology	21.05.2020	CIT, Chennai
48	Dr. PL. Meyyappan	Webinar on Emerging Trends in Concrete Technology	22.05.2020	Civil, KARE
49	Dr. PL. Meyyappan	Webinar on Introduction to Structural Design	22.05.2020	VCE, Warangal
50	Dr. PL. Meyyappan	Webinar on Next Gen Classroom Teaching Leveraging PBL	23.05.2020	CSE, KARE
51	Dr. PL. Meyyappan	Webinar on Artificial Aggregate and its Behaviourial Aspects in Structures	25.05.2020	VCE, Warangal
52	Mr. K. Mukilan	Webinar on Sustainable Building Materials: Timber and Bamboo	25.05.2020	Ramco, RJPM
53	Dr. PL. Meyyappan	Webinar on Sustainable Building Materials: Timber and Bamboo	25.05.2020	Ramco, RJPM
54	Dr. PL. Meyyappan	Webinar on Data Driven Optimzation in Engineering	25.05.2020	KVCET, Pondicherry
55	Mr. K. Mukilan	FDP on Applications of Construction Techniques and Practices in Civil Engineering	25.05.2020 - 31.05.2020	Civil, KARE
56	Dr. PL. Meyyappan	National Level Webainar on Application of Fibre Reinforced Polymer Composites	26.05.2020	SAEC, Chennai
57	Mr. K. Mukilan	Webinar on High Early Strength of Low and High Modulus of Fibre Reinforced Concrete	26.05.2020	Ramco, RJPM
58	Mr. R. Premkumar	Two Week FDP on Seismic Analysis and Design of RCC and Masonry Structures	26.05.2020 - 06.06.2020	BIT, Sathy
59	Mr. K. Mukilan	Two Week FDP on Seismic Analysis and Design of RCC and Masonry Structures	26.05.2020 - 06.06.2020	BIT, Sathy
60	Mr. S. Jagan	Webinar on Simulation Driven Engineering Best Practices using ANSYS	26.05.2020	CIT, Coimbatore
61	Mr. K. Mukilan	Webinar on Introduction to Finite Element Analysis	27.05.2020	Ramco, RJPM
62	Dr. PL. Meyyappan	International Webinar Series on Coastal and Environmental Management	27.05.2020 - 28.05.2020	PSG, Coimbatore
63	Mr. K. Mukilan	Webinar on Applications of Remote Sensing and GIS in Watershed	27.05.2020	MAM, Trichy

		Management		
64	Dr. PL. Meyyappan	Online Short Term Program on "Innoovation and Upgradation in Infrastructural Technology	27.05.2020 - 02.06.2020	TEC, ASTAR
65	Dr. PL. Meyyappan	Two-Day International Online Capacity Building Program on "Civil Engineering Practices"	28.05.2020 - 29.05.2020	AITS, Tirupati
66	Mr. K. Mukilan	Webinar on Carreer Opportunities in Civil Engineering	28.05.2020	Ramco, RJPM
67	Mr. R. Premkumar	Webinar on Use of Admixtures for Sustainable Concrete	28.05.2020	ICI Centre, Bangalore
68	Mr. K. Mukilan	Global Opportunities in Space Exploration and Research	29.05.2020	SVCT, Sriperumbuthur
69	Mr. R. Premkumar	National Webinar in Challenges in Concrete Technology	29.05.2020	ICI, Bangalore Centre
70	Mr. K. Mukilan	Job Opportunities and Chanllenges of Civil Engineering after Graduation	29.05.2020	KPRIET, Coimbatore
71	Dr. PL. Meyyappan	Webinar on Challenges in Concrete Technology	29.05.2020	ICI, Bangalore Centre
72	Mr. K. Mukilan	Webinar on Importance of Planning and Project Management in Civil Engineering	29.05.2020	AIHT, Chennai
73	Mr. S. Jagan	Webinar on Knowledge Sharing on A to Z of Journal Publications	30.05.2020	IFERP
74	Mr. K. Mukilan	Webinar on Green Building Rating System in India	01.06.2020	SRMTRP, Chennai
75	Mr. K. Mukilan	Webinar on Surviving and Succeeding through Pandemonium Times	02.06.2020	AKCE-KLU, KARE
76	Mr. K. Mukilan	Webinar on Sustainable Building Materials from Agro-Forestry	03.06.2020	Sathyabama, Chennai
77	Mr. K. Mukilan	Webinar on Disinfection Technology of Hospital Wastes and Waste on COVID Pandemic	03.06.2020	FXEC, Tirunelveli
78	Dr. PL. Meyyappan	Webinar on Microstructural Characterization of Concrete	04.06.2020	EEC, Chennai
79	Mr. K. Mukilan	Webinar on Concrete Technology for Digital Era - Research and Industry Perspective	04.06.2020	Civil, KARE
80	Mr. S. Jagan	Webinar on Virtual classroom for Teachers and Challenging Technologies in Post COVID19	05.06.2020	IFERP
81	Mr. K. Mukilan	National level Webinar on Solid Waste Management	05.06.2020	VMRF, Chennai

82	Mr. K. Mukilan	Webinar on Carreer Guidance and Competitive Skills in Civil Engineering	06.06.2020	GTU, Gujarat
83	Mr. R. Premkumar	Online Webinar on Carrieer Guidance and Competative Skills in Civil Engineering	06.06.2020	GTU, Gujarat
84	Mr. R. Premkumar	One Week FDP on Advanced Applications of Structural Concrete in Civil Engineering	07.06.2020	KLU, Guntur
85	Mr. S. Jagan	Online Short Term Program on Recent Trends in Civil Engineering and Construction Technology	08.06.2020 - 13.06.2020	BNSE, Pusad
86	Dr. S. Vanitha	One Week FDP on Experimental and Modeling Aspects in Environmental Engineering	08.06.2020 - 13.06.2020	Civil, KARE
87	Mr. K. Mukilan	Webinar on Scientific Writing	11.06.2020	TIEIT, Bhopal
88	Mr. S. Jagan	Webinar on Research Article Writing and Publishing in Good Impact Journal	13.06.2020	IFERP
89	Dr. PL. Meyyappan	Expert Webinar on Recent Trends in Concrete Technology and Admixture	13.06.2020	REC, Chennai
90	Mr. S. Jagan	Webinar on AI getting used in Impact of COVID-19	14.06.2020	IFERP
91	Mr. S. Jagan	One Week FDP on Digital Tools for Learning	15.06.2020 - 20.06.2020	IQAC, KARE
92	Mr. K. Mukilan	One Week FDP on Digital Tools for Learning	15.06.2020 - 20.06.2020	IQAC, KARE
93	Mr. R. Premkumar	One Week FDP on Digital Tools for Learning	15.06.2020 - 20.06.2020	IQAC, KARE
94	Dr. S. Vanitha	One Week FDP on Digital Tools for Learning	15.06.2020 - 20.06.2020	IQAC, KARE
95	Mr. K. Mukilan	Webinar on Leadership	15.06.2020	CIT, Chennai
96	Mr. K. Mukilan	Webinar on Scope in Administrative Jobs after Engineering	21.06.2020	NSHM, Durgapur
97	Dr. PL. Meyyappan	Webinar on Theory of Simple Bending and its Application in Civil Engineering	24.06.2020	VCE, Telangana
98	Dr. PL. Meyyappan	Webinar on Regression Modelling	25.06.2020	FXEC, Tirunelveli
99	Mr. R. Premkumar	Two Days Online FDP on Designing and Implementation of OBE Model	07.07.2020 - 08.07.2020	SMC, Aurangabad
100	Dr. PL. Meyyappan	National Training Programme on Earthquake Risk Mitigation	08.07.2020 - 10.07.2020	NIDM, NewDelhi
101	Dr. PL. Meyyappan	Webinar on 3D Printing in Concrete Construction	12.07.2020	Ultra Tech
102	Dr. PL. Meyyappan	Webinar on New Construction and Water Proofing	17.07.2020	NIT, Coimbatore

103	Dr. PL. Meyyappan	International online workshop on Learning Management System e-learning tools	20.07.2020	SRM, Chennai
104	Mr. K. Mukilan	Webinar on the Comparative Method in Qualitative and Quantitative Research	22.07.2020	SLTC, Lanka
105	Mr. K. Mukilan	Webinar on Simple and Rational Mixture Design of Self Compaction Concrete	28.07.2020	UCE, Nagercoil
106	Dr. S. Vanitha	Course on IUCEE Clean and Green Campus	01.08.2020 - 30.11.2020	IUCEE
107	Dr. S. Vanitha	First International Conference of Sustainable Infrastructure with Smart Technology - SISTEEM 21	03.09.2020 - 04.09.2020	BIT, Sathy
108	Dr. S. Vanitha	Eighth International Conference on Transformation in Engineering Education - ICTIEE-2021	08.01.2021 - 10.01.2021	IUCEE
109	Mr. S. Jagan	Two Days Online Workshop on Patent Drafting and Processing with Importance of Trademark	06.05.2021 - 07.05.2021	JAER
110	Mr. K. Mukilan	Online FDP on Latest Innovations in Transportation Engineering and Infratructure Developments	21.05.2021 - 26.05.2021	Civil Dept, KARE
111	Mr. K. Mukilan	Virtual Training on Importance and Implementation of Process Safety Management	23.05.2021	TNSPW Association
112	Mr. K. Mukilan	Webinar on Variabiliy and Strength Factors affecting the Intrepretation of Concrete Strength	12.06.2021	Ultra Tech
113	Dr. PL. Meyyappan	Webinar on the Future of Intellectual Property Rights	15.06.2021	SIT, Kariayapatti
114	Dr. S. Vanitha	FDP on Fluid Mechanics and Channel Hydraulics	16.06.2021 - 18.06.2021	Civil Dept, KARE
115	Mr. K. Mukilan	FDP on Fluid Mechanics and Channel Hydraulics	16.06.2021 - 18.06.2021	Civil Dept, KARE
116	Mr. R. Premkumar	Workshop on CDIO - Conceive, Design, Innovate and Operate	18.06.2021	IUCEE
117	Dr. S. Vanitha	Webinar on Solid Waste Management Techniques	05.06.2021	NSS, KARE
118	Mr. R. Premkumar	Online Workshop on Role of Technology and Specific Tools in Research	28.06.2021 - 03.07.2021	SGT, New Delhi
119	Dr. PL. Meyyappan	Webinar on Research and Without Border	24.08.2020	NGP, Coimbatore
120	Mr. S. Jagan	2021 Global Conference on Recent Advances in Sustainable Materials - GCRASM 2021	29.07.2021 - 30.07.2021	AJIET, Mangalore
121	Mr. R. Premkumar	National Webinar on Coining Research Article Title and Literature Review	10.08.2021	AIGS, Bangalore

122	Mr. S. Jagan	Webinar on Technology Based Teaching in Class Room	10.09.2021	IFERP
123	Mr. S. Jagan	Webinar on Biology in Concrete	20.09.2021	IFERP
124	Mr. S. Jagan	Webinar on Composite Materials - Metal Matrix Composites	26.09.2021	IFERP
125	Dr. S. Vanitha	Webinar on Pollution Prevention Measures in Industrial Sectors	16.11.2021	NSS, KARE

(b) List of organized Events

Name of the capability enhancement program	Date of implementation	Number of students enrolled	Name of the agencies/consultants involved with contact details (if any)
2021-22			
National level technical symposium "ASTHIVAAR-2K22	29.04.2022	116	Department of Civil Engineering, KARE
Webinar "Construction Management in Infrastructure Aspects of Urban Transport"	31.01.2022	48	Department of Civil Engineering, KARE
Project Expo	30.11.2022	42	Department of Civil Engineering, KARE
Webinar on the topic "Pollution Prevention Measures in Industrial Sectors	16.11.2022	76	Department of Civil Engineering, KARE
Webinar on the topic "Nano-Technology in Civil Engineering	30.10.2022	47	Department of Civil Engineering, KARE
Webinar on The Next Normal in Construction Industry: Startup Perspective	15.09.2021	42	Department of Civil Engineering, KARE
2020-21			
Guest Lecture on "Civil Engineer Profession-After Lock down"	09.04.2021	60	Department of Civil Engineering, KARE
Training Program on Total Station	24.03.2021 to 26.03.2021	42	Department of Civil Engineering, KARE
Guest Lecture on Water Management	22.03.2021	135	Department of Civil Engineering, KARE
One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete Technology (Phase III)	07.12.2020 to 12.12.2020	100	Department of Civil Engineering, KARE

One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete Technology (Phase II)	23.11.2020 to 28.11.2020	100	Department of Civil Engineering, KARE
One Week AICTE & ISTE Sponsored Online STTP on Latest Innovations and Technological Advancements in Concrete Technology (Phase I)	02.11.2020 to 07.11.2020	100	Department of Civil Engineering, KARE
VIRTUAL INTERNATIONAL CONFERENCE ON "INNOVATIONS INTERDISCIPLINARY RESEARCH"	23-6-2020	42	Department of Civil Engineering ,KARE
Cloud Internship Program Civil – STAAD Pro	10.08.2020 to 20.08.2020	52	Department of Civil Engineering ,KARE
2019-20			
EXPERT LECTURE ON "CREATING STAIRS IN REVIT ARCHITECTURE"	22-5-2020	176	Department of Civil Engineering, KARE
WEBINAR ON "CONCRETE TECHNOLOGY FOR DIGITAL ERA - RESEARCH AND INDUSTRIAL PERSPECTIVE"	4-6-2020	83	Department of Civil Engineering ,KARE
NATIONAL SEMINAR ON "SUSTAINABLE CONCRETE –A CONCRETE FOR THE FUTURE GENERATION"	4-6-2020	50	Department of Civil Engineering ,KARE
WEBINAR ON "NATURAL RESOURCE CONSERVATION"- A NEED OF THE HOUR	7-6-2020	25	Department of Civil Engineering ,KARE
WEBINAR ON " SUSTAINABLE DEVELOPMENTS IN FLEX IBLE PAVE STRUCTURES"	7-6-2020	18	Department of Civil Engineering ,KARE

4.4 Research and Development

4.4.1. Sponsored Research

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):

Amount>50Lac15Marks,
Amount >40 and<50 Lacs 10Marks,
Amount >30 and<40 Lacs 5Marks,
Amount >15 and<30 Lacs 2Marks,
Amount<15Lacs 0Mark

Table 4.4.1.1 Sponsored research projects

No	Name of the PI/ Co-PI	Project Title	Funding Agency	Duration	Amount	Assessment Year
1	Dr.P.L. Meyyappan (PI)	Development of cost effective Light Emitting Transparent Concrete.	TNSCST	6 Months	0.075lakhs	2021-22
2	Dr. M. Muthukannan (PI) Dr. A. Chithambar Ganesh (Co-PI)	Utilization of industrial waste in the production of energy efficient bricks	TNSCST	6 Months	0.1 lakhs	2019-20
3	Dr. M. Muthukannan (Co-PI)	Establishment of STI hub for production of eco-friendly and economical products to improve the socio-economic status of SC population in Srivilliputtur block, Virudhunagar District, Tamilnadu	DST-SEED	3 Years	2.38 crores	2019-20
4	Dr. C. Sivapragasam (PI) Dr. S. Vanitha (Co-PI)	Biological treatment of hazardous sludge from petroleum refinery industry	KARE & UTP	2 Years	3.5 lakhs	2018-19
Cumulative amount					**Rs. 2,42,11,400**	

4.4.2 Consultancy (from Industry) (15)

Table 4.4.2.1 a

No	Name of the Faculty	Title of the consultancy work	Funding Agency	Amount	Assessment Year
1	Dr.C.Sivapragasam, Dr.Naresh Kumar Sharma, Dr.S.Vanitha	Kowsiganathi River and Kullursandai dam Testing Charges	Executive Engineer, Public Works Department, Environmental Cell Division, Madurai	10384	2020-21
2	R. Prem Kumar, C. Ramesh Babu	Safe bearing capacity of soil for the construction of panchayat union primary school	panchayat union primary school	24000	2020-21
				Rs. 34384	

Table 4.4.2.1 b

No	Name of the Faculty	Title of the consultancy work	Funding Agency	Amount	Assessment Year
1	Mr.M. Muthukannan	Stability Analysis of structure	Kodaikanal Municipality	10000	2019-20
2	Dr. T. R. Neelakantan	Dynamic Pressure-Dependent Simulation of Water Distribution Networks Considering Volume-Driven Demands Based on Noniterative Application of EPANET 2	Praj Industries Ltd.	632000	2019-20
3	Dr. C. Ramesh Babu & Mr. R. Premkumar	Design and Detailing of Commercial Building in Rajapalayam	Ayothi Consultancy	70000	2019-20
				Rs.712000	

Table 4.4.2.1 b

No	Name of the Faculty	Title of the consultancy work	Funding Agency	Amount	Assessment Year
1	Dr. C. Ramesh Babu	Smart health informatics system	Guru Hospitals	555000	2018-19
2	Mr. P. Velumani	Accident Analysis & Mitigation in NH 208 from Alagapuri	Inspector of Police, Traffic Division, Srivilliputhur-626125	15000	2018-19

		junction to Rajapalayam (20Kms)			
3	Mr. S. Jagan	Survey work	Sobha Limited, Site at Ooty- 643002	10000	2018-19
4	Dr. Ramesh Babu	Material Properties test	The Charoor Primary Agricultural Co-operative Credit Society Ltd, Bharathapally-626117	2000	2018-19
				Rs. 582000	

Cumulative Consultancy Amount

Year	Consultancy Amount
2020-21	Rs. 34384
2019-20	Rs. 712000
2018-19	Rs. 582000
	Rs. 1328384

CRITERION 5	Laboratories and Research Facilities	75

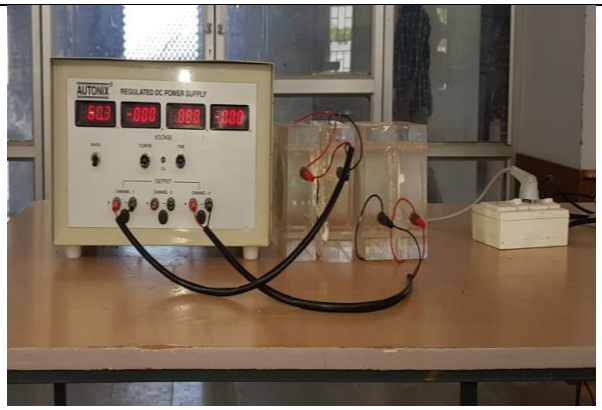
5.1. Adequate and well equipped laboratories in area of Program specialization (30)

Sr. No.	Name of the Laboratory	Specialized Equipment Name	Equipment details	Utilization details from the perspective of PO attainment
1	Structural Engineering laboratory	Computerized Universal Testing Machine (UTM) with double shear attachment (100 T)	Fuel Instruments & Engineers Pvt ltd, Maharastra Model Number: UTE 100	PO1, PO2, PO3
2		Compression Testing Machine (200T)	Lawrence & Mayo(India) Pvt. Lld Chennai-2	
3		Hot air oven	Labtech Laboratory Products, Tiruchy Model Nmuber: LTMHD 5-6	
4		Accelerated curing tank	GS Scientific company, Madurai	
5		Rotating Concrete Mixer	Ganapathy Scientific Equipment	
6		Loading Frame Apparatus-50 Ton	Lawrence& mayo pvt.ltd H type.50 Tonnes	
7		Ultrasonic Pulse Velocity	Ganapathy Scientific Equipment Model Number:4600	
8		Rebound Hammer	Lawrence& mayo pvt.ltd 10-70 N/mm^2 DSW, India	
9		Rapid Moisture Tester	Lawrence& mayo pvt.ltd	
10		Rapid Chloride Penetration Test	Ganapathy Scientific Equipment Model Number: ASDM-1202-05	

11		Blain Air Permeability Apparatus	Lawrence& Mayo pvt.ltd	
12		STADD Pro	STADD Pro V8I	
13		SPSS	SPSS 2020	
14		Primavera	Primavera P6, version19.12	
15		AutoCAD	AutoCAD 2012	
16		KY Pipe	This software was provided by Fluid Hammed Consultancy Services, Hyderabad which is the Indian part of KYPIPE, USA, for academic use. The cost of the software is Rs 2.5 lakh.	
17		ANSYS	ANSYS 14	
18		ETABS	ETABS version 9	

Equipment Details

Loading frame



Rapid chloride penetration test

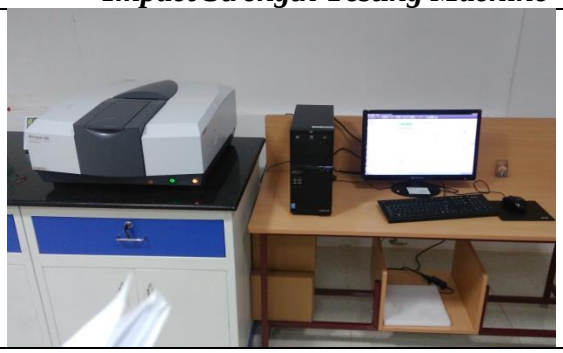
	
Universal testing machine	***Ultrasonic pulse velocity***
	
Rebound hammer	***Attrition testing machine***
	
Accelerated Curing tank	***Compression testing machine***

5.2. Research facilities / center of excellence (30)

In the Civil engineering department, Centre for Building materials (Research Laboratory) is available. The following major equipments namely Loading frame, Rapid chloride penetration

test, Ultrasonic pulse velocity, Rebound hammer, Rapid moisture tester, Air permeability apparatus, Hot water curing tank, rotating concrete mixture are available.

Apart from that, X-ray Diffractometer (XRD), Scanning Electron Microscope (SEM) Energy Dispersive X Ray Analysis (EDX) and Fourier Infrared Spectroscopy (FTIR) equipments are also available at International Research Centre (IRC) in Kalasalingam Academy of Research and Education and are effectively utilized by civil engineering students. Every Laboratory is supported by laboratory technical in-charges and laboratory technicians with sufficient working experience to guide the students to use tools, equipment and computing resources. Besides this, for each laboratory, laboratory manuals are prepared to augment the support rendered by laboratory instructors. Display boards are provided in all laboratories for obtaining information about the experiments and equipment specification.

<table>
<tr><th colspan="2">Utilization of Equipment at International research center</th></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>X-Ray Diffractometer</td><td>Impact Strength Testing Machine</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Scanning Electron Microscope</td><td>Fourier Transform Infrared Spectrometer</td></tr>
</table>

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 undersupervision until then explanned 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 offices pace is within the laboratory, they may access their desk. However, unless another fully trained laboratory staff member is present, the student shouldnot 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. Theymust register for the laboratory safety training session after their arrival and shouldnot 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 anothertrainedlab member.

Faculty Members (PIs) and Laboratory Supervisors:

While faculty members and laboratory supervisors may receive immediate access to their assigned laboratories, they must under go the two-part training series as soon as possible. The first part is a high level supervisory specific briefing provided by EHS personnel. It should be scheduled 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 ofResearch. Except for short-term visitors, all visitors are subjected to the sametrainingand keyaccessrules outlined above.

Short Term Visitors:

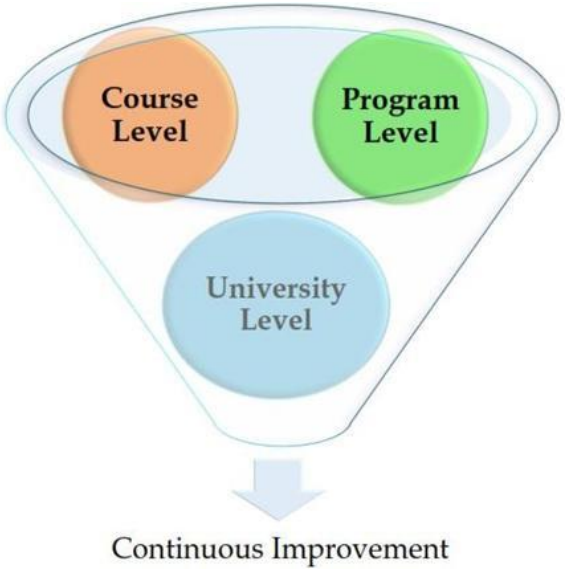
Laboratory access should not be granted to short-term visitors. These visitors should only be working in laboratories while trained University faculty, staff, or students are present. Because these visitors will be accompanied at all times, laboratory safety training is not necessary. However, they should 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	75

6.1. Actions taken based on the results of evaluation of each of the POs (25)

Identify the areas of weaknesses in the program based on the analysis of evaluation of POs attainment levels. Measures identified and implemented to improve POs attainment levels for the assessment years including curriculum intervention, pedagogical initiatives, support system improvements, etc. Actions taken, to be mentioned here.

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 decides the attainment of POs. Hence, steps were taken for achieving higher CO attainment and to strengthen the mapping of CO with the PO through detailed analysis by implementing various measures like innovative pedagogy and curriculum upgrade. 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 various action plans specific to the courses and programme are shown in Fig 6.1.



Improvement Process at the Course Level

- 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 Process at the Program Level

- Revision of curriculum
- Revision of teaching and learning process
- Revision of assessment procedure and interpretation of result
- Revision of feedback system
- Improvement Process at the University level
- Implementation of ICT tools in teaching
- Faculty Development Program through Center for Learning Technology
- (CLT)
- Swayam MOOC Courses – 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, Fig 6.2 shows the overall action taken to improve the quality of the system, the actions taken to improve the attainability lack by offering quality improvement programs to supporting staff and improving faculty qualities by advising them to undergo online courses and participate in seminar/workshop at peer group institution.

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

The programme coordinator will continuously evaluate the performance of the student through direct assessment methods for achieving the targeted COs and POs and the gap will be identified. Fig 6.2 shows the process of identification of gap 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. The following step by step procedure is implemented for the identification of gap analysis and action taken:

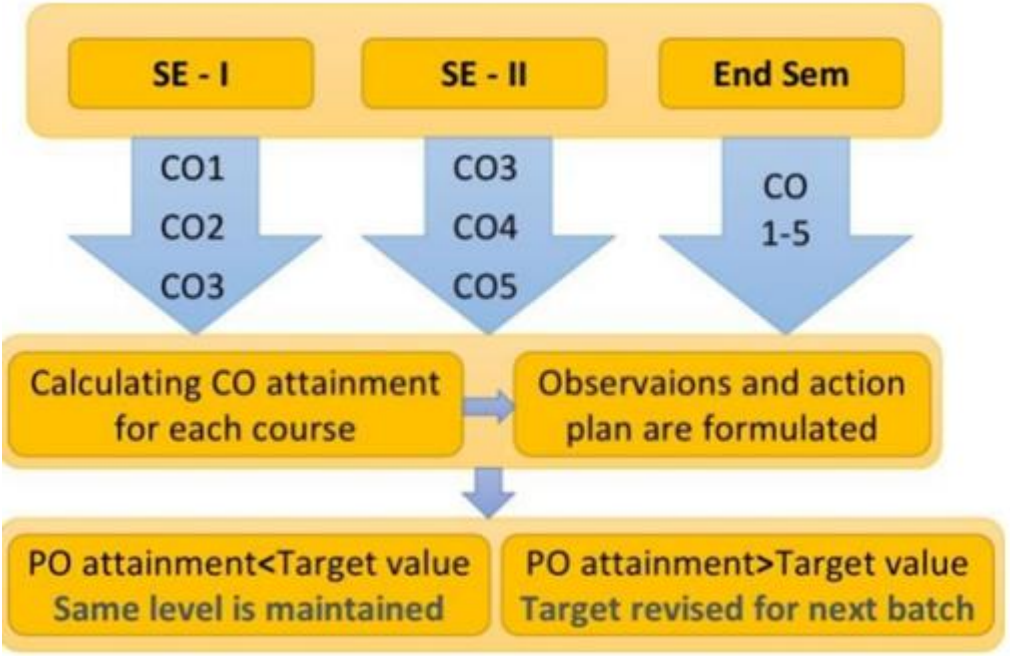
1. Based on the CO attainment level, the reason for the lack was observed and subsequently the action plans for the improvement are framed.
2. Effective implementation of the action plan helps to bridge the gap between attainment and set target value.
3. Further the POs attainment is calculated based on the COs attainment.
4. 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.

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

The programme 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.

1. Based on the COs attainment level the observations were noted subsequently the action plans for the improvement are framed.
2. Effective implementation of the action plan helps drastically to minimize the gap observed.
3. Further the POs attainment is calculated based on the COs attainment.
4. 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.



Following the above process, the data of the previous batch of students (2018–2020) were collected and analysed 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

Continuous Assessment on Program Attainment

Based on the student performance on PO attainment, the remedial measures were taken in various aspects such as, teaching and learning process, curriculum modification, and elimination of academic content and dissemination of academic flexibility based on course exit survey. All these modifications were performed with the focus of improving CO attainment for the individual student since the enhancement of CO attainment will aid to improve the PO attainment. 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 carryout research / investigation and development work to solve practical problem.

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 Details	CO1	CO2	CO3	CO4	CO5
1	PGM18R5001 – Research Methodology	1	2	1	2	1
2	CIV18R5102 – Structural Dynamics	2	2	2	2	1
3	CIV18R5106 – Matrix Method of Structural Analysis	2	2	3	2	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.

Based on the student performance, the Program Outcomes are evaluated with reference to the level of involvement in courses examination and experiential learning through practical and field work. To execute the continuous improvement, the Program Outcome and Course Outcomes attainments are interrelated to find a remedial measures and action plan. In this section, the action plan and the key parameters involved to improve the Course outcome and program outcome are discussed in detail. The level of attainment fixed for the Program Outcome is 70%, and converted to a meter scale 0 to 3. The Program Outcome attained for the proposed course in the batch 2018 – 20 is given as below. Figure shows the level of attainment for the program M.Tech. in Structural Engineering for the CAY.

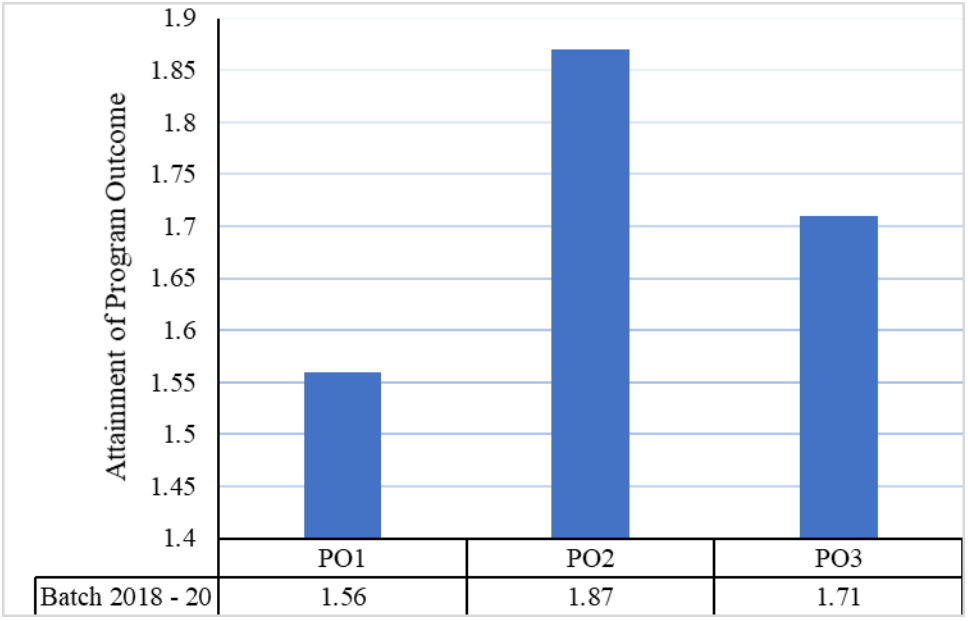


Figure: Program Outcome attainment for the batch 2018 – 20; for action plan and remedial measures in continuous measurement.

It is clear thatthere are three Outcomes in the Program which has not met the expected target value of 70% (2.1 for 3 scale meter) in the current academic year. To discuss in detail, the courses involved in each program outcome are micro analysed with course attainment and the action plan for continuous improvement for next batch.

Continuous Assessment on Program Attainment

PO1: An ability to independently carryout research / investigation and development work to solve practical problem.

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	CIV18R5102 – Structural Dynamics	2	2	2	2	1
3	CIV18R5106 – Matrix Method of Structural Analysis	2	2	3	2	2

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

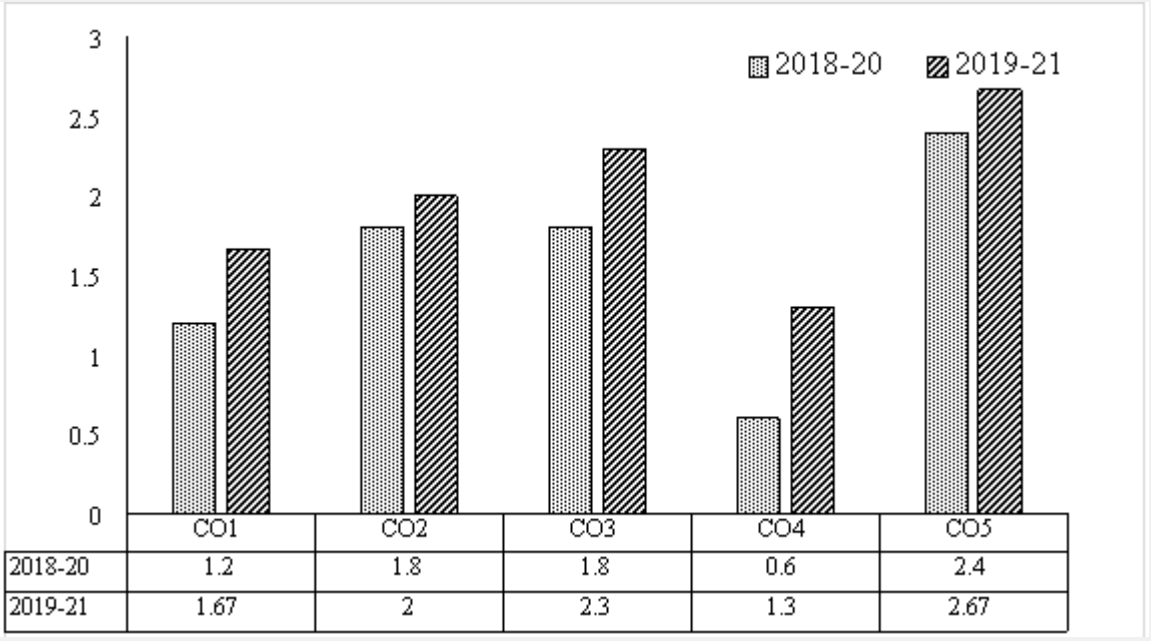
The majority of the courses and their COs mapping with the PO1 are in the Medium level.

POs	Target Level	Attainment Level	Observations for the Batch 2018 – 20.
PO1	2.1	1.69	***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. The attainment for the courses are not meet out due to 1. Aspirants felt lagging on identifying he problem and data collection for analysis 2. Students are inefficient to find suitable problem-solving method for the problem taken.
			CIV18R5102 – Structural Dynamics It is a post graduate core course, intended to provide necessary knowledge to establish the equations of motion and determination of structural response from dynamic loads and experience in modelling and calculation of dynamic response for simple structural systems. The attainment for the courses 1. Aspirants felt lagging in understanding the concepts of dynamic analysis 2. Students have lack of practice in the analysis procedures
			CIV18R5106 – Matrix Method of Structural Analysis It is a post graduate core course, aimed to provide systematic and simple solutions for the analysis of beams-columns and frames. Two approaches stiffness matrix and flexibility matrix computation is involved. The attainment for the courses are not meet out due to 1. Aspirants felt confusion in the computation methods. 2. Students have lagging the basic concepts of mathematics and matrix solving approaches.

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

Action Taken	*COs*
Data collection and Documentation from the industrial safety measures and analysis	CO1
Advanced techniques to be adopted in complex situation for ease of problem solving	CO3
Needs to conduct training program on how to publish paper in the conference and journals	CO4



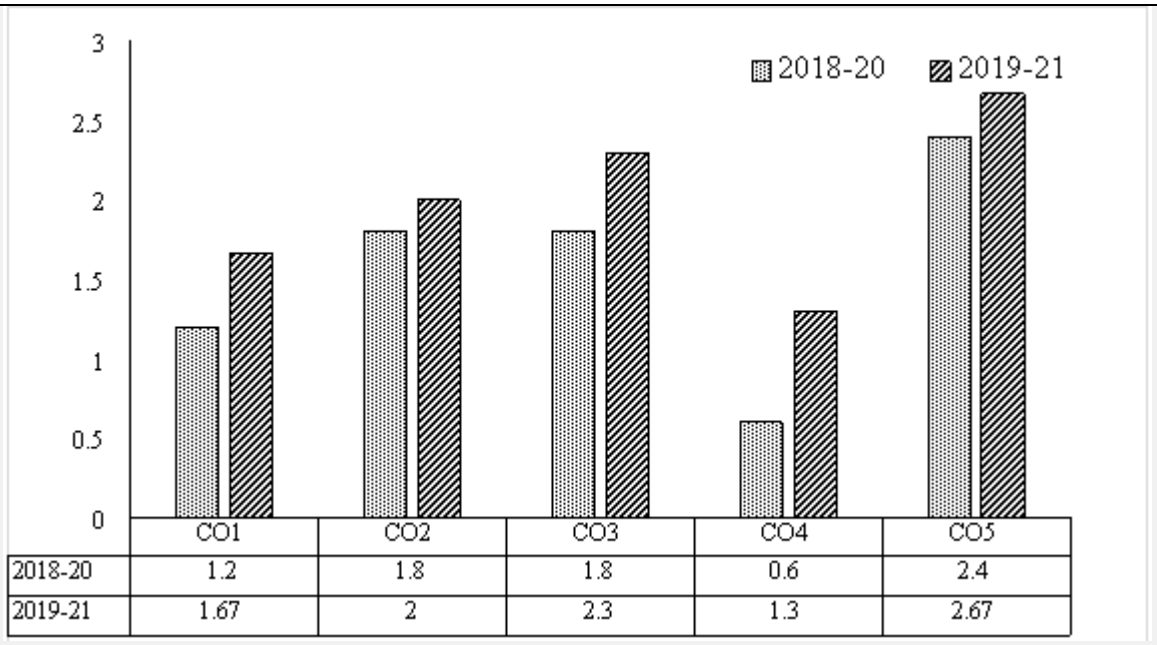
	CO1	CO2	CO3	CO4	CO5
2018-20	1.2	1.8	1.8	0.6	2.4
2019-21	1.67	2	2.3	1.3	2.67

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) have been improved a lot for the course on Research Methodology. Still the CO3 requires still more concentration on data interpretation and evaluation pattern.

2. CIV8R5102 – Structural Dynamics

Action Taken	*COs*
Video lectures to be used in explain the concepts for better understanding	CO1
Additional classes to be conducted beyond the regular hours for adequate practice	CO2 & CO3
More problems to be given to practice the procedures that involved in dynamic analysis	CO4



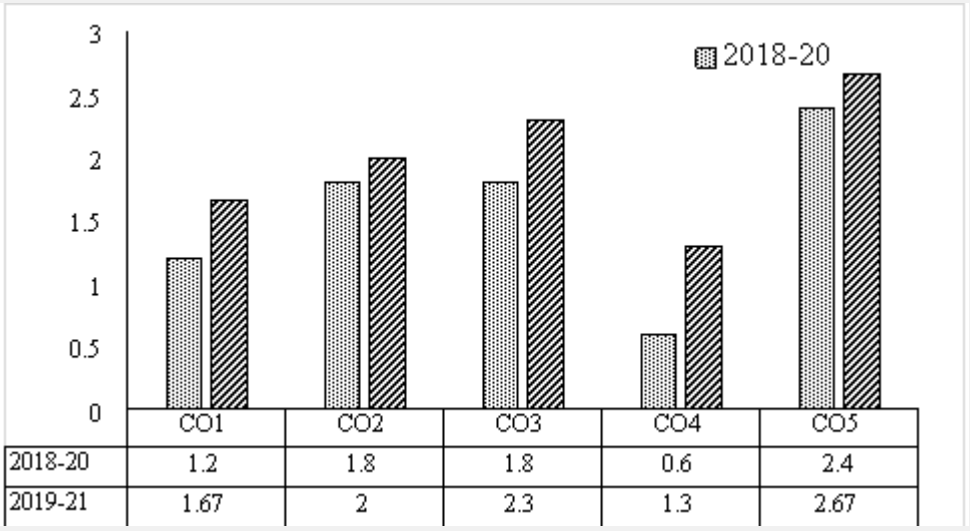
	CO1	CO2	CO3	CO4	CO5
2018-20	1.2	1.8	1.8	0.6	2.4
2019-21	1.67	2	2.3	1.3	2.67

Course Attainment for the course CIV18R5102 – Structural dynamics for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO2, CO3 are in the marginal improvement for the course on Structural dynamics. CO1 requires still more concentration on arriving the equation. CO4 increases in good from 1.2 to 1.67.

3. CIV18R5106 – Matrix Method of Structural Analysis

Action Taken	***COs***
Additional classes will be conducted beyond the regular hours to get more practice on the computing procedures	CO2
Bridge course conducted to impart the basic concepts in mathematics and matrix solving approaches	CO2 and CO4
Flipped class room methodology has to be adopted to understand the concepts in a better manner	CO5



	CO1	CO2	CO3	CO4	CO5
2018-20	1.2	1.8	1.8	0.6	2.4
2019-21	1.67	2	2.3	1.3	2.67

Course Attainment for the course CIV18R5106 – Matrix Method of Structural analysis for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO1, CO2 and CO3 are in the marginal improvement for the course on Matrix Method of Structural analysis. CO3 and CO4 increased tremendously.

PO 2: 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 PO1 and their CO mapping are as follows:

S.No.	***Course Detail***	***CO1***	***CO2***	***CO3***	***CO4***	***CO5***
1	CIV18R5105 – Advance Concrete Design	1	3	3	3	1
2	CIV18R5110 – Design of Steel Concrete Composite Structures	1	2	2	1	1
3	CIV18R5104 – Advanced Steel Structures	2		2		2

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

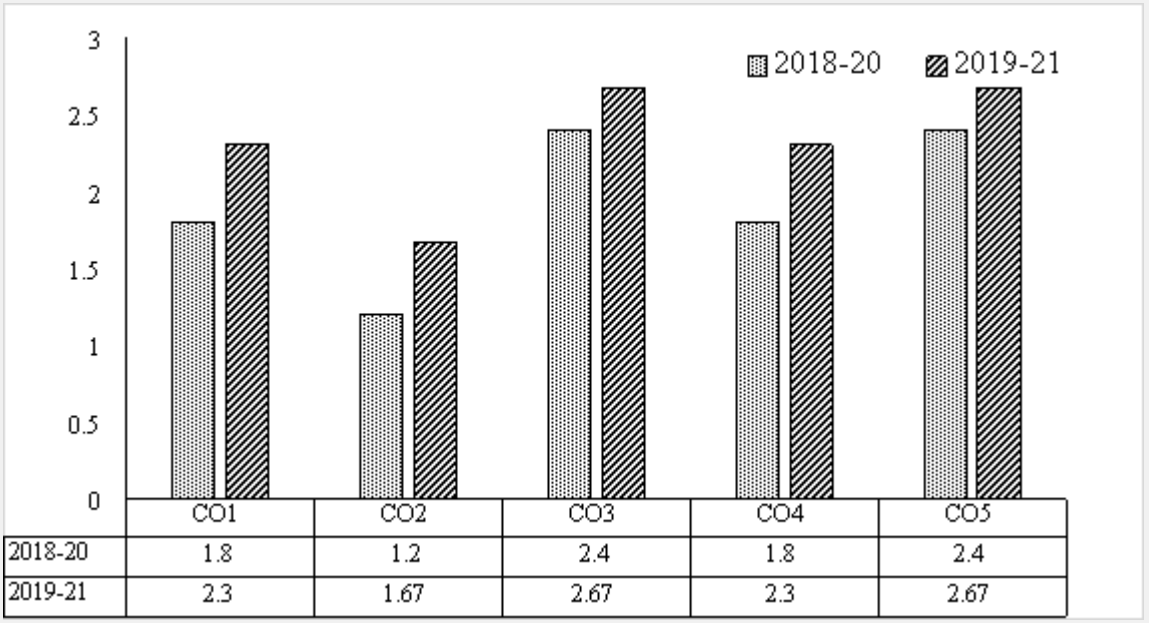
The majority of the courses and their COs mapping with the PO1 are in the medium level.

POs	**Target Level**	**Attainment Level**	**Observations for the Batch 2018 – 20.**
PO2	2.25	1.93	***CIV18R5105 – Advance Concrete Design*** It is a post graduate Core course, intended to provide necessary knowledge to establish reinforced concrete beams &slabs. It has deliberated outcome on the physical and mechanical properties of concrete influence design methods and construction process. The attainment for the courses are not meet out due to 1. Students have lagging in understanding the concepts of beams and Columns. 2. Students have lack of practice in the design procedures.
			CIV18R5110 – Design of Steel Concrete Composite Structures It is a post graduate Elective course, aimed to provide necessary knowledge of steel concrete composite. It has deliberated outcome to design the beams and composite trusses. The attainment for the courses are not meet out due to 1. Aspirants felt lagging on identifying he problem and design of composite members. 2. Students are inefficient to find suitable problem-solving method for the connections.
			CIV18R5104 – Advanced Steel Structures It is a post graduate core course, aimed to provide systematic and simple solutions forhow to design compression and tension members of a steel truss girder bridgesThe attainment for the courses are not meet out due to 1. Students felt confusion in the analysis of steel structures 2. Students have lagged the basic concepts of shear forces and bending moments in beams and columns of building

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

2. CIV18R5105 – Advanced Concrete Design

Action Taken	*COs*
Additional classes to be conducted beyond the regular hours for adequate practice	CO1
Video lectures to be used in explain the concepts for better understanding	CO2
More design problems to be given to practice the procedure.	CO3 & CO4



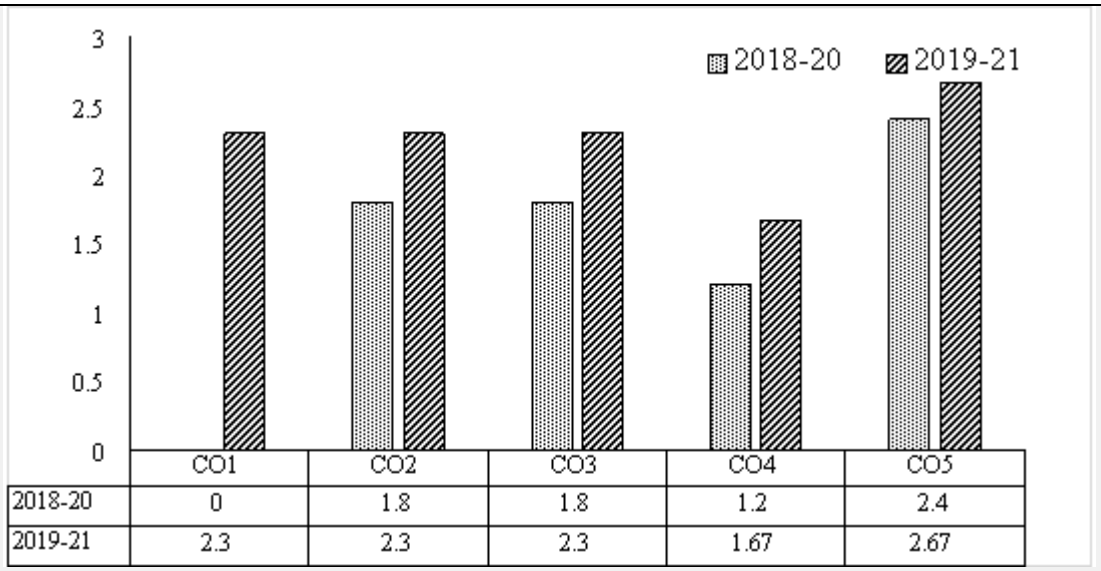
	CO1	CO2	CO3	CO4	CO5
2018-20	1.8	1.2	2.4	1.8	2.4
2019-21	2.3	1.67	2.67	2.3	2.67

Course Attainment for the course CIV18R5105 – Advance Concrete Design for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO1, CO3 and CO4) have been improved a lot for the course on Advance Concrete Design. Still the CO3 requires still more concentration on data interpretation and evaluation pattern.

2. CIV18R5110 – Design of Steel Concrete Composite Structures

Action Taken	*COs*
More problems to be given to practice the procedures that involved in design of steel.	CO1
Students were encouraged to do mini project in design and analysis of steel structures with the help of software tool.	CO2 & CO3
Case study report has to be discussed and making them to submit report along with all check and requirements.	CO4



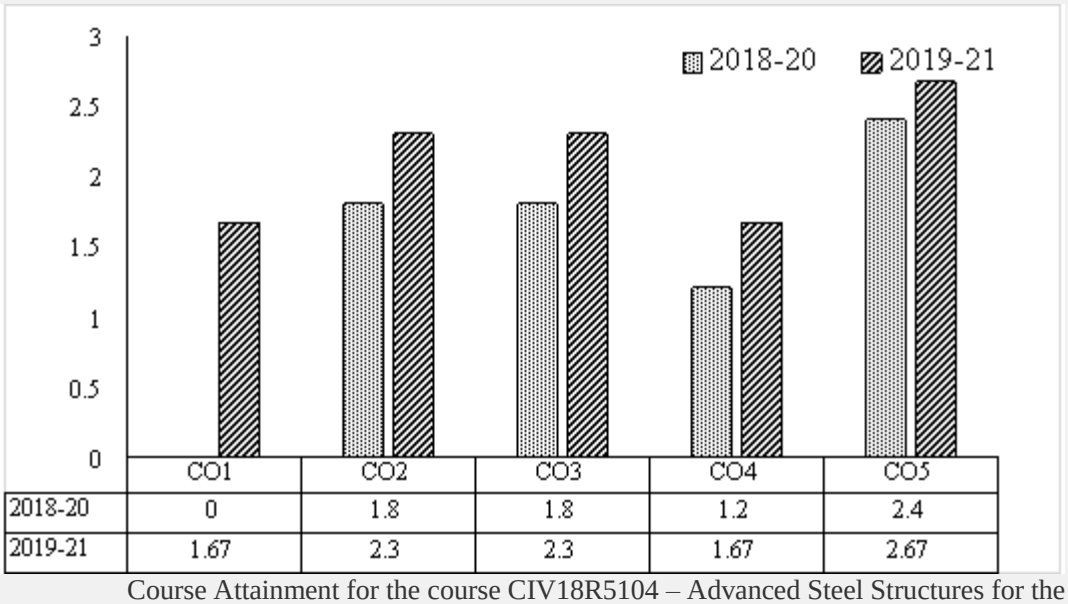
	CO1	CO2	CO3	CO4	CO5
2018-20	0	1.8	1.8	1.2	2.4
2019-21	2.3	2.3	2.3	1.67	2.67

Course Attainment for the course CIV18R5110 – Design of Steel Concrete Composite Structures for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO2, CO3 are in the marginal improvement for the course on Design of Steel Concrete Composite Structures. CO1 requires still more concentration on arriving the equation. CO4 increases in good from 1.2 to 1.67.

3. CIV18R5104 – Advanced Steel Structures

Action Taken	***COs***
Students were encouraged to participate in various seminars and workshops organized in and outside of the campus related steel structures	CO1
Bridge course conducted to impart the basic concepts in steel and design.	CO2 and CO4
Additional classes will be conducted beyond the regular hours to get more practice on the computing procedures	CO5



	CO1	CO2	CO3	CO4	CO5
2018-20	0	1.8	1.8	1.2	2.4
2019-21	1.67	2.3	2.3	1.67	2.67

Course Attainment for the course CIV18R5104 – Advanced Steel Structures for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO1, CO2 and CO3 are in the marginal improvement for the course on Advanced Steel Structures. CO3 and CO4 increased tremendously.

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	CIV18R5101 – Advanced concrete technology	2	2	3	2	1
2	CIV18R5114 – Industrial Structures	2	3	1	2	3
3	CIV18R6199 – Project Work – Phase II	2	3	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.

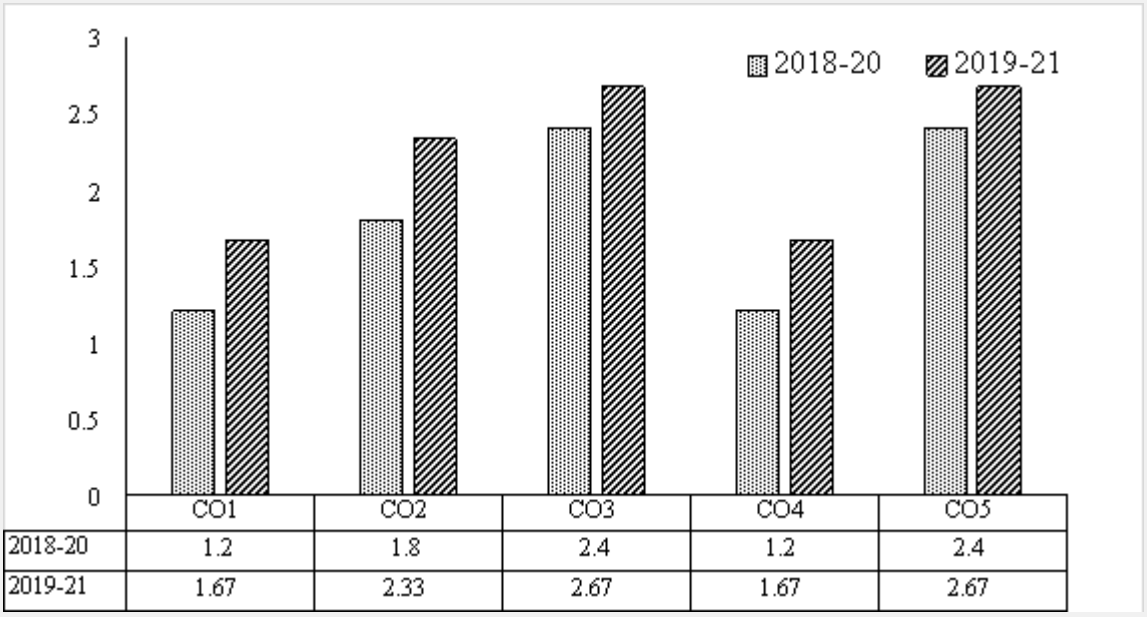
POs	**Target Level**	**Attainment Level**	**Observations for the Batch 2018 – 20.**
PO3	2.25	1.86	***CIV18R5101 – Advanced Concrete Technology*** It is a post graduate core course, covering the properties and various testing methods of fresh and hardened concrete. The course also encompass on the various methods of concrete mix and different types of special concrete with its practical applications. The attainment for the courses are not meet out due to following reasons 3. The students find difficulty in understanding the advanced testing techniques in concrete 4. The Students are incompetentto design the concrete mixes with European and American standards. 5. The students struggle with the appropriate applications with different types of special concrete.
			CIV18R5114 – Industrial Structures It is a post graduate elective course, intended to comprehend the design of various industrial, power plant and transmission structures. The course also provides details on the design on the auxiliary structures such as chimneys, bunkers, silos etc. The attainment for the courses are not meet out due to following reasons 1. The students find difficulty in design of advanced structures such as Gantry Girders, power plant structures etc. 2. The students lack the basic concepts such as shear force, bending moment etc. involved in the design of the complex industrial structures. 3. Lack of practice in solving the complex problems.
			CIV18R6199 – Project work Phase II It is a post graduate mandatory course, aimed at providing the utilization of skillset learned in their curriculum in real time application. The course was also aimed in providing independent

			thinking ability and involvement of the students in execution of the research project works, preparation of project books, publication of research works etc. The attainment for the courses are not meet out due to following reasons 1. The students find difficulty in writing project book, presentation of their work to defend their research work. 2. The students also lag in writing research papers to publish their works in reputed journals.

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

3. CIV18R5101 – Advanced Concrete Technology

Action Taken	*COs*
The students were taken to laboratory to demonstrate the functional mechanism involved in the various testing methods of fresh and hardened concrete	2
Numerous tutorial and practice problems were given to the students to ensure the proper mix design by European and American standards.	3
Additional classes to be conducted beyond the regular hours for adequate practice	5



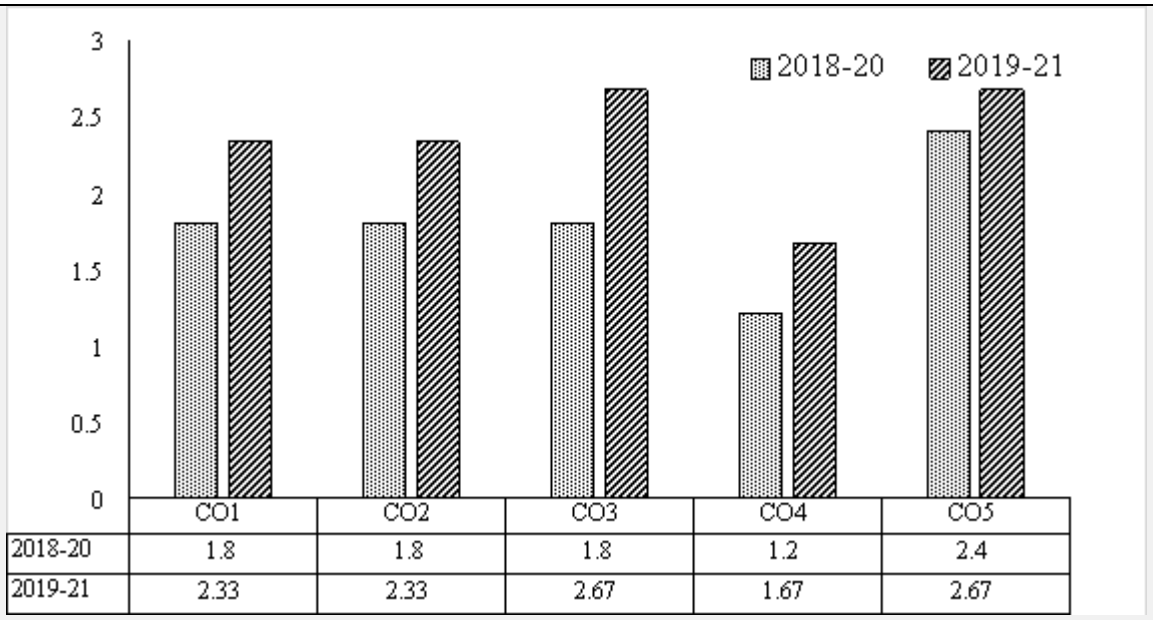
	CO1	CO2	CO3	CO4	CO5
2018-20	1.2	1.8	2.4	1.2	2.4
2019-21	1.67	2.33	2.67	1.67	2.67

Course Attainment for the course CIV18R5101 – Advanced Concrete Technology for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments (CO2, CO3 and CO5) have been improved a lot for the course on Advanced Concrete Technology. Still the CO1and CO4 requires still more concentration on data interpretation and evaluation pattern.

2. CIV8R5114 – Industrial Structures

Action Taken	*COs*
Numerous problems were taught in the design of complex structures such as Gantry girders, power plant structures etc.	2
The students were taught with a bridge course on the basic concepts of shear force, bending moment, deflection etc. for different support conditions.	1
Numerous tutorial, practice and assignment problems were given in the design of complex industrial structures	3



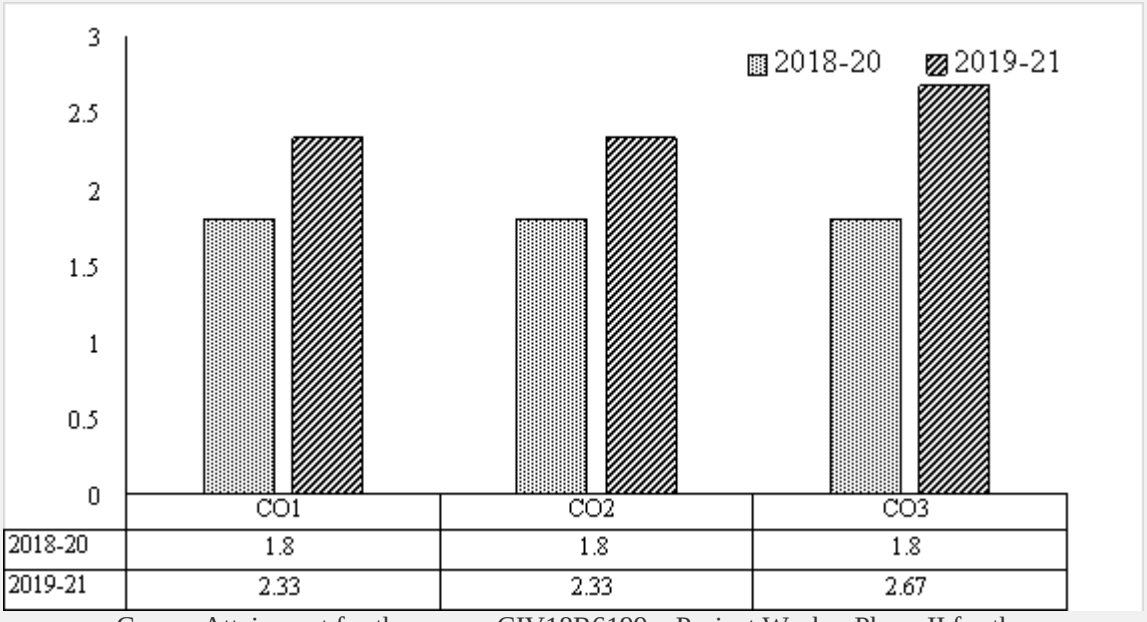
	CO1	CO2	CO3	CO4	CO5
2018-20	1.8	1.8	1.8	1.2	2.4
2019-21	2.33	2.33	2.67	1.67	2.67

Course Attainment for the course CIV18R5114 – Industrial Structures for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO4 are in the marginal improvement for the course on Industrial structures. CO4 requires still more concentration on arriving the equation.

3. CIV18R6199 – Project Work – Phase II

Action Taken	***COs***
Conduct bridge course on project book writing, preparation of power point presentation.	1
Conduct bridge course on converting the project work in the form of the research papers to publish in reputed journals	3

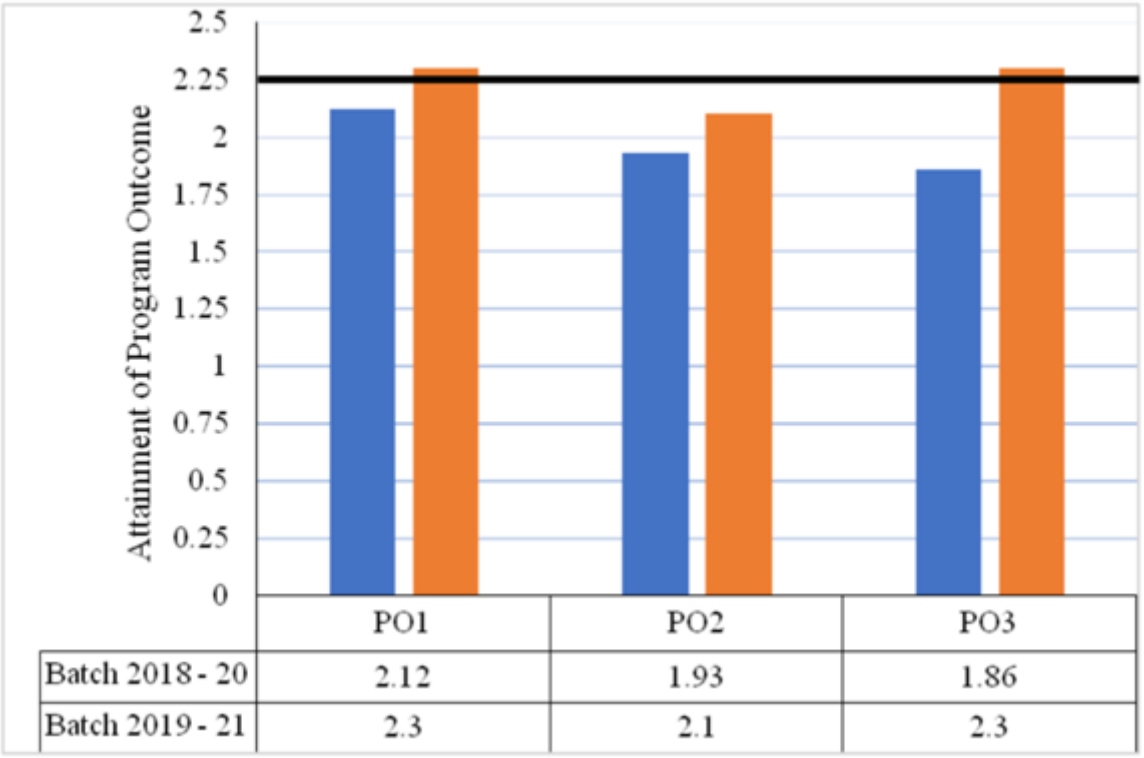


	CO1	CO2	CO3
2018-20	1.8	1.8	1.8
2019-21	2.33	2.33	2.67

Course Attainment for the course CIV18R6199 – Project Work – Phase II for the batch 2018 – 20 and 2019 – 21.

From the action taken, the CO attainments CO1and CO3 are in the marginal improvement for the course on project work – phase II. CO3 has increased from 1.8 to 2.67.

PO attainment (Target level 2.25)

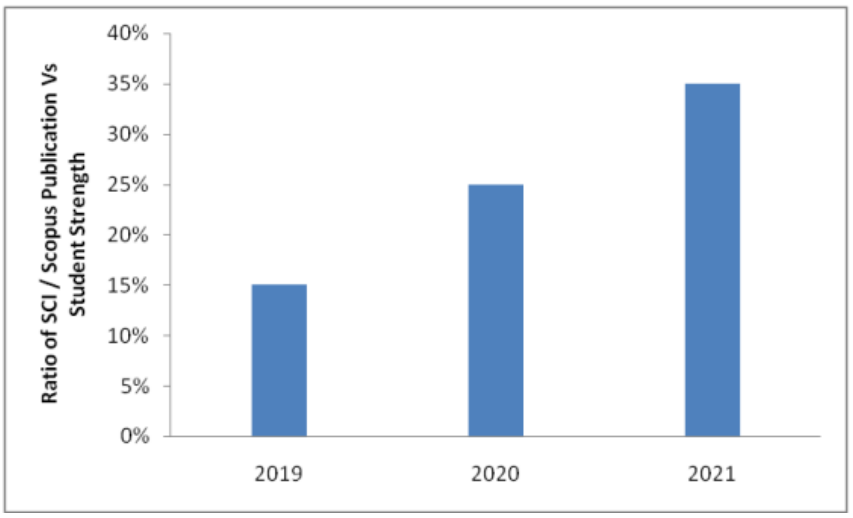


	PO1	PO2	PO3
Batch 2018 - 20	2.12	1.93	1.86
Batch 2019 - 21	2.3	2.1	2.3

The above figure shows the comparison of PO attainment for the batch of students 2018-20 and 2019-21. From the figure it was clearly observed that the significant improvement in the PO attainment due to the implementation of the action plans carried out in an effective manner.

1. Improvement in Quality of Projects (10)

Project quality has been improved year wise which is reflected by the increase in the publication count of the students over the years. Figure shows the improvement of quality publications (SCI / Scopus) of students over the last three years.



2. Improvement in Placement, Higher Studies and Entrepreneurship (10)

Assessment is based on improvement in:

- *Placement: number, quality placement, core industry, pay packages etc.*
- *Higher studies: admissions for pursuing Ph. D in premier institutions*
- *Entrepreneurs*

A. Improvement in placement

The department of Civil engineering in KARE take necessary corrective measures to improve the placement of students doing the SE Program. Structural 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 colloborate with them for internship arranged followed by placement.
- To assimilate the moto of SE 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

B. Improvement in higher studies

- Structural 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 industry expert to join for PhD program even though at the moment no student undergone the same.

C. Entrepreneurship

- Structural Engineering strives towards training the students to become an entrepreneur. At present in every batch passed out students 10% to 20% percentage turnout to be an entrepreneur

- The students of SE 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

Item	CAY*m*1 21-22	CAY*m*2 19-20	CAYm3 18-19
Total no. of final year students (N)	5	9	5
No. of students placed in companies or Government Sector (x)	5	5	3
No. of students pursuing Ph.D. / JRF/ SRF(y)			
No. of students turned entrepreneur in engineering/technology (z)		2	-
x + y + z =	5	7	3
Placement Index: (x + y + z)/N	1	0.77	0.6
Average placement= (P1 + P2 + P3)/3	0.792		
Assessment Points = 20 × average placement	15.84		

3. Improvement in the quality of students admitted to the program (10)

Assessment is based on improvement in terms of ranks/score in GATE examination

Table represents the intake and the admitted strength of the M.Tech Structural 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

I. Students having eligible GATE score

Step 1.

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

Step2.

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

Step 3.

After verifying the eligibility criteria of GATE Score card, and based on the merit of the students, they can be called 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. Structural 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 informed to participate in the counseling process.

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 21-22**	**CAY*m*1 20-21**	**CAY*m*2 (LYG) 19-20**	**CAYm3 (LYGm1) 18-19**	**CAYm4 (LYGm2) 17-18**
Sanctioned intake of the program (*N*)	12	12	12	12	12
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)*	6	5	9	5	2
Total number of students admitted in the Program (*N*1 + *N*2)	6	5	9	5	2

4. Improvement in quality of paper publication (10)

Year	No. of papers published
2017	13
2018	27
2019	24
2020	37
2021	67
2022	27

Year 2022:

1. **Meyyappan PL**, K. Ravi Tejaswar, K. Omkarnath, Venkata Naveen Kumar, P. Venkatakrishna (2022), Arriving Factors in the Conceptual Design Framework of 3D Printing Techniques for Building Construction, Proceedings of International Conference on Innovative Technologies for Clean and Sustainable Development (ICITCSD – 2021). Springer, Cham. https://doi.org/10.1007/978-3-030-93936-6_25
2. **Meyyappan PL**, Krishnan Kumar R, Framaing Conceptual Design of Adopting Interlocking Bricks Technology in Construction (2022), Proceedings of International Conference on Innovative Technologies for Clean and Sustainable Development (ICITCSD – 2021). Springer, Cham. https://doi.org/10.1007/978-3-030-93936-6_24
3. **Meyyappan Palaniappan** (2022), An Optimal Utilization of Waste Materials in Concrete to Enhance the Strength Property: An Experimental Approach and Possibility of 3D Printing Technology, Springer Tracts in Additive Manufacturing Book Series, Volume 1, 315-321.

4. **Meyyappan**, Rajha Poorna (2022), A Prototypical Design Strategy for Soil-Cement Construction, for Indian Condition, Springer Lecture Notes in Mechanical Engineering, 349-357.
5. **Meyyappan**, Ravi Tejaswar Reddy (2022), Effect of GGBS and Burnt Paper Based Solid Wastes Ash in Making Sustainable Paver Blocks: An Experimental and Model Study, Springer Lecture Notes in Mechanical Engineering, 341-348.
6. Karthigai Priya Pandiaraj, Vanitha Sankarajan, **Meyyappan Palaniappan** (2022), Utilization of compost and GGBS in the manufacturing of light-weight concrete — characteristics and mechanical properties, Environmental and Pollution Research, Volume 29, 38026-38037.

7. **Muthukannan M** and Ance Mathew Development of a Methodology to Optimize the Formulation of Concrete to Immediate Release from the Mold (2022) AIP Conference. Proceeding. 2463, 020022-1–020022-13; https://doi.org/10.1063/5.0080407.

8. L. Balaji, **M. Muthukannan** and R. Kanniga Devi , A GIS-Based Study of Air and Water Quality Trends in Madurai City, India , Nature Environment and Pollution Technology e-ISSN: 2395-3454 Volume 21 No 1 PP 21-32 (2022)

9. K.Arunkumar, **M.Muthukannan**, A.Sureshkumar ,A.Chithambarganesh and ,R.Kannigadevi Cleaner Environment Approach by the Utilization of Low Calcium Wood Ash in Geopolymer Concrete , Applied Science and Engineering Progress, Vol. 15, No. 1, 2022, 5165.

10. K.Arunkumar , **M.Muthukannan** , A.Sureshkumar, A.Chithambarganesh and R.Kanniga Devi ,Hybrid fibre reinforced eco-friendly geopolymer concrete made with waste wood ash A mechanical characterization study Engineering and Applied Science Research 2022;49(2):235-247.

11. Suresh Kumar A, **Muthukannan M**, Irene A.D.K.B, Arunkumar K and Chithambar Ganesh A. Flexural Behaviour of Reinforced Geopolymer Concrete incorporated with Hazardous Heavy Metal Waste Ash and Glass Powder, Materials Science Forum, ISSN: 1662-9752, Vol. 1048, pp 345-358.

12. **M. Muthukannan,** A. Suresh Kumar, M. Vignesh Kumar2,M.Rajesh and K. Arunkumar Influence of partial replacement of fine aggregate by copper slag on the durability properties of self-compacting concrete AIP Conference Proceedings 2463, 020024 (2022); https://doi.org/10.1063/5.0080204

13. Arunachalam Suresh Kumar, **Muthiah Muthukannan**, Kadarkarai Arunkumar , Arunasankar Chithambar Ganesh and Rangaswamy Kanniga Devi Utilisation of waste glass powder to improve the performance of hazardous incinerated biomedical waste ash geopolymer concrete Innovative Infrastructure Solutions (2022) 7:93 https://doi.org/10.1007/s41062-021-00694-8.

14. Suresh Kumar A, **Muthukannan M**, Arun Kumar K, Chithambar Ganesh Aaand Kanniga Devi Rc Influence of incinerated biomedical waste ash and waste glass powder

on the mechanical and flexural properties of reinforced geopolymer concrete AUSTRALIAN JOURNAL OF STRUCTURAL ENGINEERING https://doi.org/10.1080/13287982.2022.2044613.

15. Baranitharan, B., **Sivapragasam, C.**, Rajesh, K. Identification of appropriate statistical distribution for the assessment of energy requirement of Eastern states of India AIP Conference Proceedings, 2022, 2463, 020029.

16. **Sivapragasam, C.**, Saravanan, P., Balamurali, S. Estimation of climate change impact on the flood of Kickapoo River at La Farge AIP Conference Proceedings 2022, 2463, 020026.

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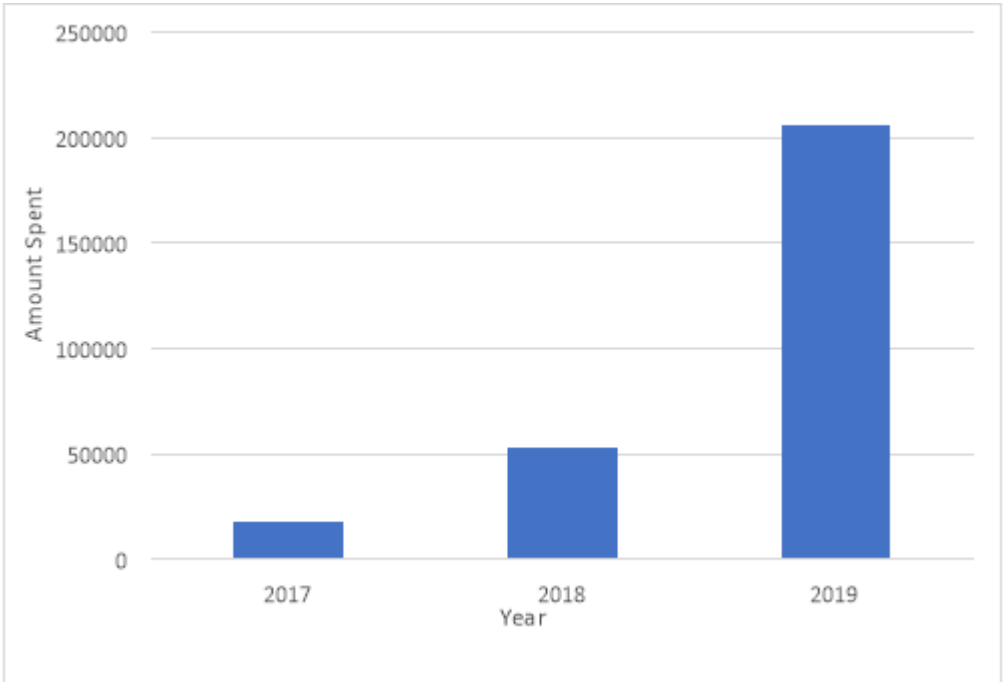
28. Improvement in laboratories (10)

S.No	Equipment Name	Make and Model, Supplier	Value (Rs.)	Date of Purchase
1	Accelerated curing tank	GS Scientific company, Madurai	2,05964	04.12.2019
2	Hot air Oven	GS Scientific company, Madurai	53,100	29.09.2018
3	Blaine's Air Permeability	Lawrence& mayo	3910	07.02.2017

		pvt.ltd		
4	Spring Testing Machine	Precision Scientific Equipment Corporation New Delhi-28	13,750	25.03.2017
5	Ultra Sonic Pulse Velocity Tester	Ganapathy Scientific Equipment	2,18,977	04.04.2016
6	Rebound Hammer Tester	Lawrence& mayo pvt.ltd	1700	16.04.2016
7	Concrete Mixer	Ganapathy Scientific Equipment	139000	16.04.2016
8	Rapid Chloride Permeability Apparatus	Ganapathy Scientific Equipment	178000	16.04.2016
9	Loading Frame 50 Ton	Lawrence& mayo pvt.ltd	446250	16.04.2016
10	Loading Frame 50 Ton	Lawrence& mayo pvt.ltd	446250	16.04.2016
11	Rapid Moisture Tester	Lawrence& mayo pvt.ltd	8800	26.09.2016


250000
200000
150000
100000
50000
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Amount Spent
2017
2018
2019
Year